Evaluation of the TEN-E Regulation and Assessing the Impacts of Alternative Policy Scenarios

Final Report

Trinomics

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Executive Summary

The Trans-European Energy Networks (TEN-E) Regulation[1] identifies priority corridors and thematic areas of trans-European energy infrastructure and provides guidelines for the selection of Projects of Common Interest (PCIs). The TEN-E Regulation establishes that PCIs can benefit from financial support from the Connecting Europe Facility (CEF), streamlined permitting, specific regulatory treatment providing access to cross-border cost-allocation mechanisms and incentives, and increased transparency. The main objective of the TEN-E Regulation is the development and interoperability of trans-European energy networks and connection to such networks. The specific objectives are to:

- Identify PCIs.
- Facilitate the timely implementation of PCIs by addressing permitting procedures and public participation.
- Guide the cross-border allocation of costs and specific risks-related incentives for PCIs.
- Determine the eligibility criteria for EU financial assistance (particularly the CEF).

The main objective of this assignment was to provide an independent evaluation of the TEN-E Regulation and PCI framework. It aimed to assess whether the framework for the implementation of PCIs is adequate and to what extent the TEN-E Regulation is delivering on its objectives. The evaluation is based on the assessment criteria and evaluation questions listed in the Terms of Reference (ToR) and the evaluation matrix (Annex). The study also contributes to identifying inadequacies or barriers and subsequently proposing and evaluating possible options to adapt provisions or processes in order to enhance the effectiveness of the regulation.

Several methods have been used to answer the evaluation questions. These include literature review, data analysis, a targeted survey, a public consultation, three workshops, and interviews. The targeted survey sample consisted of 115 submissions from project promoters, competent authorities, regulators and other relevant stakeholders who completed very detailed questions. The public consultation sample consisted of 36 respondents, comprising associations or companies as well as private individuals, public authorities and international organisations. The workshops were topic oriented and focused on key aspects of the Regulation; namely, the regulatory provisions, network planning, and permitting and public acceptance. Finally, 32 experts have been interviewed with at least two representatives of each relevant category of stakeholders: regulators, electricity TSOs, gas TSOs, and energy sector associations. The interviews allowed us to validate findings and fill in information gaps as required.

The assignment found that the TEN-E regulation, compared to the situation in 2013, has garnered higher **relevance** in relation to electricity interconnectivity. Gas and CO_2 (transport) infrastructure are still relevant within the TEN-E regulation to some degree, whilst the promotion of oil infrastructure investments is regarded by stakeholders as less relevant compared to 2013. Looking into the future, it is apparent that electricity interconnectivity between MSs needs to intensify to reach the 15% interconnection target for 2030. Continued promotion of this will allow energy and economic efficiency gains, higher system flexibility and competition, whilst also increasing the security of supply within the energy system. In addition, expansion of transmission capabilities (including interconnectors) will facilitate RES integration within the energy system. However the approach to implementing the

[1] Regulation 347/2013 on guidelines for trans-European energy infrastructure

interconnection target should be tailored at MS or regional level to properly take into account economic and technical variabilities amongst MSs.

In relation to the **efficiency** of the TEN-E regulation, stakeholders mentioned that the PCI selection method should be adjusted to consider all relevant dimensions to enable efficient solutions. Administrative costs related to PCI selection, implementation and monitoring were noted to be high, which can negatively affect the realisation of trans-European energy infrastructure, although this has been somewhat alleviated by applying a common (and improved) European CBA methodology. Making concrete conclusions on the cost-efficiency of the application and implementation of PCIs was not possible due to limited information as well as significant variance of cost estimates between MSs and stakeholders. However, there is no evidence to assume that alternative frameworks could have provided the same results at a lower cost.

The regulation shows in general **coherence** with other EU policies, although some stakeholders mentioned that further alignment is required between cost allocation principles, CEF funding and interconnection targets to ensure consistency. Regarding PCI contribution to climate objectives, further transparency and awareness could be facilitated by a more cohesive approach to quantify climate impacts of oil and gas PCIs.

Regarding **EU added value**, the TEN-E regulation was found to offer benefits beyond those that could be expected from MS level actions only, although benefits vary between MSs. However, further work needs to be done to engage the public in infrastructural planning and development, to simplify procedures to reduce administrative burdens and to ensure higher consistency between the procedures for PCI and non-PCI infrastructure investments.

Regarding **effectiveness** of TEN-E, this assignment highlighted that the regulation positively contributes to reaching the 2020 climate and energy targets, whilst disseminating awareness of the needs for network reinforcements and increased interconnections. TEN-E can be seen as an effective instrument in promoting infrastructure developments. Further implementation of the TEN-E will assist MSs to reach the 2020 and 2030 RES targets as well as the low carbon economy by 2050 target, although national legal and regulatory frameworks will be required to be harmonised to facilitate energy infrastructure investments and further system and market integration. Similarly, harmonisation or alignment between legal and regulatory frameworks of the Energy Community, EuroMed and TEN-E would be beneficial to facilitate the realisation of economically feasible interconnectors between the EU and neighbouring regions. To gather constructive participation of the public in energy infrastructure planning and building, public consultations can be further improved to properly mitigate public opposition to such projects. Most project promoters and other stakeholders interviewed did not refer to specific difficulties in applying for regulatory incentives and confirmed that CEF funding allowed access to PCIs that are in most need of funding.

According to the assessment, the Regulation has a number of strengths. The Regulation has improved the planning of trans-European energy infrastructure and accelerated the selection and realisation of PCIs. Further, it has for instance revolutionised network planning and investment projects' selection via its regional approach which is a necessary step towards European level planning. It offers national competent authorities and regulators, as well as project developers, useful guidance, a common legal basis and adequate instruments for identifying priority needs for trans-European energy infrastructure

and for accelerating the implementation of selected projects. It facilitates coordination and cooperation amongst Member States for cross-border projects (by providing the same framework, including definitions and timeframes), particularly in the context of permitting, cost-benefit analyses, cost allocation and financing. For example, the harmonised methodology for energy system-wide cost-benefits analyses is welcomed by most stakeholders and is considered a very useful provision in the Regulation.

The Regulation also provides an effective EU legal framework for regional network planning and investment projects' selection via regional groups and adequate monitoring at EU level. This allows selection of the most appropriate infrastructure projects from a European macro-economic perspective. The Regulation also offers access to financing instruments for projects which present an overall net social benefit at EU level, but whose financing by the hosting countries is problematic due to asymmetric costs/benefits and/or their high impact on national system tariffs. Reallocation of costs amongst concerned countries via the cost border cost allocation (CBCA) regulatory tool and/or access to CEF co-funding or in exceptional cases through the provision of specific incentives, are useful instruments to address these problems.

However, the Regulation also has some weaknesses. The permitting procedures remain complex, difficult and lengthy. These specific PCI procedures do not properly take account of existing national permitting procedures and lead in some cases to inconsistencies and duplications. The priority corridors and areas as well as the eligibility criteria seem no longer follow the evolution of the energy system and the 'new' policy priorities. In particular the need for supporting oil and gas transmission projects may merit a revision in the context of the long-term decarbonisation pathway. The CBA methodology does not capture and quantify all projects' costs and benefits adequately. CBCA decisions are not being used as intended, but rather as a stepping stone towards CEF access.

On the basis of the different studies and reports that we reviewed, the stakeholders' feedback and our own insights, we can conclude that the TEN-E Regulation is overall a positive initiative which has effectively improved and accelerated the selection and realisation of trans-European energy infrastructure projects. Further, we believe that there is no evidence that a revision of the Regulation is necessary at this stage. However, if an update of certain aspects (e.g. the list of priority corridors and areas, as well as the eligibility criteria) would be opted for, the most appropriate instrument should be chosen, in order to have a more flexible and future-proof approach. Moreover, certain elements can be improved by better implementation of the current Regulation at national level and additional guidance at EU level. The report concludes with suggestions which could be further assessed in order to mitigate the weaknesses and reinforce the positive impacts of the EU Regulation:

- Updating the list of priority corridors and the eligibility criteria (if a revision of the Regulation would be opted for). Flexible non-binding guidelines, which are not a formal part of the Regulation, could be a suitable instrument to be considered.
- Setting up structural cooperation between the European Network of Transmission System Operators (ENTSOs) for a more holistic approach and enhanced consistency between the Ten Year National Development Plans (TYNDPs) and the Projects of Common Interest (PCI) selection in the two vectors, with stricter oversight by ACER and/or the EC, in particular with regard to the scenarios and assumptions choices for network planning. A consistent and interlinked electricity and gas market and network model should be developed and effectively implemented.

- Improving and harmonising the CBA methodology for electricity and gas to consistently capture and quantify all projects' costs and benefits, including their impact on the environment and security of supply (at project level), and to offer an adequate basis for CBCA decisions.
- Increasing flexibility in the permitting provisions e.g. via best-practice sharing or non-binding guidelines or through legally binding acts such as delegated acts.
- Simplifying procedures to lower the administrative burden for project developers and authorities, e.g. renewal of PCI-label and reporting on progress by PCI promoters.

Résumé

Le règlement portant sur les réseaux transeuropéens de l'énergie (RTE-E) identifie les corridors prioritaires et les domaines thématiques des infrastructures énergétiques transeuropéennes et fournit des lignes directrices pour la sélection des projets d'intérêt commun (PIC). Le règlement RTE-E établit que les PIC peuvent bénéficier du soutien financier du mécanisme pour l'interconnexion en Europe, d'une autorisation simplifiée, d'un traitement réglementaire spécifique donnant accès aux mécanismes et incitations transfrontalières d'allocation des coûts et d'une transparence accrue. L'objectif principal du règlement RTE-E est le développement et l'interopérabilité des réseaux énergétiques transeuropéens et la connexion à ces réseaux. Les objectifs spécifiques sont:

• Identifier les PIC.
• Faciliter la mise en œuvre des PIC le plus vite possible en abordant les procédures d'autorisation et la participation du public.
• Guider l'allocation transfrontalière des coûts et les incitations spécifiques liées aux risques pour les PIC.
• Déterminer les critères d'éligibilité pour l'aide financière de l'UE (en particulier le mécanisme pour l'interconnexion en Europe (MIE)).

L'objectif principal était de fournir une évaluation indépendante de la réglementation RTE-E et du cadre PIC. Il visait à évaluer si le cadre de mise en œuvre des PIC est adéquat et dans quelle mesure le règlement RTE-E atteint ses objectifs. L'évaluation est basée sur les critères d'évaluation et les questions d'évaluation énumérés dans les Termes de Référence (TdR) et la matrice d'estimation (Annexe). L'étude contribue également à identifier les insuffisances ou les obstacles et à proposer et évaluer par la suite les options possibles pour adapter les dispositions ou les processus afin d'améliorer l'efficacité de la réglementation.

Plusieurs méthodes ont été utilisées pour répondre aux questions d'évaluation. Ceux-ci comprennent la revue de la littérature, l'analyse des données, un sondage ciblé, une consultation publique, trois workshops et des entretiens. L'échantillon de l'enquête ciblée comprenait 115 soumissions émanant de promoteurs de projets, d'autorités compétentes, de régulateurs et d'autres parties prenantes concernées qui ont répondu à des questions très détaillées. L'échantillon de la consultation publique était composé de 36 répondants, comprenant des associations ou des entreprises ainsi que des particuliers, des autorités publiques et des organisations internationales. Les workshops étaient axés sur des sujets et axés sur les principaux aspects du règlement; à savoir, les dispositions réglementaires, la planification du réseau, l'obtention de permis et l'acceptation par le public. Enfin, 32 experts ont été

interrogés avec au moins deux représentants de chaque catégorie d'acteurs concernés: les régulateurs, les opérateur de système de transmission (OST) électriques, les OST de gaz et les associations du secteur de l'énergie. Les entretiens nous ont permis de valider les résultats et de combler les lacunes d'information au besoin.

L'étude a constaté que le règlement RTE-E, comparé à la situation de 2013, a acquis une plus grande **pertinence** en ce qui concerne l'interconnexion électrique. Les infrastructures de (transport de) gaz et CO2 restent dans une certaine mesure pertinentes dans le règlement RTE-E, tandis que la promotion des investissements dans les infrastructures pétrolières est considérée par les parties prenantes comme moins pertinente qu'en 2013. Si l'on se tourne vers l'avenir, Les États membres doivent intensifier leurs efforts pour atteindre l'objectif de 15% d'interconnexion pour 2030. La poursuite de cette promotion permettra des gains d'efficacité énergétique et économique, une plus grande flexibilité et concurrence du système, tout en renforçant la sécurité de l'approvisionnement énergétique. En outre, l'expansion des capacités de transmission (y compris les interconnexions) facilitera l'intégration des sources d'énergie renouvelables dans le système énergétique. Cependant, l'approche de la mise en œuvre de l'objectif d'interconnexion devrait être adaptée au niveau des États membres ou au niveau régional afin de prendre correctement en compte les variabilités économiques et techniques parmi les États membres.

En ce qui concerne **l'efficacité** de la réglementation RTE-E, les parties prenantes ont mentionné que la méthode de sélection PIC devrait être ajustée pour prendre en compte toutes les dimensions pertinentes afin de permettre de trouver des solutions efficaces. Les coûts administratifs liés à la sélection, à la mise en œuvre et au suivi des PIC ont été jugés élevés, ce qui peut nuire à la réalisation des infrastructures énergétiques transeuropéennes, bien que cela ait été quelque peu atténué par l'application d'une méthodologie européenne commune. Il n'a pas été possible de tirer des conclusions concrètes sur le rapport coût-efficacité de l'application et de la mise en œuvre des PIC en raison des informations limitées et des écarts importants entre les estimations de coûts entre les États membres et les parties prenantes. Cependant, rien ne permet de supposer que d'autres cadres auraient pu fournir les mêmes résultats à moindre coût.

Le règlement montre une **cohérence** générale avec les autres politiques de l'UE, bien que certaines parties prenantes aient mentionné qu'un alignement supplémentaire est nécessaire entre les principes d'allocation des coûts, le financement du Mécanisme pour l'interconnexion en Europe (MIE) et les objectifs d'interconnexion pour assurer la cohérence. En ce qui concerne la contribution du PIC aux objectifs climatiques, une plus grande transparence et une plus grande sensibilisation pourraient être facilitées par une approche plus cohérente de la quantification des impacts climatiques des PIC du pétrole et du gaz.

En ce qui concerne **la valeur ajoutée** de l'UE, il a été constaté que la réglementation RTE-E offrait des avantages allant au-delà de ce que l'on pouvait attendre des actions au niveau des États membres, bien que les avantages varient entre les eux. Cependant, des efforts supplémentaires doivent être faits pour impliquer le public dans la planification et le développement des infrastructures, pour simplifier les procédures afin de réduire les charges administratives et pour assurer une plus grande cohérence entre les procédures pour les investissements PIC et non-PIC.

En ce qui concerne l'**effectivité** du RTE-E, cette etude a souligné que le règlement contribue positivement à atteindre les objectifs climatiques et énergétiques de 2020, tout en sensibilisant aux besoins de renforcement des réseaux et d'interconnexion accrue. Le RTE-E peut être considéré comme un instrument effectif pour promouvoir les développements d'infrastructures. La poursuite de la mise en œuvre du RTE-E aidera les États Membres à atteindre les objectifs de 2020 et 2030, ainsi qu'une économie à faible intensité de carbone d'ici 2050, mais les cadres juridiques et réglementaires nationaux devront être harmonisés pour faciliter les investissements dans les infrastructures énergétiques et l'intégration du marché. De même, l'harmonisation ou l'alignement entre les cadres juridiques et réglementaires de la Communauté de l'énergie, EuroMed et RTE-E serait bénéfique pour faciliter la réalisation d'interconnexions économiquement viables entre l'UE et les régions voisines. Pour obtenir une participation constructive du public à la planification et à la construction d'infrastructures énergétiques, les consultations publiques peuvent être encore améliorées pour atténuer l'opposition du public à tels projets. La plupart des promoteurs de projets et des autres parties prenantes interrogées n'ont pas mentionné les difficultés spécifiques liées à la demande d'incitations réglementaires et ont confirmé que le financement du Mécanisme pour l'interconnexion en Europe (MIE) permettait d'accéder aux PIC les plus nécessiteuses.

Selon l'évaluation, le règlement présente un certain nombre de points forts. Le règlement a amélioré la planification des infrastructures énergétiques transeuropéennes et accéléré la sélection et la réalisation des investissements productifs d'énergie. En outre, il a par exemple révolutionné la planification des réseaux et la sélection des projets d'investissement grâce à son approche régionale, étape nécessaire vers la planification au niveau Européen. Il offre aux autorités nationales compétentes et aux régulateurs, ainsi qu'aux concepteurs de projets, des orientations utiles, une base juridique commune et des instruments adéquats pour identifier les besoins prioritaires en infrastructures énergétiques transeuropéennes et accélérer la mise en œuvre des projets sélectionnés. Il facilite la coordination et la coopération entre les États membres pour les projets transfrontaliers (en fournissant le même cadre, y compris les définitions et les délais), notamment dans le contexte des autorisations, des analyses coûts-bénéfices, de la répartition des coûts et du financement. Par exemple, la méthodologie harmonisée pour les l'analyse coûts-avantages à l'échelle du système énergétique est bien accueillie par la plupart des parties prenantes et est considérée comme une disposition très utile dans le règlement.

Le règlement fournit également un cadre juridique Européen efficace pour la planification du réseau régional et la sélection des projets d'investissement par l'intermédiaire de groupes régionaux et un suivi adéquat au niveau de l'UE. Cela permet de sélectionner les projets d'infrastructure les plus appropriés dans une perspective macro-économique Européenne. Le règlement donne également accès à des instruments de financement pour des projets présentant un avantage social net global au niveau de l'UE, mais dont le financement par les pays d'accueil est problématique en raison des coûts / avantages asymétriques et / ou de leur incidence sur les tarifs nationaux. La réaffectation des coûts entre les pays concernés via l'outil réglementaire d'allocation des coûts aux transfrontières (ACT) et / ou l'accès au cofinancement du Mécanisme pour l'interconnexion en Europe (MIE) ou, dans des cas exceptionnels, par des incitations spécifiques, sont des instruments utiles pour résoudre ces problèmes.

Cependant, le règlement comporte également certaines faiblesses. Les procédures d'autorisation restent complexes, difficiles et longues. Ces procédures spécifiques de PIC ne prennent pas correctement en compte les procédures d'autorisation nationales existantes et conduisent dans certains

cas à des incohérences et des duplications. Les corridors et zones prioritaires ainsi que les critères d'éligibilité ne semblent plus suivre l'évolution du système énergétique et les «nouvelles» priorités politiques. En particulier, la nécessité de soutenir des projets de transport de pétrole et de gaz pourrait mériter une révision dans le contexte de la voie de la décarbonisation à long terme. La méthodologie de l'ACB ne permet pas de saisir et de quantifier de manière adéquate les coûts et les avantages de tous les projets. Les décisions de l'allocation des coûts aux transfrontières ACT ne sont pas utilisées comme prévu, mais plutôt comme un tremplin vers l'accès au Mécanisme pour l'interconnexion en Europe (MIE).

Sur la base des différentes études et rapports que nous avons examinés, des réactions des parties prenantes et de nos propres idées, nous pouvons conclure que le règlement RTE-E est globalement une initiative positive qui a effectivement amélioré et accéléré la sélection et la réalisation des projets d'infrastructures énergétiques. En outre, nous estimons qu'il n'y a aucune preuve qu'une révision du règlement est nécessaire à ce stade. Cependant, si une mise à jour de certains aspects (par exemple la liste des corridors et domaines prioritaires, ainsi que les critères d'éligibilité) était retenue, l'instrument le plus approprié devrait être choisi, afin d'avoir une approche plus flexible et pérenne. En outre, certains éléments peuvent être améliorés par une meilleure mise en œuvre du règlement actuel au niveau national et des orientations supplémentaires au niveau de l'UE. Le rapport conclut avec des suggestions qui pourraient être évaluées afin d'atténuer les faiblesses et de renforcer les impacts positifs du règlement de l'UE:

- Mise à jour de la liste des corridors prioritaires et des critères d'éligibilité (si une révision du règlement est retenue). Des lignes directrices flexibles et non contraignantes, qui ne font pas officiellement partie du règlement, pourraient constituer un instrument approprié à prendre en considération.

- Mise en place d'une coopération structurelle entre les ENTSOs (le réseau Européen des gestionnaires de réseau de transport d'énergie) pour une approche plus holistique et une meilleure cohérence entre Le plan décennal de développement du réseau (TYNDP) et la sélection PIC dans les deux vecteurs, avec un encadrement plus strict de L'Agence de coopération des régulateurs de l'énergie (ACRE) et/ou de la Communauté Européenne notamment sur les scénarios et hypothèses de choix de planification de réseau. Un modèle de marché et de réseau de l'électricité et du gaz cohérent et interconnecté devrait être développé et mis en œuvre de manière efficace.

- Améliorer et harmoniser la méthodologie ACB pour l'électricité et le gaz afin de capturer et quantifier systématiquement les coûts et les bénéfices de tous les projets, y compris leur impact sur l'environnement et la sécurité d'approvisionnement (au niveau des projets) et offrir une base adéquate aux décisions de l'allocation des coûts aux transfrontières (ACT).

- Augmenter la flexibilité dans les dispositions relatives aux permis, par ex. via le partage des meilleures pratiques ou des lignes directrices non contraignantes ou par des actes juridiquement contraignants tels que les actes délégués.

- Simplifier les procédures pour alléger le fardeau administratif pesant sur les promoteurs de projets et les autorités, par ex. renouvellement du label PIC et faisant rapport sur les progrès réalisés par les promoteurs PIC.

List of Abbreviations

AA	Appropriate Assessments
ACER	Agency for the Cooperation of Energy Regulators
BEMIP	Baltic Energy Market Interconnection Plan
CAPEX	Capital expenditure costs
CBA	Cost Benefit Analysis
CBCA	Cross-border Cost Allocation
CEF	Connecting Europe Facility
CEER	Council of European Energy Regulators
CESEC	Central and South Eastern Europe Gas Connectivity
CWE	Central Western Europe
EC	European Commission
ECRB	Energy Community Regulatory Board
EE	Energy efficiency
EEA	European Economic Area
EEPR	European Energy Programme for Recovery
EIA	Environmental Impact Assessment
ENS	Energy not supplied
ENTSO	European Network of Transmission System Operators
ESIF	European Structural & Investment Funds
EU	European Union
HLG	High Level Groups
IA	Impact Assessment
IEM	Internal Energy Market
INEA	Innovation and Networks Executive Agency
LNG	Liquefied natural gas
MDI	Market Design Initiative
MEDREG	Mediterranean Energy Regulators
MS	Member State
NDP	National Development Plan
NRA	National Regulatory Authority
NPV	Net Present Value
NSI East	North-South Gas Interconnections in Central Eastern and South Eastern Europe
NSI West	North-South Gas Interconnections in Western Europe
NSOG	Northern Seas Offshore Grid
OSC	Oil Supply Connections in Central Eastern Europe
PCI	Project of Common Interest
PECI	Projects of Energy Community Interest
PP	Project Promoter
RES	Renewable Energy Sources
ROCS	Regional Operation Centers
RG	Regional Group
RGI	Renewables Grid Initiative

SEA	Strategic environmental assessment
SEW	Socio-economic welfare
SGC	Southern Gas Corridor
SSO	Storage System Operator
TEN-E	Trans-European Energy Networks
TOR	Terms of Reference
TSO	Transmission System Operator
TYNDP	Ten-Year Network Development Plan
UF	Unscheduled flows
UfM	Union for Mediterranean
UGS	Underground gas storage

1 Introduction

1.1 Objectives and Scope of the Evaluation

1.1.1 Objectives

The main objectives of this assignment are to provide an independent evaluation of the TEN-E Regulation and the PCI framework; and to provide support in assessing the impacts of alternative policy scenarios in the framework of TEN-E. This report focuses on the evaluation, which aims to assess whether the framework for the implementation of PCIs is adequate and to what extent the TEN-E Regulation is delivering its objectives. The evaluation is based on the assessment criteria and evaluation questions listed in the Terms of Reference (ToR). A key point to our approach has been to assess the situation before and after the TEN-E Regulation. We have also looked for evidence on delivery, including as to whether the Projects of Common Interest (PCI) framework is delivering as expected. The study also contributes to identifying barriers and subsequently proposing and evaluating possible options to improve the processes in order to enhance the effectiveness of the Regulation.

1.1.2 Scope

The study covers all the countries where the TEN-E Regulation applies (all 28 EU Member States) and the period during which the TEN-E Regulation (347/2013[2]) has been in force, i.e. from 1 June 2013 until now. We also take the previous TEN-E Regulation (Decision 1364/2006/EC) and the problems it aimed to address into account, though not in depth.

The **evaluation** addresses the specific questions mentioned in the ToR regarding the evaluation of the Regulation, in particular the PCI framework. It is – to a large extent - an assessment of compliance and administrative costs and benefits, including a quantification of the most important obligations (which are as follows):

- introduction of a one stop shop for the permitting of PCIs in all MSs
- introduction of a 3.5 year time limit for the last two phases in the PCI permitting process
- introduction of obligations regarding stakeholder involvement in the PCI permitting process
- introduction of a European coordinator.

The evaluation also investigates which TEN-E provisions could potentially be simplified/dropped, for instance because they are widely viewed as being too prescriptive.

While the PCI framework includes oil, smart grids and CO_2 infrastructure, the majority of the activity, and hence the majority of our focus, has related to electricity and gas networks, although the activity that has occurred relating to smart grids is discussed where relevant. The Connecting Europe Facility (CEF) is not part of the assessment per se (since an independent evaluation is being undertaken as required by the CEF Regulation (1316/2013) by the end of 2017). However, the overlap between TENE and CEF has been considered, with evidence sought to attempt to determine what impacts were achieved by CEF and what was achieved by TEN-E. These distinctions have been made explicit, for example, during stakeholder engagement (e.g. by investigating whether it was the regulatory or the financial contribution from the EU that made the difference) and by looking at the relevance and effectiveness of the selection criteria defined in TEN-E.

[2] Repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009.

This evaluation focuses on the state-of-play of the TEN-E framework for the 1st and the 2nd PCI list. The project identification process for the 3rd list is assessed as well, but not the outcome, i.e. the list itself.

1.2 Structure of this Report

This report is structured as follows:

- *Our approach to the evaluation:* We present and discuss the intervention logic for the TEN-E Regulation based on our understanding of the logic behind the Regulation when it was drafted. This includes a discussion of the counterfactual – i.e. what we think would have happened without the TEN-E Regulation being in place, the specific questions that this evaluation is seeking to address and the methods we have (and will) employ to answer these questions.

- *Background to the TEN-E Regulation*: A summary of the history and current state of the TEN-E Regulation.

- *Evaluation questions:* The information that we have collected and analysed to answer each of the evaluation questions. This is grouped under groups of questions (relevance, effectiveness efficiency, coherence, EU added value) and these group's subquestions. Under each subquestion, we have grouped our findings according to their source. First we present the literature review findings, followed by data gathered via stakeholder input (including the targeted survey, interviews, public consultation and focus groups). Finally, we provide conclusions per evaluation question.

- *Draft conclusions and recommendations*: The key points / answers to each group of evaluation questions are presented.

The report is supported by an annex: an evaluation matrix which lists all of the questions and the methods used to address them. In addition, a Stakeholder Consultation Synopsis report was presented to DG ENER, including a detailed report of the targeted survey, focus groups and interviews.

2 Our Approach to the Evaluation

This chapter presents the main elements of our approach and methodology for the study. First, we present our interpretation of the intervention logic of the TEN-E Regulation based on an analysis of official EC documents and discussions with the Commission. This is followed by a short discussion of the counterfactual and our evaluation framework (including the interlinkage between the evaluation questions and the five evaluation criteria: effectiveness, efficiency, relevance, coherence and EU added value). We conclude with a discussion of the main methods we have used in this study, including a consideration of their strengths and weaknesses.

2.1 Our Interpretation of the Intervention Logic

The main elements of the intervention logic underlying Regulation 347/2013 (especially the problem analysis) are described in the relevant Impact Assessments[3]. We also checked the consistency between the TEN-E Regulation itself and the Terms of Reference for this evaluation.

Below, we start with the problems the policy was designed to address and the rationale and overall objectives of the policy. We subsequently review the specific objectives of the TEN-E Regulation, the planned outputs and the actions taken.

2.1.1 What was the problem? What were the needs which led to the 2013 TEN-E Regulation?

The impact assessment (IA) that accompanied the Commission proposal in 2011[4] hightlighted the fact that large investments in European energy infrastructure, in particular appropriate electricity transmission and gas transport infrastructure, are needed to integrate the energy systems and markets in Europe, and to achieve a low-carbon energy supply system. The IA also stated that electricity and gas transmission systems are constraining the proper functioning of the internal energy market, given that there is insufficient capacity for interconnection and that existing infrastructure is often not used optimally. Several Member States remain under the 10% target for electricity interconnection, which is fragmenting the market and leading to a less secure and more expensive supply of electricity. In the gas sector, there are still some major technical bottlenecks, or missing links, that have a negative impact on the functioning of markets as well as on security of supply. Furthermore, existing infrastructure needs to be refurbished and upgraded in order to properly address the current challenges (reverse flows in gas, unscheduled and loop flows in electricity, automated operational and control systems).

The IA made it clear that there is insufficient energy infrastructure (particularly cross-border infrastructure) in place to reach the EU energy and climate targets and that there is a need for a substantial increase in private and public investments in energy infrastructure, the realisation of which should be facilitated and accelerated. The IA described the following main obstacles to the delivery of infrastructure:

[3] SEC (2011) 1233, Commission Working Paper: Impact Assessment accompanying the document 'Proposal for a Regulation on guidelines for Trans-European Energy Infrastructure and Repealing Decision No 1364/2006/EC' and SEC (2010) 1395, Commission Staff Working Document: Impact Assessment - Accompanying document 'Communication: Energy infrastructure priorities for 2020 and beyond – A Blueprint for an integrated European Energy Network'

[4] SEC(2011) 1233, Commission Working Paper: Impact Assessment accompanying the document 'Proposal for a Regulation on guidelines for Trans-European Energy Infrastructure and Repealing Decision No 1364/2006/EC' and SEC (2010) 1395, Commission Staff Working Document: Impact Assessment - Accompanying document 'Communication: Energy infrastructure priorities for 2020 and beyond – A Blueprint for an integrated European Energy Network'

- **Lengthy and inefficient permitting and administrative procedures**. Permitting procedures can cause long delays and high administrative costs (including stranded costs in some cases), especially for cross-border projects. The extended time lag between an investment decision, based on market price signals or grid capacity needs, and its realisation, is an obstacle. The main causes of these delays include the complex and fragmented process (particularly relevant for cross-border projects); the lack of adequate upfront planning and coordination procedures; the lack of binding time limits, and unclear and poor quality documentation. The high standards for environmental protection and the lack of coordinated national implementation were also leading to difficulties for promoters, as the fulfilment of all requirements can often be time consuming and lead to delays.
- **Public opposition** is a barrier for most investments in large energy infrastructure projects (due to their significant impact on landscapes). Public opposition due to environmental concerns (e.g. if infrastructure is to be build in a natural area or close to populated areas[5]) can hinder or block the development of investment projects. It can also cause delays: via objections during consultations which require significant additional efforts; complex and lengthy negotiations with land owners; and lodging appeals to courts which delay or prevent the start of construction.
- **Inadequacy of regulatory framework.** The regulatory framework was not designed to deliver the optimal infrastructure from an EU perspective, but rather to deliver cost-effective solutions based on the need of individual MSs to ensure low tariffs for their (national) consumers. The key issues concern: asymmetric benefit distribution and cost allocation (in projects with cross-border impact); externalities (impacts not reflected by market signals or revenue streams); lack of regulatory incentives and long-term signals for the implementation of projects needed to meet EU priorities; lack of coordination for the cross-border NRA approval process.
- **Issues related to financing.** The main issues are: TSOs have limited financing capacities (they are not able to raise the required debt at a reasonable cost); there are difficulties in attracting new institutional investors[6] because many TSOs are not open to equity investment from third parties; and lack of adapted funding instruments (only grants are available, there are no innovative financial instruments or risk sharing arrangements for PCIs).

2.1.2 Specific objectives of the TEN-E Regulation

The main objective of the TEN-E Regulation is the development and interoperability of trans-European energy networks and connection to such networks (see recital 43). The specific objectives are to:

- Identify PCIs.
- Facilitate the timely implementation of PCIs by addressing permitting procedures and public participation.
- Guide the cross-border allocation of costs and risk-related incentives for PCIs.
- Determine the eligibility criteria for EU financial assistance (particularly the CEF).

2.1.3 The contents of the Regulation

Here we present a brief summary of the contents of the different articles of the Regulation:

- **Article 1:** Scope and objectives of the Regulation
- **Article 2:** Definitions

[5] Also known as the NIMBY concept (Not in my backyard)
[6] Institutional investors include e.g. pension funds, insurance companies and wealth funds.

- **Article 3:** Establishes 12 regional groups (1 per priority corridor), requires them to adopt a regional list of proposed PCIs. Requires the Commission to set up a Union wide list of PCIs every 2 years based on these regional lists. PCIs on this list should be included in regional and national TYNDPs.
- **Article 4:** Defines the general and specific criteria for assessing (and internally ranking by regional groups) PCIs – electricity transmission and storage, gas, electricity smart grid, oil transport and carbon dioxide transport.
- **Article 5:** Sets requirements for implementation and monitoring for the different stakeholders, including a PCI Implementation plan (for project promoters). Requirement for project promoters to submit an annual report on progress to the national competent authority (see Article 8) and ACER (the Agency for the Cooperation of Energy Regulators). ACER to prepare a consolidated report on progress in all PCIs. Each competent authority to report to regional groups on the progress of PCIs in its territory. If a PCI is delayed (apart from reasons beyond the control of the project promoter), the national regulator can oblige the project promoter to appoint someone else to deliver the PCI and the Commission can, subject to the agreement and with the full cooperation of the Member States concerned, launch a call for proposals open to any third party capable of becoming a project promoter to build the project.
- **Article 6:** Defines the role of European Coordinators, as well as why and when they can be assigned. If a PCI is significantly delayed, the Commission may designate a European Coordinator. This European coordinator shall help speed up / facilitate the PCI.
- **Article 7:** Establishes the 'Priority Status' of PCIs to ensure efficient administrative processing.
- **Article 8**: Organises the permit granting process, establishing the role of the national competent authorities as well as three schemes for permit granting.
- **Article 9**: Provides the requirements regarding transparency and public participation.
- **Article 10**: Defines the two stages of permit granting procedure (pre-application and statutory permit granting), and sets time limits.
- **Article 11**: Defines the cost-benefit analysis.
- **Article 12**: Defines the cross-border cost allocation (CBCA) framework.
- **Article 13**: Ensures incentives are granted to address the higher risks of PCIs.
- **Article 14 & 15**: Defines eligibility criteria for EU financial assistance (including CEF).
- **Article 17**: Reporting and evaluation.
- **Article 18:** Information and publicity.
- **Article 19:** Transitional provisions.
- **Article 20-23**: Amendments to other Regulations & repeal of Decision 1364/2006/EC.
- **Article 16 & 24:** Exercise of the delegation and entry into force.

2.1.4 Inputs, actions and outputs

The Regulation establishes several procedures and required actions. We have classified these as follows:

- **Input**: Item defined by the Regulation itself (e.g. the regional groups, the criteria for PCIs, options for permitting schemes, etc.)
- **Output**: Documents that result from applying the Regulation.
- **Action**: Actions that need to take place because of the Regulation.

These are summarised in the table below.

Table 2-1 TEN-E Regulation inputs, actions and outputs

Art.	Type	Description	When	Responsibility
3	Input	Set-up 12 regional and thematic groups to propose & review PCI	By 06/2013	EC
3	Output	Regional lists of PCI	Every 2 years	Groups
3	Output	Union list of PCI	Every 2 years	EC
4	Input	Define criteria for PCI	By 06/2013	EC
5	Output	Implementation Plan (for each PCI)	Once	Promoters
5	Output	Progress report (for each PCI)	Annual	Promoters
5	Action	Monitor PCI progress	Constant	ACER & Groups
5	Output	Consolidated progress report	Annual	ACER
5	Action	Report on PCI implementation delays	Annual	MSs
6	Action	Designate European Coordinators	-	EC & MSs
7	Action	Provide priority status to PCI if possible under national legislation	-	MSs
7	Output	Non-binding guidance on environmental assessment procedures[7]	By 08/2013	EC
7	Output	Legislative measures to streamline environmental assessment procedures	By 08/2015	MSs
8	Action	Designate national competent authority to coordinate permitting	By 11/2013	MSs
8	Input	Define three schemes for permitting ('One-stop-shop'): • Integrated scheme • Coordinated scheme • Collaborative scheme	By 06/2013	EC
9	Action	Carry out (at least one) public consultation for each PCI	-	Promoter
9	Output	Manual of procedures for PCI permit granting process, including public participation routes	By 05/2014 (& updated)	MSs
9	Output	Concept for public participation (for each PCI)	Start of permit granting	Promoters
9	Output	Report of public participation activities (for each PCI)	With application file	Promoters
9	Output	Website with PCI information (for each PCI)	-	Promoters
10	Input	Define two procedures for permit granting process with 3.5 year time limit: • Pre-application procedure • Statutory permit granting procedure	By 06/2013	EC
11	Output	Methodologies for harmonised energy system-wide cost-benefit analysis	By 11/2013 (& updated)	ENTSO-E/ ENTSOG
11	Output	Indicators for the comparison of unit investment costs	By 05/2015	ACER/NRAs
11	Output	Interlinked network model	By 12/2016	ENTSO-E/ ENTSOG
12	Input	Define CBCA framework	By 06/2013	EC
12	Output	Cost allocation decisions	-	ACER/NRAs
13	Action	Ensure incentives are granted to address high risks of PCI	-	MS / NRAs
14	Input	Define eligibility criteria of projects for Union financial assistance	01/2014	EC
15	Input	Define award criteria for CEF	01/2014	EC
17	Output	Evaluation report on PCI implementation	By 2017	EC
18	Output	Infrastructure transparency platform	By 2014	EC

Source: Consultant's own analysis

[7] http://ec.europa.eu/environment/eia/pdf/PCI_guidance.pdf

2.1.5 Planned impacts

The key impacts that these outputs are intended to achieve are:

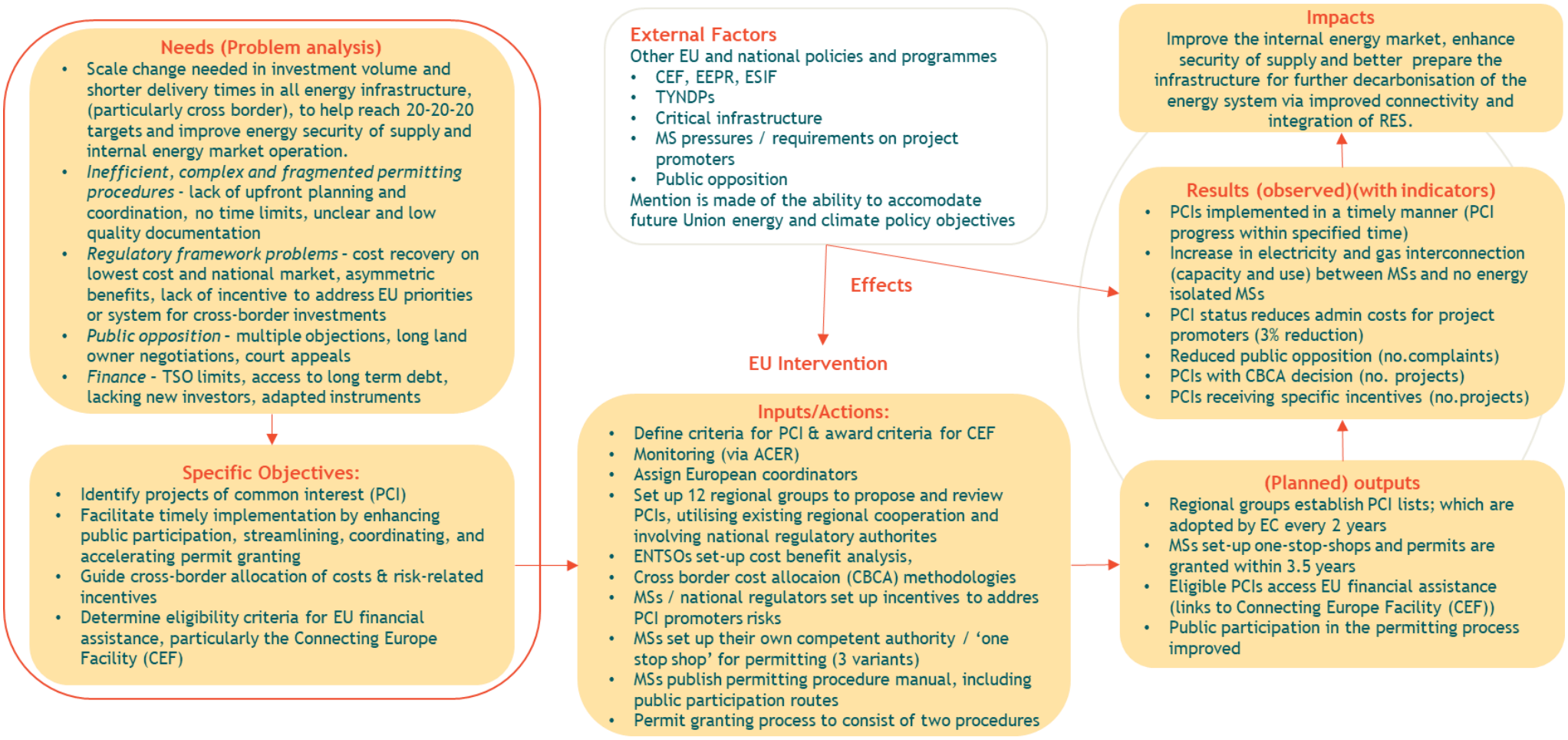
- Improved public participation and transparency in the permitting process.
- Improved regulatory conditions and cost-allocation.
- Lower administrative costs.
- Increased visibility and attractiveness for investors.
- Improved access to EU financial assistance for eligible PCIs.
- Improved functioning of the internal energy market.
- Improved energy system stability and security of supply.

Reliable energy transmission infrastructure and interconnections should ensure that electricity and gas can be transported across Europe without major physical constraints in order to facilitate the further integration of energy systems and markets. The development of appropriate transmission (cross-border) infrastructure will enhance competition within, and the competitiveness of, the energy sector. It will also contribute to a more sustainable energy supply as RES can be more easily integrated in highly interconnected systems and markets, and ensure the supply of energy at the lowest possible costs and prices for society. These positive impacts not only benefit the energy end-user, but also the wider economy, enhancing economic growth and employment (in particular in the energy-intensive industries) and reducing carbon emissions overall. Moreover, in emergency situations, energy interconnections enable the solidarity between (neighbouring) countries to ensure cross-border supplies.

2.1.6 Graphical representation of the intervention logic

A simplified intervention logic, summarising the need to act, activities, outputs and impacts of TEN-E is presented in the figure below.

Figure 2-1 Intervention logic



2.2 Counterfactual

In an evaluation, it is important to assess not just whether the envisioned impacts have been realised, but also what role the Regulation played in delivering these impacts. Methodologically, the observed effects (the factual) have to be compared with the anticipated effects under an alternative policy scenario (the counterfactual), while having controlled for the impact of external factors / other EU policies in both scenarios, in order to establish EU added value. Hence, the agreement of the counterfactual is also key to the intervention logic.

Given the focus of this study on the evaluation of the TEN-E Regulation (347/2013) and the PCI framework, the counterfactual we have chosen is the legislative framework prior to the 2013 Regulation. This is best described in the Baseline Scenario presented in SEC (2011) 1233 which builds on SEC (2010) 1395.

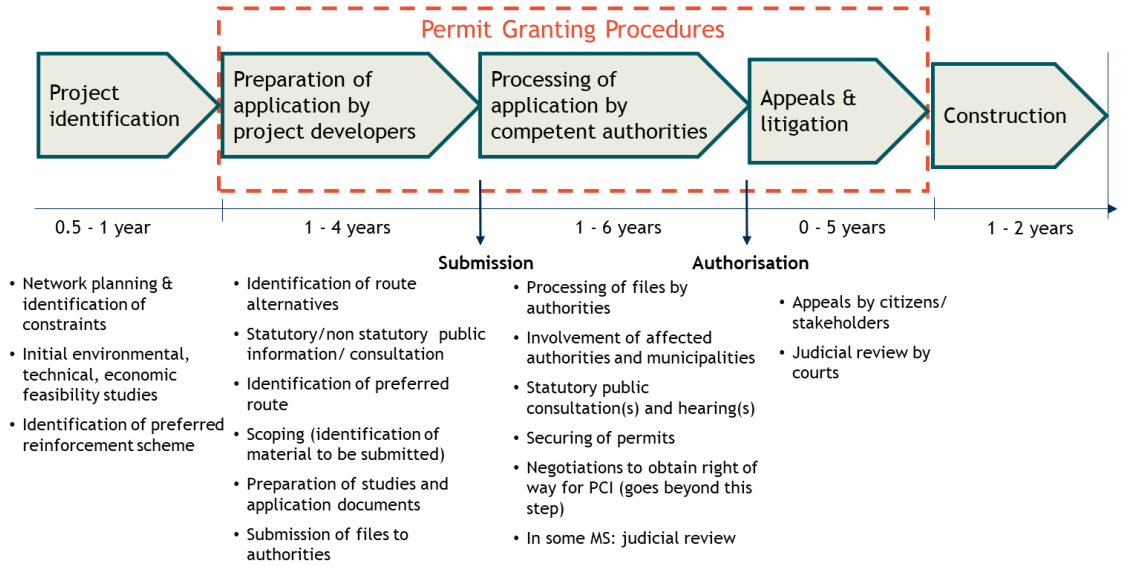
2.2.1 Assumptions from the impact assessment regarding the baseline

The impact assessment[8] prepared for the Regulation provides information regarding the baseline, i.e. the situation before the new TEN-E Regulation was implemented.

Project development process

Regarding the typical project development process (see figure below), it states that the total average duration of a project (including planning and construction) was seven to thirteen years, with an average of four to ten years of this time required for the permit granting process.

Figure 2-2 Typical project development process before the entry into force of TEN-E Regulation 347/2013. Source: Adapted from SEC (2011) 1233



The impact assessment also mentions that:

- Public opposition and complex permitting procedures were considered to be the main cause of delays.

[8] SEC (2011) 1233, Commission Working Paper: Impact Assessment accompanying the document 'Proposal for a Regulation on guidelines for Trans-European Energy Infrastructure and Repealing Decision No 1364/2006/EC'

- The permitting procedure was fragmented. There could be from one to more than 10 authorities directly involved, and up to 50 authorities indirectly involved. Only five Member States had one responsible authority at national level.
- 13 Member States had time limits for the statutory process[9] (either partially or for the entire procedure) and 10 Member States had fast track schemes (of which five schemes were linked with a one-stop-shop or time limit). See Table 2-2 for details.
- There was limited guidance from public authorities to help the PCI promoters in many Member States.

The table below provides information on the typical duration and permitting requirements for PCIs at MS level, as existed prior to the TEN-E Regulation.

Table 2-2 Key data on permit granting procedures in selected MSs. Source: SEC (2011) 1233, Annex 7

MS	Time limit for statutory process	Average duration	Number of permits	Responsible authorities	Fast-track procedure available
AT	Yes	3 years*	>1	>1	Yes
BE	No	4 years	5	NA	No
BG	NA	NA	NA	NA	NA
CZ	Yes	4 years	3	NA	No
DE	Partially	8 years	1	>2	Yes
DK	No	10 years	2-3	2-3	No
EE	NA	NA	NA	NA	NA
EL	Yes	5 years	1	1	Yes
ES	Partially	3 years*	>3	>10	Yes
FI	No	6 years	3	8-10	No
FR	No	5.5 years*	3	1-2	No
HU	Yes	2 years*	3	3-10	No
IE	Yes	4 years	1	1	Yes
IT	Yes	5 years	1	1	Yes
LT	No	4 years*	3	several	No
LV	Partially	3 years*	3	>5	No
NL	Partially	1.5 years*	1	1	Yes
PL	Partially	4 years*	>3	>3	Yes
PT	Partially	1.5 years*	2	>1	No
RO	No	3.5 years	>4	25	Yes
SE	No	9.5 years	2	>2	No
SK	No	4 years*	4	>2	No
SI	No	7.5 years	4	4	No
UK	Yes	4 years	1	1	Yes

** Pre-application efforts to be added (average 2 years)*

[9] The statutory permit granting procedure, according to the TEN-E Regulation, covers the period from the date of acceptance of the submitted application file until the comprehensive decision is taken.

Administrative cost assessment

The Impact Assessment[10] presented an administrative cost assessment in Annex 18, analysing the most important changes under each policy option.[11] It included a quantitative analysis for the establishment of a regime of Common European Interest (PCI framework) and the introduction of the one-stop shop approach.

Policy options

- BAU: Business as usual
- A.1: Establishment of a regime of Common European Interest
- A.2: Organisation and limitation in time of permit granting process
- A.3: Establishment of a regime of Common European Interest and organisation and limitation in time of permit granting process

Assumptions of the assessment

- Measures proposed are implemented by none of the MS.
- Two responsible authorities are involved in the permit granting process and the one-stop shop competences would be allocated to one of these.
- No impacts on other local or technical authorities.
- Labour costs: 25.63 EUR/hour
- **A.1: Acceleration of procedures by three months.** Staff working subsequently 1.5 months on the promoter's and on the authorities' side. This option considers "equal distribution of workload over the project, and 50% impact on authorities' side (calculations based on data sent by respondents: on promoters' side savings of 820 person-hours; on authorities' side savings of 725 person-hours)". Assessment does not take into account impacts on litigation processes.
- **A.2: One-stop shop at national level.** 25% reduction of resources for the TSO and 34% reduction of resources on the authorities' side.

The results of the cost assessment are presented in the table below. Having the EU PCI status would, according to the above mentioned Impact Assessment, result in a decrease of administrative costs of 3% in 2014-2020 for the PCI project promoters and of 12% for the concerned authorities, mainly because there would be less objections to projects with PCI status. A maximum permit period and a one-stop shop would bring, according to the IA study, an additional administrative costs savings of 25% for project promoters and of 34% for authorities in 2014-2020. This calculation was based on the assumption that there would be, on average, a switch from two responsible authorities per Member State to one. (Note that the IA assessed a maximum duration of the permitting procedure of 4 years while the final Regulation states 3.5 years.)

Table 2-3 Results of the administrative cost assessment for 2014-2020. Source: SEC (2011) 1233

		BAU	A.1	A.2	A.3
Promoter	Administrative costs	114.5 M EUR	111.4 M EUR	85.9 M EUR	82.7 M EUR
	Change compared to BAU	-	-3%	-25%	-28%

[10] SEC(2011) 1233, Commission Working Paper: Impact Assessment accompanying the document 'Proposal for a Regulation on guidelines for Trans-European Energy Infrastructure and Repealing Decision No 1364/2006/EC'

[11] The assessment was based on a questionnaire sent out to Member States that reorganised their permit granting regime similar to the proposal (namely the Netherlands, Germany, the UK and Ireland). However, detailed data was missing due to the complexity of the process.

		BAU	A.1	A.2	A.3
Authority	Administrative costs	22.6 M EUR	19.8 M EUR	15 M EUR	12.2 M EUR
	Change compared to BAU	-	-12%	-34%	-46%
Total	Total administrative costs	137.1 M EUR	131.2 M EUR	100.1 M EUR	95 M EUR
	Change compared to BAU	-	-5%	-26%	-31%

The ex-ante cost allocation mechanism was only qualitatively assessed. It was expected that NRAs would need more resources to perform this task and that ACER would need an additional 1 FTE per 15 cost allocations. It was expected that this option would deliver large overall benefits. The IA mentions for example a more equitable burden sharing across Member States, as well as a large positive impact by delivering projects that are needed to reach the 20% RES target.

2.3 Detailed Evaluation Questions

The evaluation matrix effectively defined the scope of the evaluation, since the evaluation methods are designed to gather the evidence required to answer each of the questions. Therefore, an important task during the inception phase of the study was to set out and agree on how these questions would be answered. Our updated evaluation matrix presents the methodologies used to answer each evaluation question. Against each question, we have mapped out the:

- **Methods / tools:** The primary methods (including tools) by which we used to answer the question;
- **Stakeholders:** This column highlights whether particular questions were of particular relevance to specific groups;
- **Indicators:** This column highlights potential indicators that were used or considered to monitor/measure the respective impacts;
- **Comments**: This gives our views on the question, such as the key issues which arose, key data sources and potential answers.

The evaluation matrix is presented in the Annex.

2.4 Methods Employed

Several methods have been used to answer the evaluation questions as displayed in the matrix. These are briefly introduced in the sections below. The detailed findings from the consultation activities were presented in a separate report.

2.4.1 Literature review

The first step in answering most of the evaluation questions has been to gather relevant information from literature. We identified relevant secondary data sources including: policy documents, PCI specific data, and wider literature relevant to the evaluation (including EU evaluations, impact assessments and other studies, MS level analyses and evaluations, and academic research on the topic). These sources were mapped against the evaluation matrix. This provided context for the questions and, in some cases, have allowed us to begin to answer the questions. The list of literature reviewed is presented at the end of this evaluation (see References).

2.4.2 Data analysis

PCI data was obtained from the following main sources:

- The 2013 and 2015 PCI lists
- The 'PCI Progress Watch' Excel file[12]
- Reports from the national Competent Authorities to DG ENER
- Supporting data from ACER for the 2016 and 2017 consolidated reporting

This data has been used to answer several questions throughout the report.

2.4.3 Targeted survey and public consultation

We drafted and launched a targeted survey. The survey was developed in close cooperation with DG ENER and was tested with five external stakeholder before being made available online. The testing resulted in some simplifications, but the additional targeting that was suggested (to tailor the survey more towards electricity, gas, oil or smart grids, depending on the stated interest of the recipient) was not pursued as it was felt that it would make the survey too long. The survey was launched on 17 May, with a closing date of 14 June. An email inviting stakeholders to complete the survey was sent to all of the contact names on the stakeholder list.

The total targeted survey sample consisted of 115 completed submissions. A breakdown per type of stakeholder is provided in Figure 2-3.

Figure 2-3 Type of stakeholders in the sample

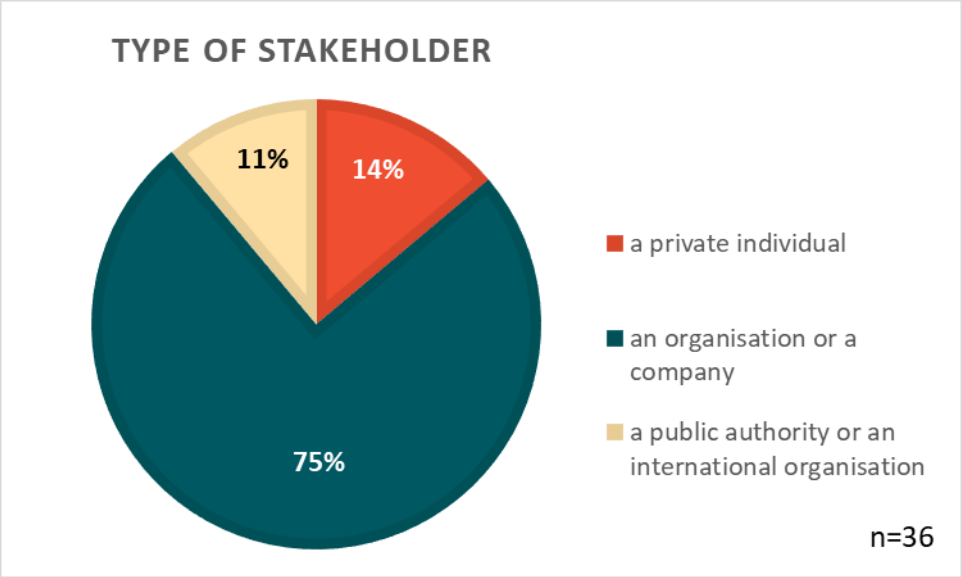
Response	Total	% of responses	%
TSO / Project promoter for a PCI	34		30%
Energy company or association	21		18%
Member State Authorities (e.g. ministries)	14		12%
National Regulatory Authority (NRA)	11		10%
NGO / consumer association	11		10%
Other, please specify	11		10%
Competent authority (under Ten-E Regulation)	5		4%
TSO without a PCI	3		3%
Academic	2		2%
Gas grid association (e.g. ENTSO-G)	1		1%
Electricity grid association (e.g. ENTSO-E)	1		1%
European agency (e.g. ACER)	1		1%
European Commission services	0		0%
Total respondents: 115 Skipped question: 0		0% 20% 40% 60% 80%	

A public consultation, with an introduction to explain the context, was also drafted. This was reviewed by DG ENER and was launched on 30 May 2017.[13] It remained open for the mandatory 12 weeks and

[12] An internal project status monitoring tool used by DG ENER and INEA staff; file dated 23 March 2017. Provided by DG ENER, received by e-mail.
[13] See: https://ec.europa.eu/energy/en/consultations/evaluation-ten-e-regulation

closed on 4 September 2017. Out of the 36 respondents, most respondents (75%) were an organisation or company, while 14% were private individuals and 11% were public authorities or international organisations (see Figure 2-4).

Figure 2-4 Type of stakeholders in the public consultation [PC1]



2.4.4 Interviews

We developed an extensive list of stakeholders as part of our work. This list formed the basis of both the targeted survey and the interviews. The list contains over 500 names and contact details, and is divided into the following key stakeholder groups:

- European Commission
- ACER
- Energy companies
- Energy consumer representatives
- Project Promoters (of PCIs)
- ENTSOs
- EU (energy trade and industry) associations
- MS Ministries
- National regulatory Authorities (NRAs)
- National Competent Authorities (as per Article 8 of TEN-E)
- Research
- NGOs
- Others (most fit under more than one of the above groups)

The targeted survey included a question asking if respondents would be willing to take part in an interview and/or focus group. Some of those willing to be interviewed were approached, if they fitted within the representative cross section of views that was required.

We used the evaluation matrix to prepare a set of interview topic guides, with the evaluation questions selected to match the main stakeholder groups (Project promoters, NRAS, ENTSOs, ACER, MSs), but with some questions being applicable to all stakeholders.

32 interviews were carried out in total, with at least two representatives of each relevant category of stakeholders: regulators, electricity TSOs, gas TSOs, and energy sector associations. The interviews were semi-structured, gathering the most relevant inputs from each stakeholder. A high-level summary of the feedback received in these interviews was presented in a separate Stakeholder Consultation Synopsis Report. However, answers provided by the interviewees are kept anonymous in the current document.

We attended the Energy Infrastucture Forum[14] in Copenhagen on June 1st and 2nd. As well as being a useful event in terms of content, we scheduled some interviews at the same time (to take advantage of the relevant people attending).

2.4.5 *Workshops / focus groups*

We planned and carried out the following three workshops:

Focus Group 1: Regulatory provisions of TEN-E – ACER/CEER Task Force on Infrastructure

Where/when: Brussels, 6 June (10h00-13h30)-(CEER premises)
Who: ACER Task Force on Infrastructure: Representatives of ACER, NRAs, EC, Trinomics
Objective: Discuss NRAs/ACER views on the functioning of the TEN-E framework including: investment incentives, CBCA process, investment approval and prioritisation of PCIs.

Focus Group 2: Network Planning

Where/when: Brussels, 19 June (10h00-16h30) – Trinomics office
Who: ENTSO-E, ENTSOG, TSOs, NRAs, ACER, EC, Trinomics and experts (e.g. JRC, European University Institute)
Objective: Discuss network planning – successes of TEN-E and scope for improvements.

Focus Group 3: Permitting and public acceptance

Where/when: Brussels, 20 June (10h00-16h30) – Trinomics office
Who: Representatives of Competent Authorities, TSOs (different Member States than those of CA), DG ENV (1 person), ENER and Trinomics
Objective: Discuss permitting in the different Member States – TEN-E regime vs practice

2.4.6 *Thematic approach*

During the kick off and inception of this study, it was agreed that we would adopt a thematic approach, rather than one based on profiling individual PCIs. This was partly because the recent CEF evaluation has completed a number of case studies on PCIs. It was also felt that a thematic approach – for example comparing the various approaches to the 'one stop shop' would offer greater insights. Three thematic focus groups were carried out, i.e. on 1) permitting and public acceptance, 2) regulatory aspects, and 3) network planning.

2.4.7 *Methodology limitations*

The following section lists the limitations found in the course of the work with regards to the methodology:

[14] https://ec.europa.eu/energy/en/events/energy-infrastructure-forum

- **The Regulation is too young to be properly assessed**. In some cases, stakeholders were not able to provide relevant information or answers to our questions because they had limited or no experience with some of the articles of the Regulation. In order to address this, we have provided anecdotal information from the Member States with experience (e.g. regarding specific incentives) or made use of estimates (e.g. regarding the PCI permitting times following the new PCI permitting procedures).
- **The costs and savings from the TEN-E Regulation are difficult to measure given the overlaps with pre-existing national frameworks**. We attempted to quantify costs and savings via the targeted survey, asking both promoters and Competent Authorities for costs and savings generated by the TEN-E Regulation. However, in most cases, these values were not available either due to lack of monitoring at such a low level or due to a very thin line between TEN-E and national systems that were already in place. Where provided, the information has been presented in this report and complemented by a qualitative assessment.
- **Interviewed stakeholders are not able to provide relevant information for all the questions.** We have selected a range of knowledgeable stakeholders from the energy infrastructure community, including EU and MS level policy makers, project promoters, energy companies and civil organisations. However, they were not always able to provide answers to all of our questions. In order to better reflect their know-how, the interview process was kept flexible. We used a semi-structured approach, based on a pre-defined interview questionnaire while at the same time providing enough space and time for the interviewees to focus on the areas in which they are most involved.
- **The workshops do not cover all relevant Member States and may give a biased view.** We are aware that not all Member States were present at the workshops. This may provide an incomplete view of some issues discussed. However, aspects covered during the workshops have also been triangulated by means of the literature review and interviews. Furthermore, views that represent one Member State in particular are listed as such in the text.
- **Unbalanced or biased answers.** The methodology was designed in such a way that information was triangulated, using different sources of information. We have more than one source of information for each of the questions, and have done our best to balance and assess the opinions received from different stakeholder groups.

3 Background to the TEN-E Regulation

This chapter provides background information and methodological context for the evaluation. First, we briefly present the history of TEN-E policies and then we provide an overview of the current situation describing the PCI Union List and the current monitoring process.

3.1 The TEN-E programme: from 1995 to 2013

3.1.1 TEN-E programme prior to 2006

The TEN-E programme was established to support the development of trans-European energy networks in order to add value to the European Union. The primary objectives of the programme were to contribute to 1) the effective operation of the Internal Energy Market, 2) the connection of renewable sources supporting carbon emission targets, 3) strengthening cohesion in the European Union by facilitating the development – and reducing the isolation - of the least developed regions, and 4) reinforcing the security of energy supply.

The TEN-E programme started in 1995 with an annual budget amounting to approximately EUR 20 million. The programme generally co-financed studies (up to 50% of their budget), mainly studies dealing with the technical, environmental, economic, and social feasibility of the proposed energy network investments. Occasionally, the programme also co-financed investment projects (up to 10% of their budget).

The first European Community Guidelines for TEN-E were adopted in 1996, comprising a list of projects of European interest. This list was revised four times, in 1997, 1999, 2003 and 2006. With the last enlargement wave, the 2003 guidelines needed to be updated to accommodate the ten new Member States as well as countries outside the EU's new external borders.

3.1.2 TEN-E guidelines 2006-2013

The revised TEN-E guidelines of 2006[15] laid the foundation for the Priority Interconnection Plan. They recognised the fact that a European energy network is more than the sum of national grids, and several actions have to be coordinated to reach the envisaged penetration of renewable energies while ensuring security of supply. The 2006 guidelines defined a number of actions to create a more favourable context for the development of the TEN-E network.

Along the priority axes, the TEN-E guidelines of 2006 presented 42 projects of European interest (of a cross-border nature or with significant impact on cross-border transmission). The projects for natural gas were mainly related to long-distance transport routes, through neighbouring and third countries, to the EU, reflecting the importance of gas imports (dependency). In addition to gas pipeline transport, priority projects included LNG and gas storage. In contrast, the projects relating to electricity reflected the fact that electricity is generated and distributed mainly within the EU, with rather short links. Within the initially estimated investment requirements, less than 20% of the total amount (ca. EUR 28 billion over the period 2007-2013) concerned electricity projects.

[15] Decision No 1364/2006/EC laying down guidelines for trans-European energy networks and repealing Decision 96/391/EC and Decision No 1229/2003/EC

Selected projects had priority for the granting of Community financial assistance and funding under the TEN-E budget. Around EUR 20 million per year was allocated to the TEN-E budget, which was mainly intended for financing feasibility studies. Other Community instruments could also be used to co-finance investments, for example the Structural Funds in the new Member States. However, such financing should not distort competition. Actual construction of the projects remained the responsibility of the network operators.

In addition, the guidelines provided a framework for increased coordination, exchange of information and the possibility of appointing a European Coordinator. For the implementation of the 'Projects of European Interest', coordination meetings were foreseen for cross-border sections, the monitoring of progress regarding implementation carried out by the Commission and Member States (jointly with energy companies) and, when appropriate, Community support, including the financing of the European Investment Bank.

3.1.3 Why a new TEN-E Regulation was required

The primary purpose of the TEN-E policy prior to the current Regulation was to provide stronger political support to energy infrastructure development from a European perspective, by focussing on supporting the feasibility stage for gas and electricity cross-border projects. Commercial interests were thought sufficient to drive the implementation of the projects and therefore EU intervention in the actual preparation and construction of the projects was not thought necessary. Hence, the TEN-E budget remained relatively low.

However, in November 2010, the Commission adopted a "Communication on energy infrastructure priorities for 2020 and beyond"[16], supported by an impact assessment. It concluded that, although the TEN-E guidelines resulted in political visibility for priority projects and facilitated cooperation with third parties, there was room for improvement. The following paragraph lists the main issues identified in relation to the TEN-E guidelines and how they are addressed in the TEN-E Regulation of 2013:

Table 3-1 Issues with TEN-E guidelines and how they were addressed in the TEN-E Regulation. Source:

Issue	How it was addressed in the 2013 Regulation
Lack of focus and clarity due to the large number of targeted projects. Moreover, new projects and technologies could not be included	Identification of 12 priority corridors and thematic areas. Besides electricity and gas networks, also oil, CO_2, electricity highways and smart grids are addressed now
Rigid and top-down European approach in granting priority projects	Ensure buy-in from Member States applying a new bottom-up method to identify Projects of Common Interest (PCIs) Regular updates in the identification of priority projects providing more flexibility
Non-binding TEN-E framework and no obligations for Member States or project promotors to actually realise the projects	Binding TEN-E Regulation with more specific actions related to e.g. improved permitting procedures, regulatory conditions and cost-allocation
Lack of methodology to assess the specific contribution of TEN-E funds for the bankability	The Connecting Europe Facility (CEF)

[16] COM (2010) 677, Energy infrastructure priorities for 2020 and beyond - A Blueprint for an integrated European energy network

Issue	How it was addressed in the 2013 Regulation
of a project. The TEN-E financing Regulation[17] did not allow for more sophisticated financing instruments	

Impact Assessments

After the TEN-E policy was revised in 2006[18], the energy policy context changed significantly following the communication of the EU energy policy in 2007[19]. This new policy context included: the energy and climate package and 2020 targets, the third internal energy market package and the Regulation on security of gas supply; new rules for infrastructure planning, establishing ACER, the smart meter target for 2020, and the EU objective of a 80-95% reduction in GHG emissions by 2050 compared to 1990 levels.

Given the new EU energy policy context, impact assessments were carried out to determine the effectiveness of TEN-E and to identify potential areas for improvement. The impact assessment[20] performed and published in 2010, supported the communication on energy infrastructure priorities of 2011[21], calling for new policy to further develop TEN-E. Based on the 2010 impact assessment, another assessment was carried out in 2011 to formulate the legislative proposal for a new European energy security and infrastructure instrument.[22]

The 2010 impact assessment assessed the investment needs for new transmission infrastructure, evaluated the TEN-E framework and financing possibilities, and compared various policy options for implementing sufficient infrastructure to support the achievement of the EU's energy and climate policy goals in the most cost-efficient way,thereby examining the possibility of integrating CO_2 and oil transport networks in future policy. It was largely based on the consultation in the context of the green paper *Towards a secure, sustainable and competitive European Energy Network*[23]. Accordingly, the recommendation was that energy infrastructure development should be driven by the energy policy goals (e.g. the "20-20-20" objectives, security of supply and solidarity, sustainability and innovation, competitiveness).

In summary, the main problem was that the 'outdated' TEN-E policy framework did not and would not lead to sufficient energy (especially cross-border) infrastructure investments, and that the infrastructure design was not optimal from an EU point of view. The identified investment need for energy infrastructure up to 2020 was about 210 billion EUR (about 140 billion EUR in onshore and offshore electricity networks including smart grids, and about 70 billion EUR in gas networks, excluding maintenance and refurbishment expenses). However, the BAU scenario as a policy option would only lead to an investment of 100 billion EUR, and the most effective policy would lead to an investment of

[17] Regulation (EC) 680/2007 of the European Parliament and of the Council of 20 June 2007 laying down general rules for the granting of Community financial aid in the field of the trans-European transport and energy networks
[18] And before in 2003, among others to include security of supply and sustainability criteria.
[19] COM (2007) 1, Communication from the Commission to the European Council and the European Parliament: An Energy Policy for Europe
[20] SEC (2010) 1395, Commission Staff Working Document: Impact Assessment - Accompanying document 'Communication: Energy infrastructure priorities for 2020 and beyond – A Blueprint for an integrated European Energy Network'
[21] Official Journal of the European Union (2013), 2013/C 33 E/06, European parliament resolution of 5 July 2011 on energy infrastructure priorities for 2020 and beyond (2011/2034(INI))
[22] SEC(2011) 1233, Commission Working Paper: Impact Assessment accompanying the document 'Proposal for a Regulation on guidelines for Trans-European Energy Infrastructure and Repealing Decision No 1364/2006/EC'
[23] COM (2008) 782 final, Green paper 'Towards a secure, sustainable and competitive European Energy Network'

about 150 billion EUR, leaving an investment gap of 110 billion EUR and 60 billion EUR respectively. The communication on energy infrastructure priorities of 2011[24] included several proposals to address the above mentioned issues and obstacles.

3.2 The Current Situation

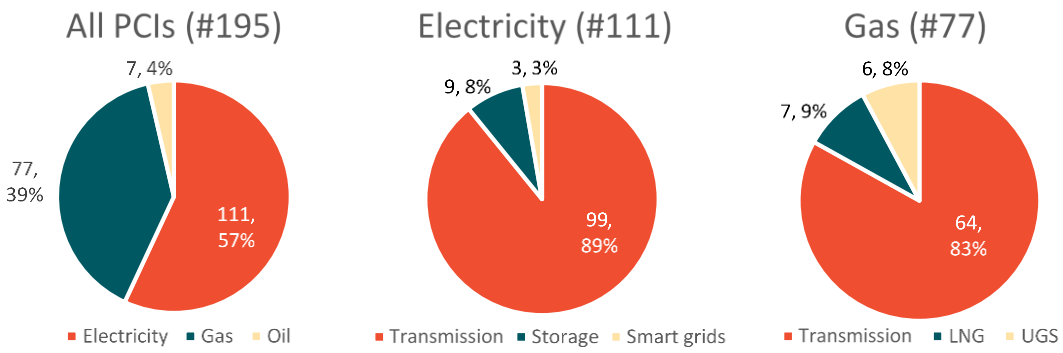
The Trans-European Energy Networks (TEN-E) Regulation[25] identifies priority corridors and thematic areas of trans-European energy infrastructure and provides guidelines for the selection of Projects of Common Interest (PCIs). The TEN-E Regulation establishes that PCIs can benefit from financial support from CEF, accelerated permitting, improved regulatory conditions and cost-allocation and increased transparency.

3.2.1 The PCI Union List

The first Union list of PCIs[26] ('2013 PCI list') was adopted by the European Commission in October 2013, followed by the second Union list of PCIs[27] ('2015 PCI list') in November 2015.

As of 2015, the 195 PCIs on the Union list comprised 111 electricity PCIs, 77 gas projects and 7 oil projects. For electricity, the PCIs can be further split into 99 transmission projects, 9 storage projects and 3 smart grid developments[28]. For gas, the transmission projects also dominate the list with 64 PCIs, while liquefied natural gas (LNG) and underground gas storage (UGS) facilities account for 7 and 6 projects respectively. The PCI splits are shown in Figure 3-1.

Figure 3-1 Split of all (195) PCIs into electricity, oil and gas (left); split of the 111 electricity PCIs (center); and split of the 77 gas PCIs (right). Source: Combination of 2015 Union list and ACER (2016a)



According to ACER[29], all Member States except Finland and Malta host electricity PCIs. Beyond the EU, Iceland, Israel, Montenegro, Norway, Serbia and Switzerland are also involved in PCIs. Germany hosts the highest number of electricity transmission projects, and Austria hosts the most storage projects. Gas PCIs are hosted by all Member States with the exception of Belgium, Luxembourg and the Netherlands. The majority of the gas PCIs are situated in Central and South East Europe, where adequate infrastructure to access diversified gas supplies is still lacking, with Greece involved in the largest number of gas PCIs. All oil PCIs are concentrated in Central Eastern Europe.

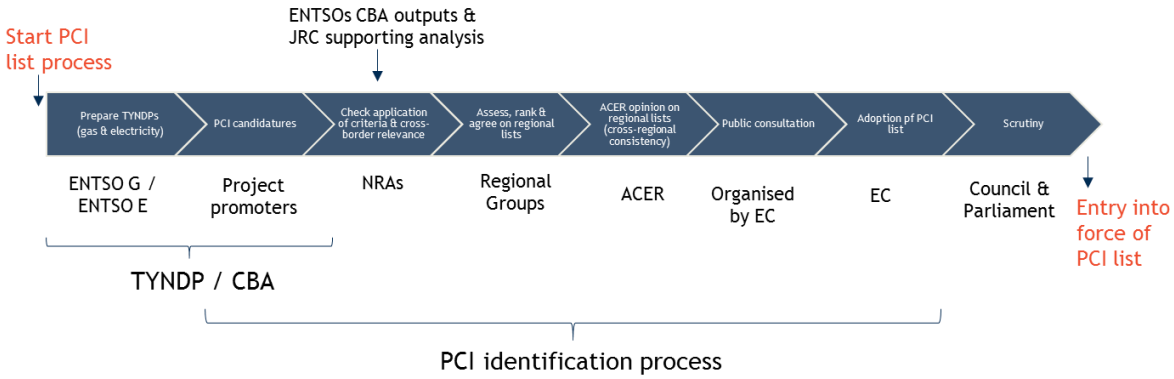
[24] Official Journal of the European Union (2013), 2013/C 33 E/06, European parliament resolution of 5 July 2011 on energy infrastructure priorities for 2020 and beyond (2011/2034(INI))
[25] Regulation 347/2013 on guidelines for trans-European energy infrastructure
[26] Commission delegated Regulation (EU) No 1391/2013 of October 2013
[27] Commission delegated Regulation (EU) No 2016/89 of November 2015
[28] From ACER, counting PCI 1.10a and 1.10b as one PCI and including PCI 10.1 (not yet reported in ACER report)
[29] ACER (2016a), Consolidated report on the progress of electricity and gas projects of common interest for the year 2015

According to the analysis by ACER (2017a), as of 31 January 2017 64% of the **electricity** PCIs were at a relatively advanced stage of implementation (commissioned, under construction or permitting). For **gas**, over half of the projects were beyond the planning stage (56%), with most of them going through permitting (51%).

3.2.2 PCI selection process

Article 3 of the TEN-E Regulation defines the process for adopting the Union list of PCIs, while Article 4 provides the criteria for PCIs. The PCI selection process is based on the NDPs (which are mainly based on national interests) and TYNDPs (which take an EU centric approach) prepared by the ENTSOs. Furthermore, the process involves consultation with multiple stakeholders (within the regional groups and via a public consultation) to ensure broad consensus of the list adopted by the EC.

Figure 3-2 PCI selection process[30]



The policy objectives that PCIs aim to address, based on the criteria set in Article 4, are:

- To enhance market integration and increase competition on energy markets;
- To enhance security of supply;
- To contribute to the EU's energy and climate goals, in particular by facilitating RES integration.

Regional Groups

Article 3 and Annex III of the Regulation establish twelve regional groups (one per corridor or priority area) and the framework for their functioning. The groups rank the PCI candidates based on the aggregated contribution to the PCI selection criteria (Article 4(4)). Based on the ranking (which is for internal use), the regional groups adopt regional lists of proposed PCIs, taking into account the EC's aim to have a "manageable total number of PCIs". The regional groups also monitor the PCIs and make recommendations to facilitate their implementation (Article 5(3)).

Regional groups include representatives from EU Member States, the Commission, electricity and gas transmission system operators and their European association, national regulatory authorities and ACER. The following regional groups have been established in line with the priority corridors and areas:

[30] Own development, adapted from Norton Rose Fulbright (2014) and European Comission presentation 'Implementing the Projects of Common Interest' 2016.

Table 3-2: Regional groups per type of PCI

Type	Regional groups
Electricity	1. NSOG 2. NSI West Electricity 3. NSI East Electricity 4. BEMIP Electricity
Gas:	5. NSI West Gas 6. NSI East Gas 7. SGC 8. BEMIP Gas
Other regional groups:	9. Oil supply connections in Central Eastern Europe (OSC) 10. Smart grids 11. Electricity highways 12. Cross-border CO_2 networks

ACER is involved in the assessment of electricity and gas projects' compliance with the PCI criteria, and their European added value (which they do by giving an opinion on the consistent application of the criteria and the cost benefits analysis across regions). ACER is not involved in assessing the oil or CO_2 network projects.[31]

3.2.3 Network Planning

The current network planning exercise is embedded in the framework of the National Development Plans (NDPs) and Ten-Year Network Development Plans (TYNDP). TYNDPs were established in 2009 and are prepared by ENTSO-E and ENTSOG, based on National Development Plans.[32] Regarding network planning, Article 3(6) of the TEN-E Regulation requires PCIs to be included in the National Development Plans (defined in Article 22 of Directives 2009/72/EC and 2009/73/EC). Annex III of the TEN-E Regulation also requires that electricity transmission and storage, as well as gas PCIs, are included in the TYNDPs.

Joint Modelling

Article 11 of the TEN-E Regulation requires the ENTSOs to jointly submit a consistent and interlinked electricity and gas market and network model to be used in the context of CBA (as determined by Annex V of the Regulation).

Cost-Benefit Analysis (CBA)

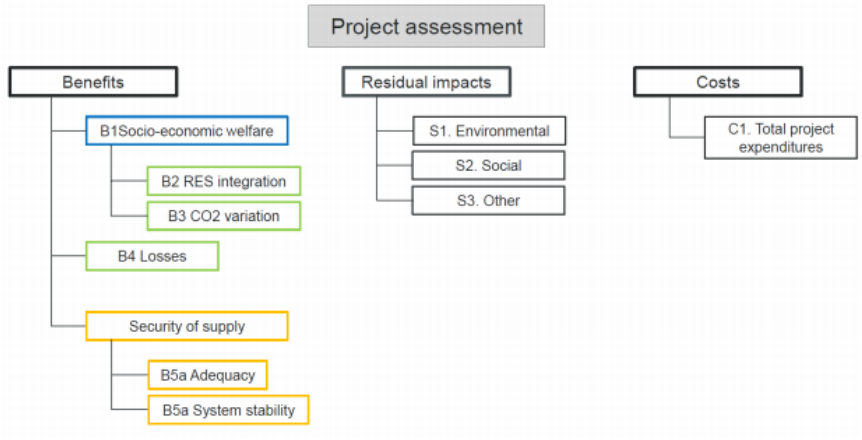
The TEN-E Regulation required ENTSO-E and ENTSOG to prepare a cost and benefit analysis methodology (CBA) to assess the transmission and storage infrastructure projects included in the TYNDPs. The ENTSOs consulted with stakeholders, ACER and the European Commission to draft and refine the CBA, with the methodology being adopted by the Commission in early 2015. The new ENTSO-E draft methodology (CBA 2.0) was put forward for consultation in 2016 and is expected to be approved in 2017.[33]

The ENTSO-E CBA guidelines set out ENTSO-E criteria for the assessment of the costs and benefits of a transmission (or storage) project, all of which stem from European policies on market integration, security of supply, and sustainability. They describe the approaches for identifying candidate

[31] DG ENER website: https://ec.europa.eu/energy/en/topics/infrastructure/projects-common-interest
[32] Regulations 714/2009 and 715/2009 require ENTSO-E and ENTSOG respectively to adopt and publish a Community-wide network development plan (TYNDP) every two years.
[33] ENTSO-E Guideline for Cost Benefit Analysis of Grid Development Projects - Version for AC ER official opinion, 29 July 2016

transmission projects and for calculating the cost and benefit indicators. In order to ensure a full assessment of all transmission benefits, some of the indicators are monetised, while others are quantified in their original physical units, such as tons or kWh.

Figure 3-3 ENTSO-E - CBA Model



Source: ENTSO-E[34]

ENTSOG developed an Energy System Wide Cost Benefits Analysis (ESW-CBA)[35], that was approved in 2015. A consultation on the ESW CBA update was carried out in 2017, and a Project Specific CBA (PS-CBA 2017) was published[36]. This integrated ESW-CBA methodology is composed of two steps:

- The TYNDP-Step, providing an overall assessment of the European gas system under different levels of development of infrastructures
- The Project-Specific Step (PS-Step), providing an individual assessment of each project's impact on the European gas system based on a common dataset defined through the TYNDP-Step and project specific data.

The first step is applied by ENTSOG and it serves as a basis for the second step (PS-Step), which is the project promoter's responsibility. The steps are designed to be fully consistent through the use of a single dataset, the same modelling tool, identical indicators, and the same approach to monetisation. The two steps are repeated every second year following the TYNDP Report cycle.

The JRC published an updated methodology in 2017 on how to assess projects of common interest in the field of smart grids.[37] The methodology aims to guide project promoters in preparing their project proposals and assist the Smart Grid Regional Group in proposing smart grid PCIs. It consists of:

- A checklist to verify project compliance with the general criteria set out by the TEN-E Regulation in Article 4(a) and (c);
- A CBA to argue the economic viability of the project;

[34] ENTSO-E Guideline for Cost Benefit Analysis of Grid Development Projects FINAL- Approved by the European Commission 5 February 2015
[35] https://www.entsog.eu/public/uploads/files/publications/CBA/2015/INV0175-150213_Adapted_ESW-CBA_Methodology.pdf
[36] ENTSOG (2017), PS-CBA 2017: Guidance for users.
https://www.entsog.eu/public/uploads/files/publications/CBA/2017/INV_170529_PS-CBA2017_handbook.pdf
[37] JRC (2017a), Assessment Framework for Projects of Common Interest in the Field of Smart Grids

- Analysis based on Key performance indicators (KPIs) for the evaluation of the non-monetary impacts.

3.2.4 PCI permit granting process

Chapter III of the TEN-E Regulation introduces requirements regarding permit granting procedures for PCIs. Article 8 of the TEN-E Regulation requires Member States to designate a Competent Authority (CA) which is responsible for facilitating and coordinating the permit granting process for PCIs. The CA is in practice referred to as the 'one-stop shop'. This designation of a single authority, as opposed to the pre-TEN-E situation in which multiple authorities would need to be contacted, is intended to help speed up and simplify the permitting process.

Article 10 requires Member States to implement a two-stage permitting process consisting of a pre-aplication procedure and a staturory permit granting procedure:

- **Pre-application procedure** – which covers the period from the start of the permit granting process[38] until the acceptance of the application file (including the preparation of any environmental reports required).
- **Statutory permit granting procedure** – which covers the period from the acceptance of the application file until the comprehensive decision is taken.

Article 10(1) states that the pre-application procedure should take place within two years, while the statutory granting procedure should take place within one year and six months. Article 10(2) states that the combined duration of the two procedures shall not exceed 3.5 years. Article 10(6), however, states that these time limits shall not apply if they affect obligations arising from international and Union law (such as certain environmental procedures, e.g. Environmental Impact Assessments (EIAs)).

These time limits may be extended by a maximum of nine months for both procedures combined, on a case-by-case basis. The during of permit granting starts on the date of of signature of the acknowledgement of the notification by the Competent Authority (CA)[39] and ends on the date of the comprehensive decision taken by the CA.

Article 8(3) of the TEN-E Regulation introduces the following three schemes for Competent Authorities (CA) to facilitate the issuing of the comprehensive decision:

- **Integrated scheme** -The CA issues the comprehensive decision (which is the sole legally binding decision), taking into account opinions from other relevant authorities.
- **Coordinated scheme** -The comprehensive decision comprises multiple individual legally binding decisions issued by several authorities, coordinated by the CA.
- **Collaborative scheme** -The comprehensive decision is coordinated and monitored by the CA which, in consultation with other authorities, establishes on a case-by-case basis a reasonable time limit within which the individual decisions shall be issued.

[38] Which is notified by project promoters to the CA in written form. The date of signature of the acknowledgement of the notification by the CA serves as the start of the permit granting process
[39] The date of the start of the permit granting process of a PCI where two or more MS are concerned is the date of the acceptance of the last notification by the CA concerned.

Article 19 of the TEN-E Regulation states transitional provisions, by which the permit granting process (as defined by Chapter III of the TEN-E Regulation) does not apply to PCIs which submitted an application file before 16 November 2013.

The EC carried out a study[40] assessing the permit granting process for PCIs in EU MSs and related manual of procedures.

Key findings from the study "Analysis of the manuals of procedures for the permit granting process applicable to projects of common interest prepared under Art.9 Regulation No 347/2013" prepared by Milieu (2016)

- Regarding the **permit granting scheme** (as defined in Article 8 of the TEN-E Regulation), 15 MSs chose the collaborative scheme, 9 MSs chose the coordinated scheme, and one MS (Romania) the integrated scheme. Two MSs (Denmark and Greece) chose more than one scheme. Out of the 15 Member States that have experience with the implementation of the Regulation, ten are non-compliant with Article 8(3), mainly due to incomplete powers given to the one-stop-shop.
- Regarding the **workflow**, MSs have organised the permitting workflow differently than presented in Article 10. Only four of the 15 MSs assessed were fully compliant with the workflow requirements (Article 10). Non-compliance was related to issues with pre-application procedure requirements.

3.2.5 Benefits for the PCIs

Article 7(3) of the TEN-E Regulation requires Member States to allocate priority status of the highest national significance possible to PCIs (where such status exists in national law). This priority status entitles them to administrative and financial support, and is intended to ensure that permitting is given the most rapid treatment legally possible.[41]

Cross-Border Cost Allocation (CBCA)

Article 12 of the Regulation introduces CBCA decisions as one of the regulatory tools to facilitate the implementation of PCIs. These are aimed only at certain PCIs, as detailed in Article 12 (excluding oil and CO_2 transport PCIs, and projects having received an exemption related to third-party access rules or certain tariff-related obligations).

The CBCA system is designed to address cases in which there is a net negative benefit to at least one of the countries hosting a PCI (the PCI as a whole will have an overall net positive benefit). A CBCA can lead to a reviewed allocation of the investment costs amongst the benefiting countries, which takes into account the project's externalities (e.g. impact on security of supply) and its impact on social welfare (consumer and producer surpluses) in the different Member States.

ACER issued specific guidelines[42] in 2013 and 2015 which include concrete recommendations for the preparation and assessment of CBCAs with regard to electricity and gas PCIs.

[40] Milieu (2016), Analysis of the manuals of procedures for the permit granting process applicable to projects of common interest prepared under Art.9 Regulation No 347/2013.
[41] Milieu (2016), Analysis of the manuals of procedures for the permit granting process applicable to projects of common interest prepared under Art.9 Regulation No 347/2013.
[42] ACER (2013), ACER Recommendation No 07/2013 regarding the cross-border cost allocation requests submitted in the framework of the first Union list of electricity and gas Projects of Common Interest; ACER (2015a), ACER Recommendation No 5/2015 on good practices for the treatment of the investment requests, including CBCA requests for electricity and gas PCIs

Specific regulatory incentives (Article 13)

Article 13 of the TEN-E Regulation sets out that if a project promoter incurs higher risks for the development, construction, operation or maintenance of a PCI than comparable investments, and the project's net positive impact is confirmed by a cost-benefit analysis (CBA), appropriate incentives shall be granted (by the NRA). These incentives are aimed only at "regulated" electricity and gas PCIs, as detailed in Article 13 (excluding, among others, oil and CO_2 transport PCIs, as well as PCIs that have received exemptions related to regulated third-party access).

The NRAs are free to decide on the combination of regulatory measures, monetary reward/penalty schemes, etc. taking into account the relevant national regulatory systems. Risk premiums are a possible instrument, particularly if the NRA decides to leave a specific risk fully with the PP.

Article 13 also obliged ACER to provide best practices and recommendations for adequate measures (by the end of 2013) and provides the EC with the possibility to issue guidelines if necessary. Accordingly, ACER published a "Recommendation on incentives for projects of common interest and on a common methodology for risk evaluation".[43]

Specific financial incentives via Connecting Europe Facility (CEF)

The Connecting Europe Facility (CEF) is a funding mechanism designed to support the development of cross-border infrastructure introduced by the EC's growth package for integrated European infrastructure.[44] Its total budget for 2014-2020 was initially EUR 33.2 billion, but it was later reduced to EUR 30.4 billion due to the implementation of EFSI. EUR 5.35 billion of the CEF budget is allocated to energy projects (EUR 4.7 billion to be allocated through grants managed by the INEA), EUR 24 billion to transport, and EUR 1 billion to telecommunications.

The CEF aims to act as a catalyst and to leverage funding from private and public investors by "giving infrastructure projects credibility and lowering their risk profiles". In particular, the CEF provides financial support to PCI projects with positive externalities "that transcend the mere project and can therefore not be financed completely by the market".The CEF actions in energy are funded as a result of regular calls for proposals. According to the CEF brochure as of of May 2017, 93 grant agreements contributing to 73 PCIs were signed for a total of EUR 1.6 billion.[45]

The CEF is intended to make a difference by targeting a few critical projects and working together with other efforts, such as the use of network tariffs and European Structural & Investment Funds (ESIF) to finance part of the infrastructure.

The TEN-E Regulation sets the eligibility criteria for Union financial assistance (Article 14). It states that electricity, gas and CO_2 transport PCIs are eligible for grants for studies and financial instruments; projects concerning oil are excluded (Art.14(1)). More specific criteria are set for grants for works. For

[43] ACER (2014), ACER Recommendation No 03/2014 on incentives for Projects of Common Interest and on a common methodology for risk evaluation
[44] COM(2011) 676 final, Communication from the Commission to the European Parliament, the Council, the European Court of Justice, the Court of Auditors, the European Investment bank the European Economic and Social Committee and to the Committee of the regions: A growth package for integrated European infrastructures.
[45] INEA (2017), CEF Energy Key figures brochure. May 2017. Available from: https://ec.europa.eu/inea/sites/inea/files/cef_energy_keyfigures_2017_leaflet_final_0.pdf)

energy PCIs, Union financial assistance "shall not exceed 50% of the eligible cost of studiesand/or works". However, this rate can be increased up to 75% for actions which are focused on regional or Union-wide security of supply, strengthen the solidarity of the Union, or involve highly innovative solutions.[46]

In addition, PCIs with large delays which are taken over by another promoter according to Article 5(7)(d) of the Regulation can also be eligible for grants for works if they fulfil the three criteria described in Article 14(2). Smart grid and CO_2 projects[47] can be eligible as well, if significant positive externalities and their lack of commercial viability can be demonstrated (Article 14(4)).

Public participation and acceptance

Article 9 of the TEN-E Regulation introduces requirements on transparency and public participation, including an early consultation (before submission of the application file). The purpose of these requirements is to improve the quality, consistency and transparency of public engagement and to thereby (ideally) reduce public opposition.

Key findings from the study "Analysis of the manuals of procedures for the permit granting process applicable to projects of common interest prepared under Art.9 Regulation No 347/2013" prepared by Milieu (2016)

- Only three Member States (Belgium, France and Latvia) had adopted **specific legislation** related to Chapter III of the TEN-E Regulation on permit granting and public participation.
- Regarding **public participation**, the study shows that most MSs "have not properly implemented the requirements of Article 9 and Annex VI". Article 9 requires MSs to prepare a manual of procedures for the permit granting process (including the information specified in Annex VI), and requires project promoters to have a project website, submit a concept for public participation, and carry out at least one public consultation. Some of the issues are related to the lack of power and means of the one-stop-shop to ensure support for the promoter in its activities and interpretation difficulties regarding Article 9(4). Only four MSs have applied the public participation concept (Article 9(3)), and of the 14 MSs to which Article 9(4) was applicable, only eight held a public participation procedure in addition to the one envisaged in the EIA.

3.2.6 Monitoring of PCI

Project promoters are required to submit an annual report for each PCI by 31 March (Article 5(4)). ACER is required to monitor the progress of electricity and gas PCIs yearly and to present a consolidated report to the Regional Groups by 30 June (Article 5(5)). The latest published report concerns 2015 activities and is based on the annual progress reports submitted by the promoters.[48] Based on the recommendations from SWD (2015) 247, a new tool - 'Progress Watch' - was implemented to monitor PCIs in real time so that risk of delays could be identified and preventive measures adopted.

The ACER consolidated report on electricity and gas PCIs[49] provides:

[46] Regulation 1316/2013
[47] Specified in Annex II.1(e) and 4 of the Regulation
[48] While all but two reports (one electricity and one gas) were submitted, the quality and completeness of the reports varied widely. In many reports, important information is missing or inconsistent.
[49] No similar (public) report was identified for oil PCIs

- An evaluation of the progress achieved and a comparison against the previous list;
- Information on the use of financial public support, permit granting duration and regulatory treatment issues;
- Recommendations on how to overcome the delays and difficulties encountered; and
- An evaluation of the consistency in the implementation of the Union-wide network development plans.

The Competent Authorities from the Member States report to the Regional Groups regarding permit granting delays (Article 5(6)).

4 Relevance

This section of the report presents the findings on the questions we have grouped under relevance. According to the Better Regulation guidelines,[50] "relevance looks at the relationship between the needs and problems in society and the objectives of the intervention."

4.1 R.1 – Relevance of the TEN-E Rationales

4.1.1 To what extent are the objectives of the Regulation proving relevant to the needs identified in the original Impact Assessment?

The intention of the 2013 TEN-E Regulation was to address the four main issues with regard to the TEN-E programme as of 2010-2011, identified in the 2010 Impact Assessment:[51]

- Lack of focus and clarity due to the large number of projects. Moreover, new projects and technologies could not be included;
- Rigid and top-down European approach in granting priority projects;
- Non-binding framework and no obligations for MSs or promoters to realise projects;
- Lack of methodology to assess the specific contribution of TEN-E funds to the bankability of a project. The TEN financing Regulation[52] did not allow for more sophisticated financing instruments.

The main mechanisms to address these issues were: the identification of priority corridors and thematic areas, an improved methodology for PCI selection, rules on timely development (including improved permitting procedures), regulatory decisions and cost-allocation, and the Connecting Europe Facility (CEF) which in turn would help meet the objectives of the 2013 TEN-E Regulation, namely the development and interoperability of trans-European energy networks and connection to such networks.

The improvements called for by the Impact Assessments[53] aimed to better meet the the Union's energy and climate policy objectives:

- **Competitiveness**: to ensure competitive and affordable energy supply by enhancing market integration and increasing competition on energy markets
- **Security of supply**: to enhance secure supply of energy
- **Sustainability**: to contribute to the EU's environmental and climate goals, in particular by facilitating RES integration

Evaluation based on literature review

The main objective[54] of the Regulation, i.e. to facilitate the development of trans-European energy infrastructure, is in our opinion still highly relevant for electricity (even increased investment needs to accommodate higher RES penetration). Although a large share of new RES installations (PV, biomass and small wind parks) are connected to LV and MV grids, further reinforcement and extension of the

[50] http://ec.europa.eu/smart-regulation/guidelines/tool_42_en.htm
[51] SEC (2010) 1395, Commission Staff Working Document: Impact Assessment - Accompanying document 'Communication: Energy infrastructure priorities for 2020 and beyond – A Blueprint for an integrated European Energy Network' ('**2010 Impact Assessment**')
[52] Regulation (EC) 680/2007 of 20 June 2007 laying down general rules for the granting of Community financial aid in the field of the trans-European transport and energy networks
[53] The 2010 Impact Assessment and SEC (2011) 1233, Commission Staff Working Paper Impact assessment Accompanying the document Proposal for a Regulation of the European Parliament and of the Council on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC ('**2011 Impact Assessment**')
[54] As per Recital (43)

interconnected transmission grids are necessary, in particular to connect large onshore and offshore wind parks and to enable deeper system and market integration.

Smart grid deployment remains highly relevant in view of reaching climate and energy objectives, but most projects do not comply with the criteria set out in the Regulation, as they concern LV and MV infrastructure, and/or only involve one Member State and have a limited cross-border impact. Further investments in storage capacity are also necessary, for instance to enable the system integration of renewable energy, but most of these projects will primarily have a local character, and hence would not be the main focus of the TEN-E Regulation.

Regarding electricity highways, a study by E-highway[55] highlights that several corridors are needed in the energy transition looking forward to 2050. According to this study, simulations of the electricity network show that the 2030 network is not sufficient to face the 2050 (low carbon) energy goals, stressing that grid congestions would prevent some available generation to reach the load during significant periods and RES would be curtailed and compensated by expensive (and CO_2 emitting) thermal generation. The study identified major "North – South" corridors to tackle this issue, connecting the North of the pan-European electricity system (North Sea, Scandinavia, UK, Ireland) and southern Member States (Spain and Italy) to the central continental area (northern Germany, Poland, the Netherlands, Belgium and France). These electricity highways remain part of ENTSO-E's 2017-2026 research and innovation roadmap, as part of power system modernisation (namely, optimal grid design).[56]

For gas, the main objective of the Regulation is in our view also still valid – but the context has changed since 2013: multiple new cross border infrastructure projects have since been launched, EU gas demand is presently substantially lower than the peak levels in 2005-2010 and is not expected to recover in the medium or long term, wholesale gas prices are converging to a large extent and although there is still some congestion at a few IPs, this is contractual rather than physical.[57] The Regulation is, however, still relevant to the extent that several Member States, in particular in Central and South-East Europe, are reliant on less than three sources for their natural gas supply[58] and need additional investments in order to comply with the N-1 infrastructure standard defined in Regulation 2017/1938 of 25 October 2017.

For oil, there is no literature-based evidence that the need for new or refurbished oil transport or storage infrastructure that meets the criteria of the TEN-E Regulation would have increased or decreased since its entry into force. Specific investments might nonetheless still be useful in terms of interoperability (i.e. reverse flows), in order to increase security of supply in some regions or member States which still face high(er) supply security risks, and/or to reduce the environmental impact of oil transport. In the last five years, the EU's final energy consumption of petroleum products has globally dropped below the 1990s level, and the drive towards decarbonisation may mean that oil demand will not recover in the future. The low number of proposed oil PCI projects and, more generally, the limited interest of the oil sector in the TEN-E framework, may indicate that this instrument is not highly

[55] E-highway 2050 (2015), Europe's future secure and sustainable electricity infrastructure
[56] ENTSO-E (2017a), Power in transition: R&I Roadmap 2017-2026. Research, development & innovation roadmap 2017-2026
[57] According to ACER (2017h), actual interruptions occurred at contractually congested IPs with substantially or even fully booked interruptible capacity, which may indicate the existence of physical congestion. Such instances of possible physical and contractual congestion have been observed in 2016 at 8 IPs (for a total number of 262 IPs). For most of those IPs, interruptions occurred for a limited number of days in 2016, ranging from 1 to 23 days, but in more severe cases up to 39 days (Oberkappel, Germany to Austria) and even 158 days (Liaison Nord-Sud, within France). Source: ACER (2017h), ACER 2017 Implementation Monitoring Report on Contractual Congestion at Interconnection Points (period covered: 2016)
[58] i.e. ENTSOG includes both the number of sources a country can access and dependency on a single supply source as a relevant criterion in the current CBA methodology

relevant (any more) for this area. Nonetheless, future investment projects in oil infrasctructure should be carefully assessed in order not to hinder the transition to a low carbon supply, and to avoid stranded assets.

CO_2 transport infrastructure of the scale foreseen in TEN-E has yet to be build, but the outlook is currently less positive than in 2013, mainly due to the fact that at present there is no business case for large scale CCS in the power sector, and this situation is not expected to improve in the future. CO_2transport might, however, become relevant for some specific industrial sectors, in particular in view of capturing and re-using CO_2 (CCU). Still, this potential is very limited and would allow only 1% to 2% of the overall emissions to be re-used.

Stakeholder consultation

Through the **targeted survey,** the respondents were asked to review nine statements concerning the original TEN-E rationales.[59] For four statements, the results show that the rationales were on average found 'now much/somewhat more relevant'. In order of relevance these statements are:

1) A major increase in the scale and pace of investment in **electricity interconnections and highways** is needed to cost-efficiently reach the RES targets and enable market integration.
2) **Public opposition** to energy related infrastructure projects causes delays which could be reduced through improved participation and transparency.
3) A major increase in the scale and pace of investment in **smart grids** is needed to cost-efficiently reach energy and climate targets.
4) The **permitting procedures** for energy infrastructure projects are complex and fragmented.

Electricity interconnections and highways in particular are found to be more relevant now, as this development is required to integrate RES and other new technologies and help balance the European energy system. 32% of 107 respondents even indicated that this rationale is 'now much more relevant', with some of them commenting that this should be the priority focus of TEN-E. Another argument for the increased relevance indicated by stakeholders was that delays in the planned development of transmission infrastructure make the need for investments more urgent now. A couple of respondents mentioned, however, that this rationale is not necessarily applicable to all parts of Europe. It was also added by some stakeholders that the scope needs to be broadened, taking into account internal network reinforcements, energy storage (the scope defined in Annex II could be enlarged) and the interaction of power with gas as well.

While **smart grid** innovations remain important, TEN-E may not be the best instrument to support this development. Some respondents noted that smart grids are mainly "national" investments with limited

[59] These statements were:
- A major increase in the scale and pace of investment in electricity interconnections and highways is needed to cost-efficiently reach the RES targets and enable market integration
- A major development of CO_2 transport infrastructure is needed to cost-efficiently reach the GHG emission reduction target
- A major increase in the scale and pace of investment in gas interconnections and corridor reinforcements is needed to enhance diversification and security of gas supply
- Specific oil interconnections and corridor reinforcements are needed to increase security of supply (and to reduce environmental risks)
- A major increase in the scale and pace of investment in smart grids is needed to cost-efficiently reach the energy and climate targets
- The permitting procedures for energy infrastructure projects are complex and fragmented
- The regulatory framework creates problems related to cost recovery on cross-border investments
- Public opposition to energy related infrastructure projects causes delays which could be reduced through improved participation and transparency
- There is a lack of access to suitable finance for energy infrastructure projects

cross-border impact. Of the repondents who provided reasons for the small number of smart grid PCIs, 21% mentioned that the sector is not relevant to the objectives of TEN-E.
The relevance of TEN-E in the light of cost recovery for **cross-border investments**, **access to finance**, the need for **gas interconnections,** and the development of **CO_2 transport** is on average considered to have an 'unchanged level of relevance' compared to the original TEN-E rationales.

The survey respondents indicated that the need for **oil interconnections** is on average considered 'now somewhat less relevant'. Several respondents (in particular NGOs) indicated that the prioritisation of oil infrastructure is counterproductive to the energy transition as committed to in the Paris Agreement.

It is important to note that the results of this survey might have been affected by the sample composition: only a small number of oil stakeholders participated in the survey, while electricity and gas stakeholders were well represented. With regard to oil, a large share of the respondents (62%) indicated to 'don't know' whether oil interconnections are more or less relevant. The number of respondents with a clear negative or positive opinion concerning the need for oil interconnections was thus low.

The **interviewees** confirmed in general that, although the context has substantially changed since 2013 and continues to change, the TEN-E Regulation remains highly relevant. It offers a framework which is, to a certain extent, flexible and can be adapted to the evolving context. Several respondents stressed, however, the need to ensure that the selected scenarios to evaluate the future energy system should be consistent for all energy vectors, and that synergy potentials between different vectors should be valued; specifically, more coordination is needed between electricity and gas.

A TSO representative added that the Regulation should be open for new types of projects, among others bidirectional gas transport[60] and distribution grids that enable injection of higher volumes of biomethane in the grid. The stakeholder added that, in general, the economic and technical impact of a project should be considered as a more important criterion than the project type.

An NRA representative considered that the increasing development of RES will not necessarily lead to a higher need for interconnections; curtailment (or local storage) can in some cases be an adequate alternative to investment in new interconnection capacity. Gas will also be needed for power generation installations, which will be used as a back-up for renewable energy based power generation, but there is at present a high uncertainty with regard to the gas demand evolution.

Conclusion

The relevance of the TEN-E Regulation in the context of the need for **electricity** interconnections and highways has increased compared to the situation in 2013, as substantially higher grid investments will be required to reach the 2030 and 2050 targets[61] and to enable market and system integration cost-efficiently. Smart grids and energy storage are at present also considered to be of higher relevance than in 2013, but most projects have a local character and are hence not eligibile. A possible enlargement of the eligibility criteria could be considered and further assessed.

[60] Reverse flows are explicitly allowed under TEN-E (Annex IV(1)(c) but, in order to accomodate the injection of increasing biomethane volumes into the distribution grids, transport pipelines should also be able to absorb biomethane
[61] Annual investment needs in 2021-2050 for electricity grids (extension, refurbishment and replacement of ageing infrastructure) are estimated at EUR 40-62 billion in the decarbonisation scenarios, compared to actual levels of EUR 25-34 in 2011-2020.

For **gas,** the initial rationale of the Regulation is still valid, but the need for new infrastructure will be lower than in the past, and mainly focused on projects needed to enhance security of supply, in particular in Central and South East Europe.

CO_2 **transport** infrastructure is still relevant, but the effective deployment perspectives of carbon capture and storage are less positive than in 2013, in particular in the power sector. CO_2transport might, however, become more relevant for some specific industrial sectors, in particular in view of capturing and reusing CO_2 (CCU). This potential is however very limited.

The need for investments in **oil infrastructure** is now considered lower than in 2013.

Public opposition to infrastructure and lengthy and complex permitting procedures remain critical and hence highly relevant issues. Cost recovery for cross-border investments and access to finance are generally considered to have an 'unchanged level of relevance' compared to the original TEN-E rationales.

4.2 R.2 – Market Failures which justify TEN-E and CEF

4.2.1 What evidence is there of (continued and/or new) market failures that justify the TEN-E Regulation and/or financing/subsidies? (Article 17.f)

A typical market market failure in relation to investments in interconnecting infrastructure refers to the situation where investment decisions by individual Member States may be optimal or rational for the country on its own, but not for the group of countries overall. Reduced market failures over the last four years may be an indication of the relevance or effectiveness of the TEN-E Regulation. The aim of this question is to look at what market failures were used to justify TEN-E at the moment of its approval in 2013 and to evaluate if these market failures still exist. At the same time, it should explore whether there are any new market failures which have become apparent in the last few years that are of potential relevance to TEN-E.

Evaluation based on literature review

Investments in infrastructure with cross-border impact are often hindered by asymmetric economic impacts; regulation can in that case contribute to their realisation via cost-sharing and/or co-financing. EU intervention is also useful for investments which are necessary to ensure energy supply security, but which are not properly remunerated by the market.

Both the 2010 and 2011 impact assessments identified a number of – partly overlapping - market failures justifying TEN-E:

- The public good character of the investments (e.g. gas reverse flow, storage for security of supply, integrated offshore grids, or investments to reduce electricity loop flows through transit Member States).
- Projects with information asymmetry (e.g. innovations or new technologies entailing first mover risks and uncertainties).
- Complex and asymmetric cost and benefit allocations involving several Member States.
- Mismatch between measures for infrastructure development to ensure grid integration of renewables and renewable support schemes.

- Market incumbents resisting implementation of investment projects to prevent entrants to access markets.
- Risks and impacts of over- or under-investments: oversizing investments with risk of sunk costs versus undersizing (or no) investments with security of supply risks.

There is little literary evidence addressing market failures in relation to the TEN-E Regulation. The Berger Study (2016) indicates that a financing gap still exists for some PCIs, in particular for those with a geographic cost-benefit mismatch. This study also concludes that the CBCA mechanisms do not have the desired effect and that some complex projects exceed the capacities of the involved TSOs.

As illustrated in the ACER (2014) CBCA Decision on the Gas Interconnection Poland – Lithuania Project of Common Interest No 8.5 (GIPL), the promoters of the project, namely the Polish and Lithuanian TSOs, had submitted a business plan whereby the promoters would bear no capacity (volume) risk but capture all additional revenues in the case of upward deviation from the level assumed in the investment request. Thus, ACER found that the absence of any corrective measures to make the TSOs of Latvia and Estonia benefit from any increase in revenues, despite them being expected to contribute to the costs of the GIPL, would 'result in an unbalanced risk distribution' between the said TSOs.[62]

The Agency also found that the proposed CBCA on the one hand deviated from the manner in which compensation was to be provided to promoters, and on the other hand from the allocation of compensation to the contributing countries, which in effect led to the proposal departing from ACER Recommendation No 07/2013,potentially affecting both the outcome of the CBCA and the level of impact on tariffs.

Infrastructure investments can also lead to asymmetric effects in the form of loop flows; this phenomenon does not directly result from a market failure, but it should be properly addressed at supranational level in order to avoid distortions amongst MSs and a suboptimally functioning electricity system. Due to the external effects of loop flows, the host country is indeed incentivised to implement measures to reduce them, while the country from which the flows originate is not motivated to alleviate this problem. In this context, Trinomics (2017)[63] refers to increasing electricity loop flows from the north of Germany, via Poland and the Czech Republic, to the south of Germany, and observes that the realisation of infrastructure projects to adequately address this problem is lagging behind and TEN-E is thus still justified.

AF & REF-E (2014)[64] also makes reference to the geographical distribution of costs and benefits and the asymmetric treatment of PCIs within different (national) regulatory frameworks, whereas JRC (2017)[65] argues that large differences between national energy infrastructures would prevent businesses and consumers from reaping the full benefits of integrated markets and smart grids and would make trade and cooperation across national borders difficult. TEN-E addresses this problem by supporting for instance the development and installation of cross-border ICT infrastructure for coordinated control

[62] ACER (2014), Decision of the Agency for the Cooperation of Energy Regulators No 01/2014 of 11 August 2014 on the Investment Request Including Cross-Border Cost Allocation for the Gas Interconnection Poland - Lithuania Project Of Common Interest No 8.5
[63] Trinomics (2017), European energy industry investments. Study for the ITRE Committee.
[64] AF & REF-E (2014), Study on regulatory incentives for investments in electricity and gas infrastructure projects – Final report. Prepared by AF-Mercados, EMI and REF-E for the European Commission, Brussels.
[65] JRC (2017a), Assessment framework for projects of common interest in the field of smart grids – 2017 update.

and monitoring of the electricity network on both sides of the border, with the aim to optimise the use of interconnection capacity, including for ancillary services.

In the current situation, important barriers (including market failures) to investments in cross-border energy infrastructure still subsist and justify the TEN-E Regulation and/or financial support:[66]

- The most important market failure is undoubtedly the asymmetry between the costs and benefits of cross-border projects and domestic projects with (large) cross-border impacts. The Biscay Gulf project between France and Spain (2000 MW HVDC) illustrates this problem. This project has been part of the TYNDP since 2012, was declared a PCI in 2013 and 2015 (number 2.7), and is a candidate to be included in the 2017 PCI list.The investments amount to EUR 1191 million in France and EUR 559 million in Spain, while the annual net socio-economic welfare amounts (in scenario 4) to EUR 82 million in France and EUR 156 million in Spain. Moreover, between 15% and 40% of the gross benefits would be captured by non-hosting countries. As the net present value of this project is negative for France, this project would not be realised without a supranational arrangement to reallocate the costs and revenues (congestion rents) and without CEF support.
- Several cross-border investments are not driven by market needs but by security of supply concerns: security of gas supply is still a critical issue in some EU MSs/regions while security of electricity supply has recently become a critical issue in some EU MSs, for instance due to the ongoing and planned large scale decommissioning of conventional power plants. Moreover, some islands (e.g. Cyprus) and regional markets (e.g. Baltic states, Iberia) are still not sufficiently integrated into the rest of Europe. TSOs and other project developers do not recognise enough incentives to invest in cross-border lines, which are mainly triggered by security of supply aspects. Without public 'support', interconnectors would not be build in these regions, although the Estlink and BEMIP projects illustrate the positive societal impact of TEN-E and CEF for these regions.
- National regulation is still impeding interconnector investments: in some Member States (e.g.UK), there are regulatory limitations for the TSO to recover interconnector costs from regulated tariffs, while other national regulators (e.g. France) are reluctant to approve national tariff increases to recover investments that mainly benefit other MSs.
- Technical barriers are also still relevant: project developers should optimally integrate technological innovations, but they are often hindered by national rules which do not properly remunerate the first mover risk related to the use of new and innovative technologies, such as for instance the HVDC-VSC technology for meshed offshore grids. Some national regulators are reluctant to reflect the higher risk of such technological choices in an adjusted return on investment for the TSO. EU support via TEN-E and/or CEF is hence useful, at least with regard tofirst mover investments, to avoid that suboptimal standard solutions are preferred to innovative technological options.
- Some specific institutional obstacles still justify TEN-E and/or financial intervention. TSOs of which the ownership was not fully unbundled might prioritise cross border investments that protect the market position of their owners and maximise their income, and might be reluctant to propose or realise projects that offer an overall positive social welfare but a negative economic impact for their shareholders. The TEN-E framework offers adequate instruments to avoid or at least mitigate this risk.

[66] This analysis is amongst others based on input from EWEA

- Finally, specific national economic interests can still have a distortive impact on cross-border investment decisions, which would be otherwise clearly beneficial from a wider socio-economic and regional perspective.

These various observations illustrate that market failures and other barriers are still hindering investments in trans-European infrastructure and hence justify TEN-E and CEF Regulation.

Stakeholder consultation

The majority of the respondents of the **targeted survey** (64%) replied that market failures (still) exist; while 14% answered they do not exist (anymore). Another 22% replied 'don't know' to the question of whether market failures which justify the allocation of EU finance to PCIs exist (total n=109).

The comment section revealed a range of presumed market failures, as identified by a total of 45 commenters (of the 70 who had indicated that 'market failures still exist'), such as:

- The market does not remunerate innovative projects with increased costs and risks[67]
- No guarantee for stable returns over sufficient time[68]
- Fragmented markets and different regulatory regimes
- Absence of price zones between some countries
- Affordability issues when recovering costs through network tariffs[69]
- Non-monetary or assymetric benefits of cross-border projects not reflected in business case
- Lock-in with fossil fuels[70]
- ETS price is not adequate
- Absence of market for CO_2 capture and storage[71]
- Incapability to take into account (long-term) positive externalities like security of supply, CO_2 reductions, higher system resilience.[72] Countries which benefit indirectly from the infrastructure do not contribute to the costs of the projects.

A dozen of the 45 comments focused on the current regulatory and market approach (e.g. short termism), related to the above identified market failures which hinder investments in interconnection infrastructure. Some respondents also made suggestions for regulatory changes, which would allow the further tackling of (still) existing market failures.[73] One NRA gave a different type of comment, stating that "these market failures differ across the European Union, thus it should be considered to concentrate on instruments to deal with this where they are specifically needed, instead of a one-size-fits-all approach."

[67] One respondent mentioned that innovative solutions were not remunerated and two that innovative solutions incur in higher costs and risks (one of which referred specifically to electricity storage projects).
[68] This comment (given by one stakeholder) might have been given by the respondent who also referred to non-regulated assets; national regulatory frameworks are in general offering sufficient certainty for investors in regulated assets
[69] Three respondents mentioned affordability issues in their answers.
[70] This comment seems not to refer to an "existing market failure"; these stakeholders suggest that fossil fuel based projects should not be supported any more in order to avoid fossil fuels lock in.
[71] This comment seems not to refer to an "existing market failure" but rather to the absence of a business case for carbon transport projects.
[72] Our interpretation is that the respondents refer to the fact that the benefits of positive externalities are currently not internalised in grid tariffs or market prices.
[73] Comments included i.e. that the EU should support energy infrastructures and technology equipment which are not fully attractive to private investors due to longer pay back time than expected, yet essential to ensure a modern, sustainable and efficient energy infrastructure, market integration and balance among EU regions; that financial assistance should be provided to projects which increase level of energy independence of the regions which face domination of one supplier; that the EU should take into account a wider perspective of the interconnection between a Member State and an EnC Contracting Party; to introduce advanced remuneration mechanisms (e.g. Cap & Floor) to mitigate the investor risks for merchant lines and encourage investments.

Of the 15 respondents who answered that there were 'no market failures', six respondents provided more information on their answer. One MS authority, for example, explained that "market failures have already been addressed by regulatory measures" as set out within the regulated markets. This same stakeholder specifies that issues of 'commercial viability', may not necessarily indicate a market failure but rather a failure of the respective regulatory framework. However, other answers mentioned that political reasons (rather than market failures), such as the question of affordability, may indeed justify the use of EU financing. Another stakeholder highlighted that "In order to justify the allocation of EU funds to PCIs, one has to argue based on expected future 'market failures'. This requires: 1) No interference with the market, e.g. in the form of introducing capacity mechanisms. 2) Creating scenarios with data sets that allow our models to simulate a future price volatility … that justifies investments in PCIs."

Finally, five respondents who answered 'don't know' to the question of whether market failures exist elaborated on their answer[74]. For instance, a MS authority stated: "A number of UK PCI projects certainly benefit from EU funding at a critical stage in their development, which has helped a number of projects to develop. However, it is hard to say if this is addressing a specific market failure."

A stakeholder provided a specific comment regarding market failures when discussing options to improve the PCI framework. Congestion rents and other interconnectors' revenues (e.g. transmission tariffs, capacity mechanisms) highly depend on bidding zones' configuration (particularly critical for merchant lines, see Regulation 714/2009) and on infrastructure development (mostly driven by regulation). An option to reduce this market failure and the resulting risks for merchant lines could be the introduction of advanced remuneration mechanisms (e.g. cap & floor), which could mitigate the investor risks and encourage investments.

Stakeholders who took part in the **Focus Group on Permitting and Public Acceptance** mentioned that CBCA is a specific regulatory tool which is focused on PCIs with benefits which do not fully outweigh the costs in the hosting country and thus the aim is to share costs with countries which benefit significantly. It was also stressed that costs not being allocated across borders is not an unsuccessful outcome in itself, as most of the times CBCA is used as a gateway to CEF funding. Stakeholders also mentioned that the focus should be on improving the CBA and scenario development because the results of the CBA are not sufficiently trusted and the scenarios are not approved by the EC as with the CBA.

During the **interviews**, two NRA representatives argued that support should continue to be provided for infrastructure which is not commercially viable but necessary to ensure security of supply. This is a particularly critical issue for peripheral countries. Another NRA respondent suggested to focus CEF funding on infrastructure investments with clear environmental or supply security benefits, which would not be otherwise realised due to a lack of proper incentives for project developers. One way to incentivise development and financing of interconnectors is to harness the commercial incentives where revenue streams exist. This option could in particular be considered if the regulated model, which is

[74] Other comments included i.e.:
- Failure of electricity markets (uneconomic investments) and of the carbon market (which does not provide enough commercial incentives for carbon capture, transport and storage).
- Lack of consistency in how security of supply benefits are monetised as revenues across Europe, improper implementation of existing rules regarding third parties (hindering accessibility to external finance); potential changes to UOR conditions which may reduce the 'market signals' for interconnector investment.
- Need to align investor commercial drivers with the socioeconomic rationale for interconnector investment

the standard for interconnections within the EU, fails to deliver the required investments, and for interconnections with non-EU Member States. A fourth NRA representative confirmed that market failures still exist and mainly result from the asymmetric economic impact of interconnectors and the lack of proper internalisation of external impacts in market signals. When they contribute to achieving political objectives in the energy field, support remains for these investments.

Conclusion

Important market failures and other barriers to investments in trans-European energy infrastructure still subsist and justify the TEN-E Regulation and/or related financial support. The most important market failure is the asymmetry between the costs and benefits of cross-border projects and domestic projects with large cross-border effects. Moreover, several cross-border investments are partly or mainly driven by security of supply needs; adequate regulation and/or support is necessary to trigger such investments. Interconnector investments are also still impeded by inadequate national regulation, technical barriers, institutional obstacles, and specific national interests; all these failures and barriers can be adequately addressed by supranational regulation.

There is no clear evidence in the literature regarding to what extent the impact of market failures on investments in energy infrastructure has decreased or increased, but it is clear that market failures still subsist and justify regulation. This conclusion is confirmed by the stakeholders, of which 64% responded that market failures (still) exist and continue to hinder investments. Respondents revealed a range of existing (or presumed) market failures. The short term focus of current regulatory and market approaches related to investment projects was identified as the main barrier for investments in interconnections.

4.3 R.3 – Gas and Electricity Network System Failure Events

4.3.1 What evidence is there for gas and electricity network system failure events, their causes and related economic cost? (Article 17.c (part))

When improvements related to system failures can be established over the last four years, it may be an indication for the relevance of the TEN-E Regulation.

Evaluation based on literature review

At the European level, CEER/ACER and ENTSO-E/ENTSOG publish information about grid disturbances and interruptions in supply. Since 2001, CEER has published five benchmarking reports providing an in-depth survey and analysis of the quality of electricity supply. The 2016 6th edition also covered the continuity and quality of supply of gas, for the EU, Norway and Switzerland.[75]

The ENTSO-E Transparency Platform[76], launched on 5 January 2015, and ENTSO-E's Power Statistics site also provide relevant information. For the Nordic and Baltic region, ENTSO-E publishes the HVDC utilisation and unavailability statistics report[77] as well as an annual HVAC Disturbance Statistics report

[75] CEER (2016a), 6th benchmarking report on the quality of electricity and gas supply
[76] Regulation 543/2013, has made it mandatory for European Member State data providers and owners to submit information related to electricity generation, load, transmission and balancing for publication through the ENTSO-E Transparency Platform.
[77] This report presents the availability and utilisation of HVDC links connected to the Nordic power system, where the unavailable technical capacity is due to maintenance outages, disturbance outages, other outages and limitations. For each link, the availability

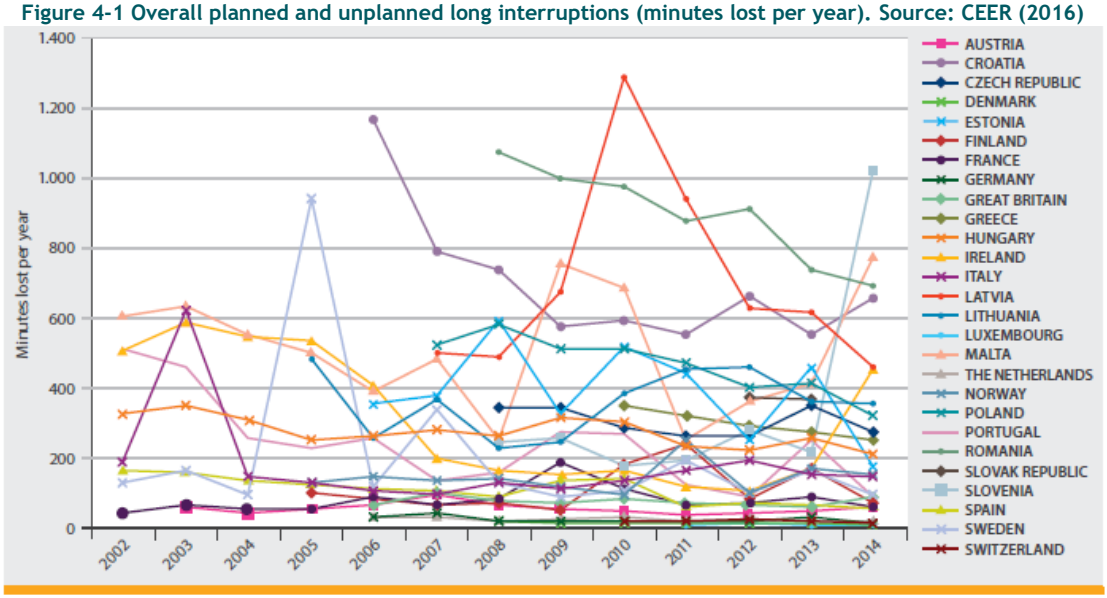
which presents the grid disturbances for Denmark, Finland, Norway, Sweden, Iceland, Estonia, Latvia, and Lithuania, and describes the connection between disturbances, energy not supplied, causes of faults, and distribution.[78]

In addition to the European level data and reports, facts and figures are available on a national level[79], although it can be assumed that this data is used by ENTSO-E and CEER. This is confirmed by ENTSO-E's Incident Classification Scale, which covers the incident reports from ENTSO-E members.[80]

Gas and electricity network system failure events

For **electricity**, the CEER report addresses – for instance – the continuity of supply[81], focusing on interruptions in electricity supply, defined as events during which the voltage at the supply terminals of a network user drops to zero or nearly zero (per EN 50160 standard). **Error! Reference source not found.** shows both planned and unplanned long interruptions, in minutes lost per year (over a wide range of durations of 15 - 1,300 minutes).

Figure 4-1 Overall planned and unplanned long interruptions (minutes lost per year). Source: CEER (2016)



If the analysis focusses on countries with interruptions of less than 400 minutes/year, we notice that: the countries that present low and relatively stable figures (not exceeding 50 minutes lost per year) are Denmark, Germany, Luxembourg, the Netherlands and Switzerland; these countries can also be characterised as those with a high proportion of cable circuits in their MV networks. When considering the number of events, or only the unplanned interruptions, or when excluding exceptional events, no clear trends can be observed. However, in general it can be concluded that performance has improved slightly over the period 2002 – 2014.

and unavailability is presented, including the number of outages and limitations. The disturbance outages are also described in the text, where for the larger disturbance outages the cause is mentioned.

[78] This is done for the past year, compared to the developments of the past decade.

[79] For example, in the Netherlands, Netbeheer Nederland (the Association of Energy Network Operators) reports on the reliability of electricity and gas grids. This report contains the results of the registration of Dutch grid companies (both TSOs and DSOs), which monitor the performance of the grid using the same methodology. In Germany, BNetzA is given the responsibility to track system failures for both electricity and gas and reports them online: https://www.bundesnetzagentur.de/EN/Areas/Energy/Companies/SecurityOfSupply/QualityOfSupply/QualityOfSupply_node.html.

[80] www.entsoe.eu/about-entso-e/system-operations/ops/incident-classification-scale/Pages/default.aspx

[81] Continuity of supply can be described by various quality dimensions and the ones most commonly used are number of interruptions, unavailability (interrupted minutes) and energy not supplied (ENS) per year. It is important to note that differences exist among countries in the type of interruptions monitored, in the indicators and procedures for data collection and analysis used, and the CEER report elaborates on those differences.

The ENTSO-E's Transparency Platform also provides information on unavailability in transmission grid, unavailability of offshore grid, unavailability of production and generation units, and aggregated unavailability of consumption units[82]. Regarding unavailability in transmission grid, planned and unforced outages are monitored, including various features such as the status, the reason, the area, net transfer capacity impact, affected assets and comments.

The ENTSO-E's HVAC Disturbance Statistics Grid reported 2386 disturbances in 2014 in the Nordic and Baltic main grids, of which 22% caused energy not supplied (ENS).[83] In 2014, the energy not supplied due to faults in the Nordic and Baltic main grids was 4.86 GWh. The ENS for the Nordic main grid totalled 4.76 GWh, which is below the ten-year average of 6.66 GWh.

Table 4-1 Number of grid disturbances in the Nordic and Baltic countries in 2014 and the annual average for 2005-2014

Country	Number of disturbances		Number of disturbances causing ENS[1)]	
	2014	2005–2014	2014	2009–2014
Denmark	77	64	7	7
Estonia	225	-	11	-
Finland	513	396.7	90	82
Iceland	40	32	23	16
Latvia	151	-	19	-
Lithuania	160	-	25	-
Norway	461	292.8	146	95
Sweden	759	546	202	158
Total	2386	1331	523	358

1) The time period is 2009–2014 because every country does not have complete data before 2009.

Table 4-2 Energy not supplied (ENS) per voltage level of the primary fault in the Nordic and Baltic countries

Country	Energy not supplied (MWh) 2014	Average ENS 2005–2014 (MWh)	ENS divided into different voltage levels, 2005–2014 (%)			
			100–150 kV	220–330 kV	380–420 kV	Other[1)]
Denmark	24	19	93.4	0.0	0.0	6.6
Finland	499	356	93.8	2.7	3.5	0.0
Iceland	835	1137	34.2	65.8	0.0	0.0
Norway	2165	3316	27.5	7.5	63.8	1.1
Sweden	1235	1832	82.0	15.2	1.9	0.8
			ENS (%) divided into different voltage levels, 2014			
Estonia	30	-	100.0	0.0	0.0	0.0
Latvia	36	-	96.7	3.3	0.0	0.0
Lithuania	39	-	100.0	0.0	0.0	0.0
Total	4758	6659	66.2	18.3	13.8	1.7

1) The category other contains energy not supplied from system faults, auxiliary equipment, lower voltage level networks and the connections to foreign countries, etc. This is described further in the guidelines [1].

For **gas**, the CEER report focuses on interruptions in gas supply, defined as events during which there is no gas at the supply terminals of a network user or the pressure drops below a specific level. However,

[82] See https://transparency.entsoe.eu/outage-domain/r2/unavailabilityInTransmissionGrid/show.
[83] According to this report, disturbances are defined as outages, forced or unintended disconnection or failed reconnection, as a result of faults in the power grid. So, a disturbance may consist of a single fault, but it can also contain many faults, typically consisting of an initial fault followed by some secondary faults.

the CEER report only discusses the indicators used per country, but does not provide any results of actual interruptions or failures.

The European Gas pipeline Incident data Group (EGIG), which involves 17 major TSOs, gathers data on the unintentional release of gas in their pipeline network systems. Its latest report concludes that, over the past 5 years, the incident frequency is 0.16 incidents per year per 1000km (compared to 0.33 incidents per year per 1000km since 1970)[84].

Causes

In 2015, ENTSO-E created a new Electricity Disturbance Incident Classification Tool (EDICT) to report and track "Causes, Consequences and Remedial Actions of electricity disturbance incidents"[85]. The latest Incident Classification Scale Annual Report of ENTSO-E provides information on the number of incidents according to 4 scales and 21 subscales. In total, 1084 incidents were reported in 2015, which is 14% less than in 2014. 297 Scale 1 incidents (noteworthy incidents) were reported in 2015, of which almost half were incidents concerning transmission network elements, including connections between TSOs. Another 35% of these incidents were N-1 violations. The four extensive Scale 2 incidents reportedwere mainly related to load in isolated system.

ENTSO-E also publishes the Yearly Statistics and Adequacy Retrospect, which reports on unavailability of international tie lines, including the reasons for (10 different codes are used) and the duration in minutes of such unavailabilities. However, it only provides the data for one year and does not give any overview of results or developments over time.

There are differences in the definitions of fault causes and disturbances between countries. Some countries use up to 40 different causes, while others merely distinguish between primary and underlying causes. The Nordic and Baltic statistics use seven different options for electricity fault causes: lightning, other environmental causes, external influence, operation and maintenance, technical equipment, other, and unknown.[86]

For gas, EGIG reported that over the last ten years the main cause for pipeline incidents was external interference (35%) followed by corrosion (24%), construction defects (16%) and ground movement (13%).[87]

Economic cost

The CEER report does not report on the economic costs of interruptions of electricity or gas supply, but it describes the standards for compensation and compensation levels in various countries, which can be used as a proxy. Other studies estimate the economic costs of supply interruptions for specific countries:

- For **Germany**[88]**,** electricity interruption costs vary significantly over time, between sectors and regions. Peaking on the midday of a Monday in December at EUR 750 million per hour, the average of total national outage costs amount to approximately EUR 430 million per hour. The industrial sectors which face the highest outage costs are the machinery and transport

[84] EGIG (2015), Gas pipeline incidents. 9th report of the European Gas Pipeline Incident Data Group.
[85] The ENTSO-E glossary defines disturbance as an unplanned event that may cause the transmission system to divert from the normal state.
[86] ENTSO-E (2017b), Nordic And Baltic Grid Disturbance Statistics 2016
[87] EGIG (2015), Gas pipeline incidents. 9th report of the European Gas Pipeline Incident Data Group.
[88] EWI (2013) , The costs of power interruptions in Germany - an assessment in the light of the Energiewende

equipment sectors, with an average aggregated hourly outage cost of approximately EUR 20 million.

- For **Austria**, the average Value of Lost Load (VoLL) for a power cut lasting one hour on a workday morning in summer was estimated at EUR 17.1 per kWh electricity not supplied.[89]
- Further information about VoLL estimates for **Norway, Great Britain and the United States** was presented in a recent study of researchers at the University of Leuven in Belgium.[90] For example, in Great Britain (based on a study by London Economics in 2013), the headline-weighted average VoLL is £16,940/MWh for peak winter workdays. However, these figures vary between customer groups, time of use, and method used to estimate the VoLL.
- London Economics estimated in 2011 the Value of Lost Load (VoLL) for domestic, SME, and industrial and commercial gas consumers in **Great Britain**. The VoLL represents the value that gas users attribute to security of gas supply and these estimates can be used to provide a price signal about the adequate level of security of supply.[91] In their conclusion they state: *"The result show large variations in the value of lost load depending on the type of gas user and, in the case of domestic and SME gas users, depending on the characteristics of the gas interruption. The estimates of industrial and commercial customers reveal huge variations depending on the sector, while VoLL for small SMEs and SMEs that expect a low impact of outages consistently are found to be lower than the average VoLL for SMEs. For household consumers we find a lower VoLL for vulnerable groups and for domestic consumers with low gas usage."* This shows the difficulty regulators face when determining uniform compensation levels for gas outages.

In the Clean Energy for All package, Article 10 of the proposed Regulation on the internal market for electricity (recast) determines that Member States must establish a single estimate of the VoLL for their territory, expressed in EUR/MWh, and to be updated at least every five years. The ENTSO-E needs to develop the methodology for establishing VoLL. Article 9 of the same Regulation states that the maximum wholesale electricity price is set by the VoLL level. The basic idea is that the market will respond to the VoLL by building additional capacity up to the point where a MW of capacity costs just as much as it earns from being paid the VoLL during blackouts.

Commission Staff Working Document SWD(2016) 119 final of 13.04.2016 estimates that the VoLL for EU Member States ranges from EUR 11,000/MWh to EUR 26,000/MWh, which is significantly higher than existing European price caps.

The literature overview shows that, both at EU and national level, there is enough information available with regard to gas and electricity network system failure events and their causes, but estimates about their related economic costs are limited. However, information seems to be inconsistent across countries and there is generally distinction made between interconnections and domestic failures or causes. The implementation of estimating a VoLL in each Member State may establish more insight into the costs of electricity scarcity, but still will not provide a direct estimation of the economic costs of a specific incident or outage.

[89] Johannes Reichl et al. (2012), The value of supply security: the costs of power outages to Austrian households, firms and the public sector
[90] KULeuven (2016), How detailed value of lost load data impact power system reliability decisions: a trade off between efficiency and equity
[91] London Economics (2011), Estimating Value of Lost Load

Moreover, it is unclear whether and to what extent the TEN-E Regulation might have had an impact on the frequency and duration of system failure events. One could assume that a higher interconnection level improves the resilience of the energy system and hence should have a positive impact on its performance and quality. Given the high degree of variability in terms of project type and range of the list of PCIs, as well as the complexity of assessing the contribution of one single project to the overall resilience[92], it is acknowledged by ENTSO-E (2015b)[93] that the technical resilience benefit is not based on an algorithmic calculation but rather on professional judgement. The assessment of technical resilience needs to consider all hazards that may affect the power system, such as failures combined with maintenance, as well as steady state and voltage collapse analysis.

On the other hand, assessing the impact on flexibility is needed since the best investment for the future is not necessarily the optimal one in one given scenario, but the most robust one, i.e. the investment which provides value across a large number of scenarios or planning cases.[94]

Interconnections can, however, also lead to unintended energy flows which perturb neighbouring energy systems and hence might cause system failures (see also the market failures and loop flows addressed in section 4.2). Loop flows can indeed result in market inefficiency (both in the area where the flows were scheduled, and in the 'host' area) if generation and the grid are not compensated for what they deliver, and if consumers are not exposed to the real costs of their electricity consumption. If loop flows are substantial, calculated capacities may have little relevance. Moreover, the host area of loop flows incurs costs, whereas the area with the originally scheduled flows saves costs. In extreme cases, loop flows can result in a black-out if the concerned TSOs do not have sufficient remedial measures available to restore system operation under proper security criteria.[95] However, this issue is not explicitly addressed in studies and reports. In 2015, the UK Parliament concluded that "there is a worrying lack of clarity about what options exist if a number of interconnected countries experience system stress simultaneously."[96]

Stakeholder consultation

Most **interviewees**did not have a clear opinion on the impact of the extension of trans-European networks on the severity and frequency of system failures; they were, however, confident that a higher interconnection level has a positive impact on the system reliability.

With new infrastructure, the impact of energy scarcity can more easily be spread over different Member States and in case of power shortages, power can be purchased more easily from other Member States. Several interviewees mentioned that this should be the case, especially if the focus of TEN- E is on those connections where there are currently security of supply problems.

[92] The system wide CBA conducted by ENTSO-E is intended to allow an assessment of projects in a homogenous way and identifies a number of indicators, i.e. 2 cost elements and 7 benefit indicators, thereby improving transparency in displaying costs and benefits of projects at a European-wide scale.
[93] ENTSO-E (2015b) ENTSO-E Guideline for Cost Benefit Analysis of Grid Development Projects. FINAL- Approved by the European Commission
[94] ENTSO-E (2013) ENTSO-E Guideline for Cost Benefit Analysis of Grid Development Projects - Frequent Asked Questions
[95] Thema (2013), Loop flows - Final advice. This report also provides empirical examples of unscheduled loop flows, in particular concerning Germany, where flows from North to South Germany (and further south) are diverted via Poland, Czech Republic and the Netherlands and Belgium. They conclude that the unscheduled flows mainly result from insufficient price signals: market prices do not reflect limitations in the grid, e.g. within the German market area, and renewable generation and feed-in is not, or only partly, related to the market price.
[96] House of Lords (2015), The Resilience of the Electricity System

The input provided by one respondent to the **targeted survey** was that the measures in the Proposal for a Regulation on the internal market for electricity[97], in particular those laid down in Article 14, will lower the incentive to invest in interconnection capacity. In his view, systematic neglect of constraints on internal network elements and loop flows contradicts the basic principles of flow-based market coupling, potentially leading to a situation in which investments in new interconnectors involve higher risks and costs.

An energy sector representative added that not only the economic cost of failures should be considered, but also their safety impact. An interruption in the gas network leads, for instance, to safety risks for end-users. Cybersecurity should also be considered in network planning; safety and security should in general be important considerations in investment evaluations.

Conclusion

Although there is information available, both at national and EU level, consistent and concrete evidence of developments in system failures, their causes and related economic costs in relation to improved interconnections is still lacking across Europe. From the CEER reporting it can be concluded that the performance of the electricity system has improved slightly over the period 2002-2014. Additionally, ENTSO-E reports 14% less incidents in 2015 compared to in 2014. Whether or not this decrease is (partly) the result of TEN Regulation remains unclear.

Despite improved data and statistics on electricity and gas system failures and their causes, the related economic costs of such failures are unknown to us. Progress is being made regarding the estimation of the value of electricity not served, by means of a proposal directing Member States to establish a single estimate of the VoLL. However, simply applying the VoLL on the energy not served due to a system failure would not cover the full economic costs of such a failure. Moreover, not every failure results in energy not served.

4.4 R.4 - Future Context

4.4.1 To what extent would the proposed 30% binding EE target reduce the needs for interconnectors e.g. gas?

Through the 2030 Climate and Energy Policy Framework, in 2014 the EU set an indicative Energy Efficiency target of at least 27% by 2030. In 2016, a more ambitious 30% binding energy efficiency target was proposed by the European Commission as part of its "Clean Energy for All Europeans" package[98], which represents a major cornerstone for the Energy Union.

Evaluation based on literature review

Currently, there is no publication providing a quantitative assessment of the impact of a higher energy efficiency target on the future need for gas interconnectors and related investments; however, energy efficiency is commonly mentioned as an alternative to - or at least as a mean to reduce the need for the development of - interconnection infrastructure. Nonetheless, so far, uncertainties about future gas

[97] COM(2016) 861 final/2 Proposal for a Regulation of the European Parliament and of the Council on the internal market for electricity (recast)
[98] COM(2016) 860 final. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the regions and the European Investment Bank, Clean Energy For All Europeans

consumption levels within the EU, which highly depend on the achievement of EU targets, remain high. In its previous TYNDPs, ENTSO-G considered a growing total gas demand in all scenarios. As mentioned by E3G in its "Energy Union insight series #1"[99], new gas infrastructure requirements may have been overestimated in TYNDPs as they were based on optimistic gas forecasts.

These forecasts have been regularly revised downwards and in the ENTSO-G TYNDP 2017[100], total gas demand is seen to be declining by 2030 (to 4,188-4,537 TWh in 2030 depending on the scenario considered); the only scenario in which a significant increase in total gas demand is depicted is the EU Blue Transition scenario (about +8.5% over the 2017-2030 period). The EC also revised its Reference scenario downwards from 5,133 TWh (Reference 2013) to 4,798 TWh (Reference 2016), compared to a level of 4,093 TWh in its EUCO 2030 scenario (which assumes that 2030 climate and energy targets are reached, including a 30% energy efficiency target).

In its 2016 study[101], E3G estimates that, in the long term, "the dual impact of economy-wide efficiency improvements and electrification trends will sharply reduce the gas demand in Europe – making new gas infrastructure superfluous before the end of its economic life (40 years or more)".

The TEN-E Regulation also underlines that "energy efficiency gains may contribute to reducing the need for construction of new infrastructures". The quantitative assessment provided by DNV[102] in its "Integration of Renewable Energy in Europe" study for the European Commission confirms that network reinforcement needs and costs are lower in a scenario with high energy efficiency combined with an assumed high share of renewables: an additional decrease of EU final consumption of 6.3% by 2030 in the enhanced energy efficiency scenario (Scenario 1b) is associated with a nearly 40% decrease in cumulative investments in networks reinforcements by the same time horizon. Energy efficiency can indeed play a key role in reducing the need for energy infrastructure investment through lower consumption, and demand-side response can be used as a source of flexibility. By increasing its energy efficiency target from 27% to 30% by 2030, the European Commission estimates that 2030 gas imports may be reduced by 12%[103], and gas gross inland consumption by about 10%[104]. Declining gas needs would lead to a lower energy dependency and could reduce the need for a further expansion of gas interconnectors.

Nevertheless, the TEN-E Regulation also notes that "union-wide integrated networks and deployment of smart grids are vital for ensuring a competitive and properly functioning integrated market, for achieving an optimal utilisation of energy infrastructure, for increased energy efficiency […]". Interconnectors can indeed enable a better sharing of energy by linking the markets from different regions of the EU, thus taking advantage of existing and efficient infrastructure and avoiding having to build unnecessary, new generation assets. However, this positive correlation between increased interconnection and higher energy efficiency can only occur provided that the transported energy is generated and used efficiently throughout the different EU markets.[105] It is therefore essential for energy efficiency policies and network planning to be aligned. Furthermore, the E3G Working Paper[106]

[99] E3G (2016), Energy Union insight series #1. More security, lower cost a smarter approach to gas infrastructure in Europe
[100] ENTSOG (2016), Ten-year Network Development Plan 2017, Main report
[101] E3G (2016), Energy Union insight series #1. More security, lower cost a smarter approach to gas infrastructure in Europe
[102] DNV (2014) for the European Commission, Integration of Renewable Energy in Europe
[103] SWD(2016) 405 final. Commission Staff Working Document, impact Assessment, accompanying the document Proposal for a Directive of the European Parliament and of the Council amending Directive 2012/27/EU on Energy Efficiency.
[104] EC (2017a), ECO2030. Available from: http://charts-move.mostra.eu/en/content/euco30?type=msline&themes=s_6_gross-inland-consumption,s_9_natural-gas&second_scenario=&index_year=#container-charts-controls
[105] E3G (2014), Briefing- Energy efficiency as Europe's first response to energy security
[106] E3G (2014), Briefing- Energy efficiency as Europe's first response to energy security

on infrastructure underlines that conferring a "binding" status to the energy efficiency target could help reduce the uncertainty about infrastructure investment requirements, for which a clear long-term vision of the efficiency gains must be considered.

Furthermore, it is interesting to note that by promoting interconnections between Member States, the EU originally wished "to make solidarity between Member States operational, to provide for alternative supply or transit routes and sources of energy and to develop renewable energy sources in competition with traditional sources"[107]. Security of supply through a better balancing of supply and demand at the European level, competitiveness and sustainability, are the core drivers for investments in interconnectors, which are therefore not necessarily driven by the level of demand. In this context, it can be argued that energy efficiency, regardless of the objective targeted, cannot be considered as a substitute to the requirement for improved interconnections within the EU.

Stakeholder consultation

During the **interviews**, an NRA representative confirmed that energy efficiency measures will effectively reduce energy consumption and hence the need for new gas infrastructure, while another NRA argued that there will still be a need for gas in the short term and therefore a need for gas interconnection and/or liquid transport options (LNG). A third NRA argued that the need for gas interconnectors will only be affected to a small extent by energy efficiency measures; other elements such as security of supply, energy and CO_2 prices, RES development and climate policy, also have an impact. In this context, the relevance of new interconnectors is quite pertinent, since infrastructure might be build that may not be used at the level expected at the moment of taking the investment decision.

Conclusion

Recent network planning and investment decisions for gas infrastructure are based on previous TYNDPs which assumed future gas demand levels, that are today considered as overestimated. Most scenarios used for the elaboration of the current (2017) TYNDP, also seem to be not in line with the 2030 energy efficiency target of 27%, and a fortiori not with a more ambitious target of 30%. Higher energy efficiency levels will, in principle, contribute to reducing the need for new gas interconnectors through a lower energy demand. A 30% EU energy efficiency target by 2030 would, for instance, enable a reduction of gas imports by 12% in 2030 and a reduction in gas gross inland consumption by 10%, compared to the 27% energy efficiency target. An enhanced integration of gas and electricity infrastructure can foster synergies at the European level and would also enable a reduction in the investment required in gas interconnectors.

In our opinion, the concrete impact of energy efficiency targets on the need for new gas interconnectors remains difficult to assess, also because it is uncertain how gas demand and peak demand will effectively evolve in the different EU regions and to what extent decreasing gas production within the EU will have to be replaced with gas imports. Moreover, most investments in gas interconnectors seem not primarily driven by demand, but are rather focusing on improving competitiveness by market integration, and on security of gas supply. Adequate interconnector

[107] Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009

deployment and energy efficiency policies should be used in a complementary way to help reach the EU objectives and targets as cost-effectively as possible.

4.4.2 *To what extent will interconnectivity/IEM/SOS targets still need to be promoted post 2020?*

The Energy Union aims at having strongly interconnected energy systems across Europe in view of, for instance, the realisation of the Internal Energy Market, with the goal of ensuring an enhanced security of supply and an optimal and cost-effective energy system for all citizens and businesses throughout the EU. In this context, and in order to realise the socio-economic benefits of a higher level of electricity transmission and interconnection capacity between MSs, an indicative 10% interconnection target at MS level has been set by 2020 (and a potential 15% target by 2030 is considered).

Evaluation based on literature review

So far, interconnectivity of the EU energy systems and markets has only been partially realised, despite significant improvements through electricity and gas market integration and the deployment of power and gas cross-border capacities: at the end of 2016, the 10% electricity interconnection level targeted by the EU by 2020 was reached in 19 Member States, whereas some of the largest MSs (Germany, France, the UK, Poland, Italy and Spain) are still below this target.[108] 14 MSs have already outperformed the 15% target. Further efforts are required in several MSs to reach the 2020 objective and a fortiori the new proposed target of 15% of interconnection capacity by 2030, which puts the emphasis on the importance of an enhanced physical interconnectivity of the electricity system beyond 2020. It should, however, be noted that a unique interconnection target for all EU MSs, expressed in interconnection capacity related to overall generation capacity, is not an optimal approach, as it does not take into account the specific characteristics (e.g. localisation, energy mix, market situation, etc.) of the individual Member States; the Commission is therefore working on an appropriate breakdown of the 2030 electricity interconnection target into regional, country and/or border interconnection targets, which would differ depending on the specific situation of the MSs.

On the one hand, a greater cross-border electricity interconnection of the different Member States can lead to substantial cost savings through higher system efficiencies amounting to around EUR 400 billion over 2020-2030.[109] Furthermore, the electricity TYNDP 2016[110] estimates that the planned investments in cross-border interconnection would have a significant impact on social welfare by 2030, by leading to an estimated reduction of power prices of 1.5 to 5 EUR/MWh. This indicates that further promotion of energy system interconnectivity and market integration in view of maximising social benefits is needed beyond 2020.

On the other hand, as decarbonisation will go hand in hand with a growing integration of variable renewables in power generation, enhanced flexibility of the power system will be crucial in the future to ensure the stability of the system. More flexibility can be reached through a combination of several options including demand response, flexible generation and storage or enhanced electricity interconnections.[111] Over 2020-2030, daily, weekly and annual flexibility needs are estimated to

[108] SWD(2017) 32 final, Second Report on the State of the Energy Union, Commission Staff Working Document, 'Monitoring progress towards the Energy Union objectives – key indicators'
[109] Booze & co (2013), Benefits of an Integrated European Energy Market. Prepared for Directorate General Energy, European Commission & ECF (2011), Power Perspectives 2030: On the road to a decarbonised power sector
[110] ENTSO-E (2015a), TYNDP 2016 Scenario Development Report
[111] E3G (2013), Working Paper- Infrastructure networks and the 2030 climate and energy framework.

continue to grow significantly, underlining the necessity to promote deeper interconnections between regional markets.[112]

The Internal Energy Market, promoted since 1992 by the Commission, aims at a full integration of electricity and gas markets throughout the EU, ensuring free energy flows across MSs without any technical or regulatory constraints and an optimal welfare to all consumers. Since then, substantial improvements have been achieved, with some important steps towards a higher supply diversification and better cross-border interconnection realised[113], either through the adoption of three legislative packages on market liberalisation, the creation of European platforms to foster cooperation (CEER, ACER, ENTSO-E or ENTSOG), or the realisation of market coupling of several zones and regions. Still, the completion of the IEM, which was targeted for 2014, requires further efforts. The evaluation report[114] accompanying the "Clean Energy for All Europeans" Package proposed by the Commission identifies several remaining barriers to the full realisation of the IEM: persisting barriers to cross-border trade and unused interconnector capacities mainly due to insufficient cooperation between national grid operators and regulators on the shared use of interconnectors; limited competition (in several large MSs, markets are still monopolistic); and remaining market distortions, which prevent lower wholesale and retail prices. In the end, consumer welfare could be significantly improved through a highly interconnected energy system and fully integrated and competitive energy markets.

Security of gas supply issues at EU level have been addressed by Council Directive 2004/67/EC and Regulation 994/2010. The Regulation was a response to concerns about rising consumption and decreasing gas production in Europe, which led to an increasing dependency on gas imports; in 2009, the Russia-Ukraine gas dispute revived the need for coping with gas supply risks. Despite the progress made on this topic, the analysis of the latest 2016 EU Reference scenario of the Commission shows that the EU objectives in terms of energy security will not be reached: gas imports are expected to increase further in the Reference Scenario (+16% by 2030 compared to 2014), which would lead to an increasing EU energy dependency. This is all the more problematic as several MSs rely on a single gas provider and route, which exacerbates the risk of price volatility or sudden disruptions in supply.[115] Finland and Baltic States, for instance, are completely dependent on Russian gas. In the long-term, and even if all the projects of the 2nd PCI list are implemented, the infrastructure standard determined in Regulation 994/2010 (N-1 for ESW-CBA indicator) would not be reached in MSs such as Bosnia and Herzegovina, Finland, Ireland, Serbia and Sweden.[116]

Insufficient cooperation between European electricity grid operators has been and remains a critical issue for improving the security of supply within the EU, both in terms of the availability of transmission capacitiesand of the ability of the market to balance the system, especially in case of emergency (SWD(2016) 412 final). In the context of growing interdependencies between MSs and their national grids, there is a strong need for more aligned and non-discriminatory security of supply policies. A stress test carried out in 2014 (COM(2014) 654 final) aimed at assessing the resilience of the European gas system if facing a severe gas disruption, showed that the EU remains vulnerable to such an event;

[112] EC (2017b), Mainstreaming RES- Flexibility portfolios, Design of flexibility portfolios at Member State level to facilitate a cost-efficient integration of high shares of renewables.
[113] COM(2014) 0634 - Progress towards completing the Internal Energy Market
[114] SWD(2016) 412 final, Evaluation Report covering the Evaluation of the EU's regulatory framework for electricity market design and consumer protection in the fields of electricity and gas and the Evaluation of the EU rules on measures to safeguard security of electricity supply and infrastructure investment (Directive 2005/89)
[115] SWD(2016) 405 final. Part 1/ 3. Commission Staff Working Document, impact Assessment, accompanying the document Proposal for a Directive of the European Parliament and of the Council amending Directive 2012/27/EU on Energy Efficiency
[116] ENTSOG (2016), Ten-year Network Development Plan 2017, Main report

the test also showed that proper coordination between MSs – based on a split of shortfall volumes between MSs - can significantly reduce the impacts of a supply disruption. Further efforts to strengthen EU market resilience are therefore necessary. A more coordinated approach as well as solidarity between MSs to better deal with emergency situations in the future (and for enhanced risk preparedness) is promoted in the 2016 proposal of the Commission, underlining the need for appropriate SoS targets also beyond 2020.

Stakeholder consultation

One stakeholder mentioned in the **targeted survey** that target interconnection capacities for gas are related to the congestion and the configuration of bidding zones. Security of supply indicators should be similar to the provisions in the risk preparedness proposal.

Another respondent mentioned that the interconnection target is not helpful when applied on the basis of a MS. The Republic of Ireland, for instance, can meet the target by developing connections with Northern Ireland, which could still leave the island of Ireland with insufficient connection. The 10% target needs to be applied to any and every region or area of the EU, e.g. to the island of Ireland. Another respondent argued for legally binding electricity interconnection objectives of 10% and 15% for 2020 and 2030 respectively. Moreover, the stakeholder suggested to reinforce the EU instruments so that projects linked to the achievement of interconnection targets have relevant EU financing support. Cost allocation efficiency principles suggest that projects with large European significance should also be largely financed at European level. EU Funding of PCI projects whose main benefits do not lie in the hosting countries, or which are needed for RES integration or market integration needs to be urgently addressed. Another respondent also considered the absence of clear and binding targets for the full interconnection of the energy networks, as a weakness of the EU energy strategy. The stakeholder referred to the efforts to achieve a well interconnected European electricity market, as well as to the TEN-E strategy which is focused on linking the energy infrastructure of EU Member States. However, results show that further efforts are needed at political, regulatory and economic level to unlock the development of the missing infrastructures and facilitate a well interconnected Europe. The stakeholder therefore suggested the establishment of binding interconnection targets on the basis of the European Council agreement of October 2014.

Another respondent to the targeted survey pointed to a lack of coherence between the TEN-E and security of gas supply Regulations. The new security of supply rules focus on the solidarity principle. It would be essential, for the evaluation of possible PCI projects, to also consider specific parameters related to the application of this solidarity principle, such as increasing reverse flow capacity, enhancing new transit routes and acquiring new supply sources.

An **interviewed** NRA agreed that targets related to interconnectivity/IEM and SoS will still be needed, but indicated they should be based on an economic analysis of their pertinence. For instance, an interconnectivity target should be set only if the benefits provided by new interconnections are higher than their costs. The objective should be to reach the energy and climate targets at the lowest possible costs, via integrated decision-making regarding the development of solutions that can be redundant or complementary to a certain extent, such as storage, demand response and interconnections.

An energy association representative argued it is difficult, if not impossible, to predict the level of future needs for interconnectors, also taking into account the long lead time to build infrastructure.

The trend towards more decentralised power generation and energy efficiency measures should in principle reduce the need for interconnectors, while an ambitious RES objective would increase the need for interconnectors. As it is unlikely that by 2020 all needs for additional interconnection capacity in terms of IEM or SoS will have been met, it is necessary to keep working on interconnection targets. Another NRA representative argued that targets will still be required as a signal of ambition post-2020, as the energy system is changing significantly. Some countries are decarbonising at a much faster rate than others; market arrangements are in vastly different states of maturity; some networks are having to upgrade and change very quickly in response to new drivers of supply and demand. Considering these factors, a one-size-fits all target is likely to have limitations. Targets should set broad aims, but should generally notbe prescriptive. The need for interconnectors in itself is not reduced because of demand response and supply flexibility, as interconnectors are enablers of flexibility at a whole-system level. Demand side management and regional development of RES can work in tandem, with interconnectors as the facilitating link.

Another energy sector representative considered that TEN-E generally strongly focuses on increasing interconnection capacity, although it is proven that this solution is the most adequate option from a macro-economic and environmental perspective in all cases. This stakeholder is not in favour of a unique electricity interconnection target for the EU and argues that the optimal interconnection level should be defined per MS/region, taking into account the new context (impact of RES and EE objectives), and on the basis of a supranational macro-economic evaluation, which also includes an evaluation of all technically feasible alternatives, such as demand response and investments in generation and storage capacity. The Regulation should be used as an instrument to enable future macro-economically justified investments.

Conclusion

On the basis of our literature review, the stakeholder consultation and our own insights we conclude thet interconnectivity/IEM/SOS targets will still need to be promoted post 2020.

Interconnectivity

- Interconnectivity is a core element of the Energy Union. However, today only 19 MSs have reached the 10% electricity interconnection target set for 2020, and the newly proposed target of 15% by 2030 confirms the need to continue and intensify efforts beyond 2020. In the gas system, interconnectivity has reached a high level, and congestion is limited.
- Flexibility requirements in the electricity system will increase significantly by 2030, and part of these needs can be cost-efficiently covered by interconnections between national/regional systems and markets.
- Interconnectors are all the more essential as they can allow for more competition and long-term cost savings through a more efficient overall system, and enhance security of supply within the EU. Howeve,r their economic viability needs to be guaranteed.
- For stakeholders, a binding interconnection target for electricity is essential as a signal of ambition on the market; however, different interconnection levels should be considered at MSs or regional level.

Internal Electricity Market

- Significant barriers are still to be removed to fully complete the IEM in the future: inadequate use of cross-border interconnector capacities mainly due to insufficient

cooperation between national governments, grid operators and regulators, as well as a limited competition performance on the market. Targets are therefore necessary to ensure benefits of the IEM for Europeans consumers.

Security of Supply

- Energy dependency remains at the forefront of the EU agenda in the context of decreasing inland gas production.
- Increasing market integration exacerbates the need for a stronger cooperation between national governments, regulators and operators through harmonised policies in order to ensure a better resilience of the EU energy system and to have a better risks preparedness.
- Specific criteria could be considered in the selection of PCIs to ensure a better consideration of SoS issues.

4.4.3 *To what extent is promoting interconnectors in electricity still in line with the new market design (MDI) proposed on 30th November and its focus on demand side and flexibility?*

In November 2016, the European Commission proposed a package of measures for implementing new rules to reform the operations and design of the European energy market and ensure a clean energy transition of its economy at minimum cost. The new framework puts the consumer at the centre of the system and underlines the "needs to organise electricity markets in a more flexible manner and to fully integrate all market players – including renewable energy producers, new energy service providers, energy storage and flexible demand".[117]

Evaluation based on literature review

The needs for deploying demand response options and more flexibility at the supply side (including storage) in a consumer-centric system as emphasised in the newly proposed market design are fully compatible with the promotion of interconnection networks between Member States. The new framework should indeed enable all participants – both on the demand and supply side - to interact on an open and transparent market. The deployment of adequate physical interconnectors therefore appears as a pre-requisite for transparent and flexible linkage of all European market players, from consumers and producers (including storage operators and aggregators), to DSOs and TSOs: interconnectors should pave the way for a fully integrated EU-wide electricity market; barriers to cross-border trade must be removed and markets must be open to cross-border participation by flexibility seekers and providers (including operators of renewable energy sources) in directly interconnected Member States. The proposal explicitly aims at "strengthening regional cooperation" by supporting enhanced cooperation between transmission system operators as well as between regulators: "without the ability to rely on generation or demand resources from other Member States, the costs of the energy transition for consumers would increase significantly".[118] The growing interconnection of EU electricity markets requires closer coordination between national actors. For this purpose, the Package proposals to adapt the institutional framework for additional regulatory cooperation, but also to remove barriers to physical cross-border trade in order to ensure that interconnector capacities are fully exploited (some interconnectors are currently only used to 25% of their capacities). It sets out new

[117] COM(2016) 864 final/2, Proposal for a directive of the European Parliament and of the Council on common rules for the internal market in electricity (recast).
[118] COM(2016) 861 final/2, Proposal for a directive of the European Parliament and of the Council on common rules for the internal market in electricity (recast).

rules for the allocation of transmission capacities and for preventing national limitations on cross-border electricity flows. In this regard, fostering the deployment and better use of electricity interconnectors remains a key task for the regulators and TSOs.

The added-value of interconnectors as an appropriate option to increase flexibility is reflected and qualitatively assessed by ENTSO-E in its TYNDP, in which a flexibility indicator which focuses on ancillary services (B7)[119] is provided for each project.

Stakeholder consultation

35% of the respondents of the **targeted survey** answered that there would be no inconsistencies between TEN-E and the new market design proposals in the 'Clean Energy for all Europeans' package (see Figure 4-3), while around 39% of the respondents "did not know" about possible inconsistencies.

Figure 4-2 Results targeted survey to the question: "Do you think there are any inconsistencies with the objectives of the TEN-E Regulation and the following proposals from the new 'Clean Energy for all Europeans' package" - Market design proposals

Respondents highlighted that the TEN-E Regulation is promoting cross-border electricity investments because of the vital role this infrastructure plays in delivering secure, sustainable and affordable energy to European consumers. These links bring important security of supply benefits in the form of an increased adequacy margin (value of additional capacity to meet demand) and improved flexibility and system stability (voltage, frequency control, ancillary services, etc.). Furthermore, TEN-E introduces regulatory incentives, recognising that investors are deterred because prospective revenues are not always sufficient to outweigh the higher than usual risks faced by investing in such projects. According to stakeholders, the TEN-E objectives are not fully aligned with several proposals in the 'Clean Energy for all Europeans' package which, if implemented, would result in higher risks for projects, and therefore less incentive to build interconnectors. Articles 40 and 54 of the proposal for a revised Electricity Directive restrict, and in some circumstances ban, the provision of Ancillary Services by TSOs. This new rule could prohibit the use of interconnectors for the provision of services like frequency control and black start, and deny potential providers an important revenue stream[120]. Markets for balancing services represent only 2-3% of the total turnover volume of wholesale markets; nevertheless, in a report[121] commissioned by the European Commission, the potential gains of sharing balancing resources between neighbouring countries are clearly shown: enhanced security of supply, reduced costs and higher energy efficiency. This represents a strong rationale for using interconnectors for cross border balancing services' procurement. Another stakeholder mentioned that with the current proposal, both capacity mechanisms and payments for ancillary/system services would 'subsidise' fossil

[119] The CBA methodology described in TYNDPs states that indicator B7 assesses "the ability of a project to be adequate in different possible future development paths or scenarios, including trade of balancing services".
[120] For congestion management on interconnections only, TSOs' net revenues reached EUR 2.6 bn in 2015 in ENTSO-E Member States. Source: Trinomics, ECN, DCision! (2017), Study supporting the Impact Assessment concerning Transmission Tariffs and Congestion Income Policies. Study prepared for DG Energy.
[121] https://ec.europa.eu/energy/sites/ener/files/documents/20130610_eu_balancing_master.pdf

fuel-based power generation. Further opening up the ancillary services market should therefore underline fair recognition of renewables' capacity contributions, especially when coupled with interconnectors.

Stakeholders mentioned that Article 21 of the proposed Electricity Regulation would change the capacity remuneration mechanisms (CRMs), making them all open to direct participation by capacity providers in another MS. The manner in which this would be done should take into account existing regimes and ensure that the interconnector owner facilitating the exchange of cross border capacity is not denied access to CRM revenues. Another stakeholder mentioned that the TEN-E Regulation considers cross-border interconnections, while the MDI proposes to abandon political borders for bidding zones. Bidding zones are by definition not stable, and the impact of increasing capacity between them is rather difficult to predict.

Three respondents (of 26 which provided comments) highlighted that the definition of storage proposed in the new package might lead to inconsistencies. TEN-E recognises that storage may help fulfil the energy and climate goals and thus includes storage projects that meet certain criteria into the categories of possible PCI projects. The 'Clean Energy for all Europeans' package would, however, propose to equate storage with generation and to limit its ownership by excluding TSOs and DSOs. Some stakeholders consider that this proposal contradicts the TEN-E Regulation and the RES objectives. By restricting the ownership of storage, the pool of potential investors will be restricted, limiting the deployment of storage despite the evident need for storage to support the EU's energy objectives. However, other stakeholders, in particular market parties, argued that storage should not be owned and operated by TSOs or DSOs, in order to avoid the risk of competition distortion and inefficient use of storage assets.

Others highlighted **demand side aspects**. Stakeholders mentioned that while the 'Clean Energy Package' promotes smart grids and flexibility at the distribution level, TEN-E falls short in Smart Grid PCIs[122] and neglects the role and opportunities of "prosumers". Other stakeholders stated that the market design proposals fall short of ensuring that demand-side management is treated as a transmission and distribution resource, and as a reliability resource, to the power system. Another stakeholder mentioned that there is a lack of coherence between the 'Energy efficiency first' concept from the Energy Union, as this priority is not reflected in the TEN-E Regulation or the PCI framework, even though it is mentioned in Recital 17 of the Regulation. The stakeholder stated that "*the TEN-E Regulation and PCI process should not only support new gas and electricity network infrastructure, but also include a requirement to consider demand side alternatives, and invest in these alternatives as part of the overall investment "portfolio" to meet the goals set forth in the TEN-E Regulation*." Moreover, stakeholders underlined that an increased RES target will require smart grids, and smart distribution grids in particular, as a large share of the RES output is coming onto the grid at that level. The TEN-E is not fit at this state to promote smart distribution grids. More focus needs to be given to the combined deployment of smart grids, renewables and energy efficiency to implement the 'Clean Energy Package' and its objectives.

[122] A stakeholder mentioned that specifically the threshold of 10kV of Annex IV.1(e) of the TEN-E (in combination with Article 4.1.c(iii) and Annex II.1.(e) is one reason why the TEN-E is not the best mechanism to support smart grids projects across Europe today.

Inconsistencies were also identified regarding the proposals on **Capacity Calculation** (Article 14 proposal of Electricity Regulation[123]) and the use of **Congestion Management Income** (Article 17 proposal of Electricity Regulation) which are expected to create "negative" incentives for building new interconnectors (which is inconsistent with Art. 13 of TEN-E on "appropriate incentives").[124] Article 17 would restrict to which uses interconnector congestion revenues can be put (removing the explicit allowance for amending transmission tariffs), which would create a (perhaps unintended) conflict with the Cap & Floor regulatory regime underpinning UK and Belgium interconnectors. Furthermore, it might translate into more public resistance, since the limitations on using congestion income would lead to higher grid tariffs and prices paid by consumers.

Conclusion

According to external input and our own opinion, the increasing flexibility needs in the electricity system will be addressed primarily by demand and supply side initiatives, but further promoting interconnectors is in line with these developments. Interconnectors indeed represent valuable flexibility options which can be combined with demand response and storage in order to tackle the flexibility challenge within the EU in a cost-efficient manner. Stakeholders agree that interconnectors will be crucial for a cost-efficient functioning of the electricity market as they are a key enabler for higher flexibility and competition. Some stakeholders point to presumed inconsistencies between TEN-E and the 'Clean Energy for all Europeans' package. In particular, the proposed provisions on the role of TSOs as regards the provision of ancillary services, and on 'prosumption' or storage seem not fully coherent with the current TEN-E principles. These comments, however, seem to mainly reflect the specific interests of economic actors and do not refer to fundamental inconsistencies between TEN-E and the new package. Therefore, promoting interconnectors in electricity is in line with the new market design proposed in November 2016.

4.4.4 To what extent is the instrument, its PCIs and the sectors covered in line with the 2030 objectives for RES and GHG?

The TEN-E Regulation was adopted before the approval of the 2030 Framework for Climate and Energy policies in 2014, which requires a minimum share of renewables of 27% in final energy consumption and a 40% GHG emissions reduction compared to 1990 levels, by 2030. The newly proposed revision of the Renewables Directive extends its reach by taking into consideration long-term decarbonisation goals for 2030.

[123] COM(2016) 861 final/2, Proposal for a regulation of the European Parliament and of the Council on the internal market for electricity (recast).

[124] A stakeholder further explained the following: The proposal for the capacity calculation method leads to an obstacle for further interconnection expansion. If the cross-border interconnection capacity is the only limiting transport restriction for the power market, the internal grids will be heavily utilised and high costs for curative curtailment management might occur. Therefore, the member states will firstly focus on internal grid expansion before thinking about further interconnector expansion. Another stakeholders explained that the objective of maximising interconnection capacity for trade is not acceptable due to an increase of system security risks and excessively high redispatch costs. Systematically neglecting constraints on internal network elements and loop flows contradicts basic principles of (flow based) market coupling and the European market rules (European, zonal market model) This will lead to a situation in which investments in new interconnectors will lead to higher risk and costs. Incentives for the development of both the domestic grid and interconnectors are needed. Regarding the foreseen measures on the use of congestion income, the stakeholder states that the option to reduce revenues by congestion income has to be reincorporated in this article givent that this measure is necessary to facilitate buy-in from citizens to foster further network development by avoiding increasing tariffs for the customers or non-submittal of benefits.

Evaluation based on literature review

Since a few years, several electricity PCIs have been developed with the specific objective of facilitating import and export of electricity generated from renewable energy sources. As mentioned in section 5.1 of this report, the implementation of the TEN-E Regulation and in particular the deployment of electricity PCIs, contributes to achieving the EU 2030 renewables target more cost efficiently by facilitating the integration of electricity from renewable sources into the system.[125]

Numerous studies demonstrate that the integration of a growing share of variable renewables at the European level requires enhanced interconnections between European countries and areas. Generally, better interconnection in an energy system with a high share of renewables increases the flexibility of the networks by supporting power flows between regions with different power mixes and load patterns, e.g. between countries with a high production of variable renewables and other regions with a high electricity demand[126]. Within the EU, solar power from southern regions can, for example, complement wind power from Northern Europe to meet consumption centric' needs. Thus, interconnectors significantly support the optimal use of variable renewables: ENTSO-E estimates that the implementation of projects of Pan-European significance contained in the TYNDP 2016 can help avoid 30 to 90 TWh of RES-spillage by 2030 at the European level, reducing curtailment to less than 1% of total forecasted supply[127].

In some regions, increased interconnections may even unlock the potential for variable renewables generation (e.g. wind in Nordic countries) beyond domestic demand, provided that power prices are higher in other European regions[128], and can therefore foster the achievement of the renewables target. A DNV study also shows that increasing the share of renewables in the energy system is accompanied by a growing transmission expansion.[129] Yet, it underlines that the need for new network capacities will depend on the geographical dispersion of renewable resources (close to or remote from demand centres). The impact of new interconnectors on higher RES integration to reach the 2030 target may therefore differ according to the areas which are or will be interlinked. In this regard, the Biscay Gulf project (interconnection of Iberia Peninsula with France, 2,000 MW), and the LitPol Link Stage 2 project (interconnection of Baltic States with Poland, 1,000 MW) both appear as two particularly relevant examples to foster RES integration in the EU energy system.

Very few studies focus on the *quantified* impact of PCIs on RES integration and GHG emissions; an assessment per project is presented in the ENTSO-E TYNDP as part of the CBA results.[130] In its METIS study[131], Artelys estimates that the implementation of the power PCIs selected in the ENTSO-E's TYNDP 2014 project list, combined with a context of ambitious efforts towards the 2050 European energy and climate goals ('Green Transition' scenario), will allow the 2030 renewables target to be reached, and will contribute to decreasing the European volume of renewables' curtailment by 60% compared to a scenario without PCIs.

[125] Artelys (2016), Metis Studies – Study S02: Assessing TYNDP 2014 PCI list in power & ENTSO-E (2015a), TYNDP 2016 Scenario Development Report
[126] IRENA (2015), Renewable Energy Integration in Power Grids – Technology Brief.
[127] ENTSO-E (2015c), TYNDP 2016 Executive Report.
[128] IEA (2016), Large-scale electricity interconnection - Technology and prospects for cross-regional networks.
[129] DNV (2014) for the European Commission, Integration of Renewable Energy in Europe.
[130] Excel "TYNDP 2016 all projects data in Excel format" available for download in the ENTSO-E website: http://tyndp.entsoe.eu/reference/#downloads
[131] Artelys (2016), Metis Studies – Study S02: Assessing TYNDP 2014 PCI list in power

Gas PCIs can also have a (more limited) positive impact on the feasibility and costs of reaching the EU RES target, to the extent that they facilitate the injection of biogas or hydrogen (conversion from RES based power to hydrogen allows curtailment to be avoided) into the gas grid at the European level. The development of cross-border gas transmission networks through gas PCIs thus offers potential opportunities for the transmission of biogas within Europe.

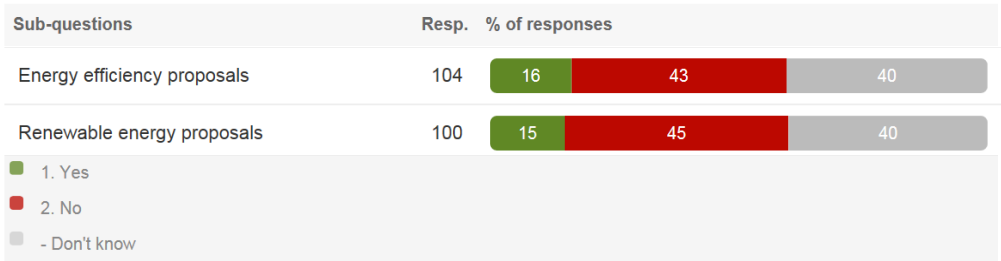
Regarding the achievement of the EU GHG emission reduction target, two main arguments emerge from the literature review which support the positive impact of further interconnection expansion. First, by avoiding RES curtailment as mentioned in the previous paragraphs, improved interconnections at the European level do not only support a greater share of renewables in generation and consumption, but also contribute to lower CO_2 emissions. ENTSO-E TYNDP 2016, which explores a power system in which a 80% emissions reduction is reached by 2030 compared to 1990 levels, quantifies the contribution of TYNDP projects as to up to 8% of the total CO_2 reduction by 2030[132]. Secondly, by supporting the use of cheaper generation units for export to other European regions with higher prices, electricity and gas network reinforcement can support GHG emission reductions within the EU through substitution of coal or oil by gas, provided that CO_2 price signals are adequate.[133] In case CO_2 prices are not high enough (e.g. in the 'Slowest Progress' Scenario of TYNDP 2016, with 17 EUR/ton), coal still remains cheaper than gas, leading to an increase of generation from coal-fired power plants rather than gas-fired power plants, which has a negative effect on CO_2 emissions from thermal units.

At horizon 2030, all scenarios developed by ENTSO-E in its TYNDP 2014, the scope of which includes projects of pan-European significance (PCIs and non-PCIs), allowing for a 40% CO_2 emissions reduction in the power sector to be reached. In its TYNDP 2017, ENTSOG estimates that all its scenarios, except the Slow Progression scenario[134], also meet 2030 emissions reduction targets.

Stakeholder consultation

Respondents to the **targeted survey** in general did not identify inconsistencies between TEN-E and the energy efficiency (EE) and renewable energy (RES) proposals from the 'Clean Energy for all Europeans' package (see Figure 4-3) or "did not know" about possible inconsistencies between the EE and RES proposals (around 40% of respondents).

Figure 4-3 Results targeted survey to the question: "Do you think there are any inconsistencies between the objectives of the TEN-E Regulation and the following proposals from the new 'Clean Energy for all Europeans' package' - Energy efficiency and Renewable energy proposals



[132] ENTSO-E (2015c), TYNDP 2016 Executive Report.
[133] Artelys (2016), Metis Studies – Study S02: Assessing TYNDP 2014 PCI list in power & DNV (2014) for the European Commission, Integration of Renewable Energy in Europe.
[134] ENTSOG Slow Progression Scenario is base don current policies and does not assume any change in the future. It can be compared to the EU Reference Scenario 2016 of the Commission but presents a lower demand.

Those who pointed to inconsistencies between TEN-E and the **energy efficiency** proposals strongly focus on the presumed contradiction between stimulating investment in additional infrastructure on the one hand, and prioritising energy savings that reduce the need for infrastructure on the other hand. Efficiency and reduction of consumption need to be interconnected with the EU's transmission system. Another stakeholder highlighted that the TEN-E Regulation is specifically targeted at large-scale infrastructure, including carbon-intensive natural gas (and oil) infrastructure, while the EE proposal of the 'Clean Energy Package' focuses on a much lower system level. It is a response to energy demand, whereas the TEN-E Regulation is about supply and transmission, and does not seek to reduce consumption. Allowing bundled projects to meet the scale requirements, as well as making demand side projects a more explicit part of the regulation could help address this concern.

Another respondent stated that energy demand reduction could also be achieved by smartly combining existing infrastructure, e.g. Europe's gas (or electricity) network, with new projects, in order to enhance the energy efficiency of the overall system.

More specific comments in this regard included:

- TEN-E does not provide the possibility for supporting and prioritising non-infrastructure solutions such as energy efficiency.[135] It therefore functions rather as an incentive for (e.g. fossil fuel based) infrastructure expansion, at the expense of urgently needed and highly-potential energy efficiency measures.
- Energy efficiency is not taken into account when selecting PCIs and in corresponding actions.
- To ensure full consistency of the legislation, a Primary Energy Factor higher than 2.3 should be imposed. A PEF value of 2.0 as proposed by the EC does not reflect the current electricity mix, but the one expected in 2020.[136]
- A more holistic approach is needed. To be able to reach ambitious RES and GHG targets, the most efficient solutions must be implemented. Energy efficiency and the promotion of the most efficient energy solution should be studied without any unjustified bias for demand electrification solutions.

The respondents who pointed to inconsistencies between TEN-E and the **RES proposal** mainly focus on the fact that there are **no selection or priority criteria in the TEN-E Regulation to specifically stimulate renewable energy sources**. An NGO/consumer association formulated this as follows: "*The conditions for PCI status (Annex 4) in the Regulation do not promote network integration for renewables or clean energy over fossil fuels - rather the conditions focus on market and supply impact, even if it supports fossil fuel based projects. A PCI status equivalent for renewables could fill this gap.*"

The other most relevant comments are listed hereafter:

[135] While this was a comment received from stakeholders, energy efficiency is taken into account as part of the energy demand used in the PCI identification process. Moreover electricity interconnectors allow to increase the overall efficiency level of the electricity system, and energy efficiency solutions are addressed by other EU instruments.

[136] This comment is made by a stakeholder who is active in the gas or oil sector. Actors from the electricity sector are in general in favour of lower PEFs in order not to penalise electricity based solutions, such as heat pumps. The 2016 study performed by Frauenhofer and Trinomics at the request of the Commission, revealed that the current PEF of 2.5 is not adequate and should be decreased in order to reflect the growth of electricity generation from RES. Four different methods were in the study evaluated and resulted in PEF values ranging from 1.54 to 2.06 for 2020. On the basis of this study, the Commission has proposed a new PEF value of 2, which is a 'conservative' but realistic approach.

- The TEN-E Regulation only envisages large-scale projects between countries, while the role and opportunities of "prosumers" are neglected; small scale, community led RES projects are not eligible within the current framework.
- TEN-E looks mainly at socio-economic aspects, while environmental benefits like integration of RES to reach climate targets are not properly taken into account.[137]
- More support for the development of renewable gas is required. Renewable gas is acknowledged in the 'Clean Energy Package', but the quick wins of the replacement of oil and coal by gas are not recognised. This situation might create an urgent need for investments in the electricity grid, while neglecting the development of gas infrastructure to accommodate the injection of biomethane.
- Support for new fossil fuel-based infrastructure is incoherent with long-term EU objectives. As the lifespan of an infrastructure asset is at least 40 to 50 years, new assets built today will still be available after 2050, by when the EU is expected to have almost completely decarbonised its energy supply.
- CEF eligibility criteria should be revisited so as to enable oil pipeline projects to be eligible for EU financial assistance, since projects which are intended to enhance oil supply security do not bring new revenues and are not profitable.
- TEN-E is not fit to promote smart distribution grids. More attention needs to be given to the combined deployment of smart grids, renewables and energy efficiency to implement the 'Clean Energy Package'.
- The renewable energy proposal does not take into account the lack of interconnections in some parts of the EU.
- PCI projects lack a proper climate impact assessment.

During an **interview**, one NRA argued that the PCI process is in principle aligned with the 2030 targets for GHG and RES because the time horizon of the TYNDPs goes beyond 2030, and the scenarios should thus capture the 2030 targets.[138] A biennial process has the advantage that the 'right' or 'appropriate' case for interconnection capacity can be adjusted in line with the progress against the GHG and RES targets. But the assessment of new interconnection capacity should still be based on realistic forecasts.

Conclusion

On the basis of stakeholders' feedback and our analysis, electricity and gas TYNDPs and PCI selection are based on scenarios which take into account the 2030 objectives for RES and GHG. TEN-E thus seems to be in line with these objectives, in particular for the priority electricity corridors and highways, which should substantially contribute to reaching these targets. Studies indeed show that a higher penetration of variable renewables in the electricity system should be accompanied by an expansion of transmission capacities, including interconnectors, for an optimal integration of RES. Interconnectors are likely to positively contribute to reaching the 2030 RES target by supporting generation from variable RES and avoiding RES curtailment, although a comprehensive quantification of such contribution is not yet assessed at the European level.

[137] For example, one stakeholder mentioned that the criteria for PCI status (Annex 4 in the Regulation) do not promote network integration for renewables or clean energy over fossil fuels, rather the conditions focus on market and supply impact – even if it supports fossil fuel based projects. This stakeholder mentioned that a PCI status equivalent for Renewables could fill this gap.
[138] According to annex V to the Regulation, PCIs should be assessed on the basis of electricity and gas system data for the years n +5 up to n +20. It states that cost-benefit analysis for PCIs should "reflect Union and national law in force at the date of analysis", so that PCI selection and implementation should in theory be in line with the 2030 objectives for RES and GHG.

Network reinforcement for electricity, and to a certain extent also for gas, could also support the GHG emission reduction target, in particular if CO_2 price signals would be higher and foster a switch from coal to gas and renewables. PCIs will also lead to a higher use of electricity from RES instead of thermal units through a decrease in RES curtailment (-60% compared to a scenario with PCIs according to Artelys), thereby contributing to the reduction of GHG emissions.

If TYNPDs are meant to take the 2030 targets into account, some studies and stakeholders underline that progress against targets should be carefully monitored as a further promotion of gas and oil infrastructure would not be in line with long-term energy and climate commitments (Paris Agreement). In this context, some priority gas and oil corridors defined in Annex 1 to the Regulation seem not fully compliant with the 2030 objectives for RES and GHG; this infrastructure might, however, be needed to ensure supply security and market integration.

4.4.5 To what extent have technological advances in storage changed the need for transmission infrastructure?

Electricity storage has gained more and more interest as a potential solution to balance demand needs in energy systems with an increasing share of variable renewables. Storage can indeed provide a relevant flexibility option for the electricity system, but until now, energy storage in the electricity system has been mainly based on hydro with pumped storage technology, which allows the provision of hourly and daily storage, with the aim of reducing peak production. Over the last years, several centralised and decentralised storage technologies have been developed and tested in pilot-facilities and have reached different degrees of maturity, e.g. compressed air energy storage (CAES), batteries (including electrical vehicles), but also a few Power-to-Gas and Power-to-Hydrogen pilot projects which can allow for weekly storage. The costs of these different storage technologies vary greatly from technology to technology, but also from plant to plant, and most of the storage technologies that currently exist, which have not yet been massively deployed at commercial scale, remain expensive - with high capital costs and conversion losses.

Evaluation based on literature review

Until now, investments in energy storage have remained very limited (except in pumped storage) and their impact on the need for transmission infrastructure is thus very difficult to assess. The Agora Energiewende (2014) study[139] assesses the need for storage capacities at horizon 2033 based on several scenarios simulating varying assumptions about the levels of cross-border network expansion and of the implementation of other flexibility options in Germany. The study assumes a 22% and 40% share of renewable energy reached within the EU, respectively at horizons 2023 and 2033 (including respectively 43% and 60% in Germany). By assuming a growing interconnection network, and even in the case where this expansion is slower than planned (ten-years delay), simulation results show that the cost-effective use of storage is very limited (3 GW in 2033) compared to the implementation of other flexibility options to reach the above-mentioned targets.

[139] Agora Energiewende (2014), Electricity Storage in the German Energy - Transition Analysis of the storage required in the power market, ancillary services market and distribution grid.

In the long-term, the potential benefits of storage technology options critically depend on significant cost reductions, and their economic effectiveness by 2030 as well as their impact on network infrastructure therefore remains uncertain by 2030.[140] In their 2011 study on cost-efficient RES-E penetration and the role of grid extensions, EWI and Energynautics[141] assess the benefits of different interconnector extension levels and their impacts in terms of minimised costs for the energy system for two scenarios leading to a low-carbon electricity system with a high RES share. Storage investments are nearly 5 times higher in a scenario with moderate grid extension[142] (EUR 9 billion over 2010-2030 compared to EUR 43 billion in a scenario without any grid extension restriction); unrestricted grid extension reduces the deployment of storage technologies, which still prove to remain costly. Thus, the cost-optimal scenario without grid restriction would require EUR 79 billion of investments in grids and storage over 2010-2030, while these investments would increase up to EUR 97 billion in a scenario combining limited grid extension with storage solutions.

Furthermore, storage differs from other flexibility options such as network expansion due to the fact that electricity storage technologies allow for a temporal balancing between supply and demand (storing cheap power generation in times of low demand, network injection in times of high demand), whereas network expansion allows only for a spatial distribution (transfer from producing areas towards consumption centres). Many publications mention that storage can be used to help avoid grid expansion; however, the underlying assumption here is that energy is produced and stored where it will be consumed -which is not true for centralised storage solutions.

Thus, in the case of a significant development of decentralised storage, the DNV study shows that, when combined with a more flexible demand, storage could avoid or defer the need for some transmission and distribution investments. The study, however, notes that storage technologies are expected to generate more savings through avoiding the installation of back-up capacities than through reduced transmission grid requirements.

In conclusion, storage and interconnection expansion options should be seen as complementary solutions rather than directly competing alternatives. In particular, Agora Energiewende highlights that in the long-term, “grid expansion until the last kWh” would be more expensive than a mix of all flexibility options, including storage.

Stakeholder consultation

During an **interview**, an NRA argued that it is difficult to evaluate the impact of storage on current transmission deployment needs. The technological advances in storage are positive, but are still relatively small (in capacity terms). The business case for new storage investment is uncertain, whereas the economic benefits of interconnectors are clear in case price differentials exist. Storage and interconnectors do not necessarily compete but are complementary; moreover, storage could reduce the need for thermal power generation investment, which would increase its complementarity with interconnectors and RES (as well as demand response and other sources of low-carbon flexibility).

[140] DNV (2014) for the European Commission, Integration of Renewable Energy in Europe.
[141] EWI and Energynautics (2011), Final Report October 2011
[142] In the Moderate Grid Extension Scenario, interconnector extensions are assumed to be limited to projects which have already entered the planning or permission phase at the date of the redaction of the study (based on the ENTSO-E’s Ten Year Network Development Plan 2010), but whose commissioning is assumed to be delayed.

An energy association representative confirmed that technological advances in terms of storage have not yet had a significant impact on the need for transmission infrastructure. However, when considering long term scenarios and taking into account expected advances in storage, the need for transmission infrastructure in general (i.e. not limited to interconnectors) will likely decrease.

Conclusion

According to external input and our own insights, new energy storage technologies with different functions are currently being developed, but very few have already reached full maturity and commercial scale, making assessment of their costs and benefits difficult; to date, storage technologies remain costly flexibility options. Stakeholders agree that with the current limited deployment of storage (except pumped storage), impacts on network infrastructure needs remain limited. A significant development of decentralised storage solutions could reduce the need for transmission network expansion, to the extent that grid investments required to accommodate peak injection from e.g. wind parks could be reduced. However, it should be kept in mind that these flexibility options have different functions: storage enables a temporal shift of supply-demand, whereas network extension will provide for an enhanced spatial distribution of energy flows.

Moreover, if storage can be coupled with an increased flexibility in demand, transmission grid investments could further be reduced as the residual peak load would be lowered. In addition, large scale development of storage would lead to lower price volatility and price differences between neighbouring markets, and thereby also reduce the need for cross-border transmission capacity. Interconnectors and storage can be seen as complementary and, when combined, can offer significant costs savings by decreasing the need for investments in back-up power generation capacities.

5 Effectiveness

This section of the report presents the findings on the questions we have grouped under effectiveness. According to the Better Regulation guidelines[143] an 'Effectiveness' analysis considers how successful EU action has been in achieving or progressing towards its objectives. The evaluation should form an opinion on the progress made to date and the role of EU action in delivering the observed changes. If the objectives have not been achieved, an assessment should be made of the extent to which progress has fallen short of the target and what factors have influenced the reason something has nott been successful or why it has not yet been achieved".

Given that the majority of the evaluation questions from the ToR relate to effectiveness, we have subdivided the questions to improve the readability of the evaluation.

5.1 EG.1 – Contribution to Energy and Climate Goals (Article 17.f)

5.1.1 How effective has the regulation been in contributing to the goals for market integration by 2014?

For electricity and gas projects, both the lifting of the isolation of at least one MS and reduction of energy infrastructure bottlenecks make up the notion of market integration. As for infrastructure bottlenecks, this shall mean the limitation of physical flows due to insufficient transmission capacity, which in some cases can be the result of lack of infrastructure.

Market integration represents a key objective for the development of the Energy Union. As a pre-requisite, all market participants within the EU should have access to the integrated energy market without discrimination. This assumes that the necessary infrastructure has been developed to support the physical interconnections that are required. The development and availability of adequate cross-border network capacities is therefore a cornerstone of this objective.

Evaluation based on literature review

The literature review reveals that the development of trans-European electricity and gas interconnectors, which is stimulated and facilitated by the TEN-E Regulation, has effectively contributed to the integration of electricity and gas markets and systems, even though the limited number of PCIs implemented between the entry into force of the regulation (2013) and the end of target year (2014) makes results difficult to assess (only 2 electricity PCIs were commissioned before the end of 2014: PCI 3.1.3 and PCI 2.5.2).[144]

The total net electricity generation capacity installed in ENTSO-E countries has increased by more than 50% between 2008 and 2014, and physical cross-border exchanges have been progressively intensified with an average yearly increase of 3% over 2000-2014.[145] Integration has been encouraged by the agreement of the European Council in 2002 on a 10% electricity interconnection target for 2020 (15% proposed by 2030). By the end of 2014, 19 Member States reached or overreached this target and among them 4 had an integration level above 50%. Installed cross-border gas infrastructure has also

[143] http://ec.europa.eu/smart-regulation/guidelines/tool_42_en.htm
[144] Based on results from ACER's Consolidated reports on the progress of electricity and gas PCIs and data published on the EC PCIs interactive emap: http://ec.europa.eu/energy/infrastructure/transparency_platform/map-viewer/main.html
[145] ENTSO-E (2011), Statistical yearbook; ENTSO-E (2012), Memo 2012; ENTSO-E (2013,2014,2015), Statistical factsheets

been expanding, with an increase of the technical physical capacity of European cross-border Interconnection Points of more than 15% over 2010-2014.[146]

The efficient utilisation of electricity interconnections, although increased over the last years, still remains limited and could be further improved. The commercial use (day-ahead and intraday) of electricity cross-border capacities still lays below 50% of the total Net Transmission Capacity (NTC) at EU level; nonetheless, the share of available capacities used in the 'right direction' (i.e. from a higher to a lower price zone) raised from 60% in 2010 to 86% in 2014 and 84% in 2015.[147] As a result, the development and improvement of the EU cross-border transmission network, along with the progressive coupling of regional markets since 2006, has favoured the convergence of regional electricity day-ahead prices within the EU[148], and the number of hours of full price convergence.[149] A correct price signal to the market and an available interconnection capacity are essential for an efficient functioning of an integrated market, as they contribute to facilitating trade between countries or zones, thereby maximising social welfare and avoiding system congestion. Over 2011-2014, welfare losses due to unscheduled flows decreased by about 10% in the CWE, CSE and CEE regions (ACER (2016b)); in 2015, increasing congestion due to growing loop flows (LFs) and unscheduled allocated flows (UAFs) led to higher welfare losses (about +20% compared to 2014), illustrating the importance of continued efforts to tackle the issue of unscheduled flows and congestion in realising market integration (ACER (2016b)). In 2016, the average day-ahead price spreads ranged from less than 0.5 EUR/MWh on the borders between Portugal and Spain, the Czech Republic and Slovakia, and between Latvia and Lithuania, to 10 EUR/MWh or more on all British borders, the borders between Austria and Italy, and between Germany and Poland. This confirms the relevance of further increasing the available cross-border capacity, particularly on borders with the highest price spreads.[150]

On the gas market, the net volumes of natural gas traded on European hubs have been significantly increasing since 2008.[151] There is, however, potential for further improvements of the physical capacity utilisation of gas interconnectors, with more than 70% of physical capacities being used with a Capacity Allocation Mechanism ratio (CAM.6: physical flow / technical capacity) lower than 50% in 2014 and 2015.[152] The impact of gas interconnections deployment on wholesale day-ahead gas prices has been positive: the difference between the highest and the lowest priced hub within the EU (except the French PEG South hub, disconnected from North-West markets) has been decreasing to around 2 EUR/MWh in 2013 and 2014 (versus about 5 EUR/MWh in 2010), reflecting a further market integration on gas markets over this period.[153] However, trends vary across the different regional gas hubs and significant differences in prices can still be observed across the different hubs: price convergence was high in the well-connected South-Western European (SWE) region, but lower and even declining in the CWE and CEE regions.[154] According to ACER[155], price differences across the EU continued to narrow in 2016. For more than half of the market areas, a differential of less than 1 EUR/MWh compared to TTF

[146] ENTSOG (2010,2011,2012,2013,2014), Capacity Map dataset in Excel format.
[147] ACER (2015c), Market Monitoring Report 2015. Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2014 and ACER (2016b), ACER Market Monitoring Report 2015. Key insights and recommendations.
[148] EPEX (2017), Digital Information Board
[149] ACER (2015c), Market Monitoring Report 2015. Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2014
[150] ACER (2017i) Annual Report on the Results of Monitoring the Internal Electricity and Gas Markets in 2016
[151] IEA (2013,2014,2015), Medium-Term Market Report
[152] ACER (2016e), Implementation Monitoring Report on the Capacity Allocation Mechanism.
[153] EC (2014) DG Energy, Market Observatory for Energy, Quarterly Report on European Gas Markets (Volume 7, issue 3; third quarter of2014).
[154] ACER (2015c), Market Monitoring Report 2015. Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2014
[155] ACER (2017i) Annual Report on the Results of Monitoring the Internal Electricity and Gas Markets in 2016

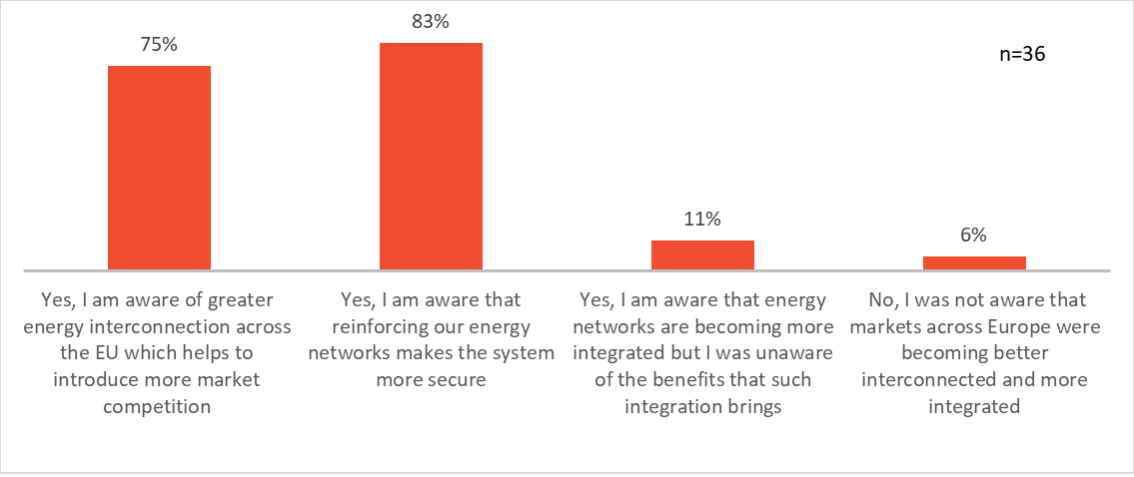
was noted, TTF being taken as a reference in terms of good market functioning. This indicates that interconnections and adequate market rules have resulted in market integration and lower welfare losses.

Although both electricity and gas wholesale prices have been decreasing (due to greater efficiency on the European markets, the introduction of market coupling and more competition, the increasing deployment of intermittent renewable energy sources which produce electricity at low variable costs, and the fall in primary energy and carbon prices in the EU ETS), energy bills for end-users in both markets continued to rise in the same time, mainly due to the different taxes, charges and transmission and distribution costs applied at national level.[156] The development of cross border transmission capacities has effectively contributed to market integration and more competitive and converging prices across the EU, but the positive impact of more interconnectivity on market integration and system efficiency could be further enhanced by the implementation of adequate and coordinated policies and rules for cross-border energy trade and procurement of ancillary services. The efficient use of interconnectors via appropriate capacity calculations and allocation mechanisms is key to efficiently enhance energy systems as well as a higher level of market competition in order to pass costs and benefits to final consumers and increase social welfare.

Stakeholder consultation

Most stakeholders, participating in the **public consultation** (83%), confirmed they were aware that reinforcements of energy networks lead to a more secure system. Almost three quarters of the respondents were aware that greater interconnection helps introduce more market competition in the EU. Only 11% mentioned to be unaware of the benefits that more integrated networks bring; while only 6% mentioned not to be aware that markets across Europe were becoming better interconnected and more integrated. See also Figure 5-1.

Figure 5-1 Awareness of benefits of the TEN-E Regulation. Question: Do you think the implementation of the trans-European energy infrastructure which allows for interconnecting of national energy networks improves the energy systems and contributes to keeping energy prices in check?

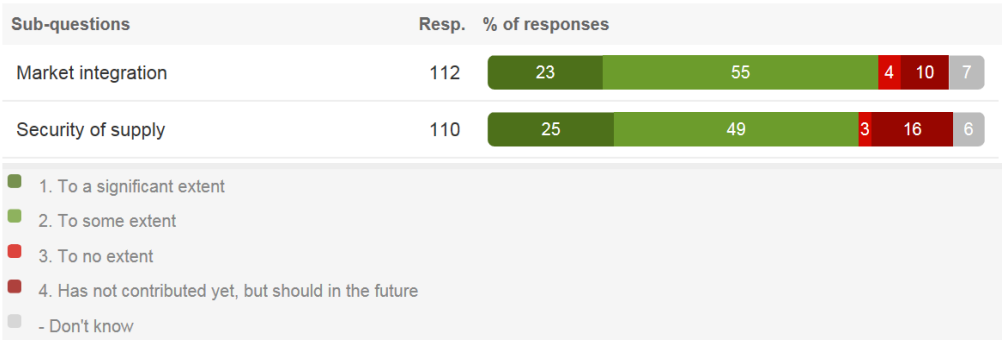


Most respondents to the **targeted survey** confirmed that TEN-E effectively contributes to market integration and security of supply. Over 70% believe that TEN-E contributes to these goals; while 10% and 16% believe that TEN-E has not contributed yet, but will in the future (to market integration and

[156] COM (2016) 420 final, Commission Staff Working Document Accompanying the Document Report Energy Prices And Costs In Europe

SoS respectively). Only 3% to 4% believe that TEN-E does not contribute to any extent towards these goals.

Figure 5-2 Results targeted survey to the question: "To what extent do you think TEN-E has contributed to the following objectives/goals" - Market integration and Security of supply



Stakeholders overall agreed that it is difficult to assess the effective contribution to market integration because most PCIs are not commissioned yet, though they remain positive regarding the expected effects. The impact could be estimated looking at planned infrastructure projects. An NRA stated: "*Although it is not possible to run a counterfactual, TEN-E has provided a stable regulatory regime around which interconnector projects are developed. This has the effect of increasing market integration - for example, in the North Sea region, where a high number of cross-border projects are planned.*"

Most stakeholders highlighted that the construction of PCIs, considering their cross-border impacts, has contributed to increasing European energy market integration (both gas and electricity) and/or will do so in the near future. One stakeholder, for example, elaborated on this subject by stating that TEN-E has created a more positive investment climate for new cross-border interconnections, which has contributed to successful final investment decisions for numerous projects, many of which are instrumental for market integration, climate targets and security of supply. Only by realising such physical projects will the theories of the new Network Codes be implemented in practice and only in this way will interoperability issues across TSO control boundaries be improved. It has also been mentioned that various instruments (e.g. permitting and cost benefit analysis methodologies) will be valuable in the near future in this regard. Some stakeholders also mentioned that commissioned PCIs contributed to some extent to improved security of supply[157] and highlighted concrete examples, specifically in the CEE region. They added, however, that more improvements are still required.

On the negative side, one stakeholder mentioned that some PCI investments have been counterproductive. In a follow-up interview, it was explained that (gas) PCIs should be selected only when there is added value in terms of SoS or dependency on single suppliers (rather than only economic interests), as they lead to increased tariffs. It was also mentioned that a fair market competition environment should be respected and supported, instead of MSs' national interests and goals.

[157] For example an energy company mentioned "Some PCIs have an advantageous impact on energy security of the EU as well as of Member States. Specifically, LNG Terminals constructed in the CEE region (i.e. LNG Terminals in Świnoujście and Klaipeda FSRU) significantly increase [supply] security of this region. However, the CEE region still faces domination of a single supplier and limited access to diversified gas sources. It is crucial for the future of the regional gas market to construct new infrastructure."

TSO representatives, during the **interviews,** also argued that the PCI selection process can be improved in such a way that it leads to the implementation of the most needed projects (highest added value from EU perspective) – which would have an impact on market integration. The current scenario approach for the TYNDP for gas is not optimal; all projects are assessed against a rather conservative reference scenario, which increases the risk for stranded investments.

Conclusion

The contribution of the TEN-E Regulation and PCIs to market integration is generally considered as positive in the literature and by stakeholders, even if it is difficult to assess as a very limited number of PCIs have been implemented since the entry into force of the regulation (2013). 75% of the public consultation respondents were aware of the need for network reinforcements and increased interconnections for market integration. This high score illustrates that the rationale for the TEN-E Regulation is well understood by the public. Physical cross-border electricity and gas transmission capacities have been expanding, enabling an intensification of cross-border energy flows and contributing to more competition and to converging wholesale prices on both the electricity and gas market, reflecting deeper market integration, though with contrasting trends from year to year and across the different electricity markets and gas hubs within the EU. Electricity markets with <10% interconnectivity in 2016 faced slightly higher prices than those with >10% interconnectivity. This shows the importance of further developing cross-border interconnections.[158] The effective use of electricity and (to a lesser extent) gas interconnectors can still be significantly improved. In addition, the efficient use of electricity interconnectors could be improved, considering that most TSOs reserve too large a share of capacity for their own purposes. Market integration requires consistent infrastructure developments and price signals, but also more harmonised and coordinated legislation and regulation to ensure enhanced market competition and security of supply at lower cost. In this regard, the TEN-E Regulation is viewed as a useful instrument to promote a positive climate for investing in interconnectors.

5.1.2 How effective has the regulation been in contributing to the 2020 climate and energy targets?

In December 2008, the EU 2020 Climate and Energy Package was adopted, setting the following objectives:

- A 20% share of renewable energy sources in gross final energy consumption;
- A 20% reduction of final/primary energy consumption compared to Business-As-Usual levels;
- A 20% reduction of GHG emissions compared to 1990 levels.

Evaluation based on literature review

There are currently a limited number of published studies which focus on PCIs, and most of them use a 2030 time horizon. However, the demand and vision scenarios developed by ENTSOG/ ENTSO-E in their TYNDPs, as well as the scenarios modelled with METIS, provide some results regarding the Renewables, Energy Efficiency and GHG emissions targets for 2020.

The implementation of electricity PCIs and more broadly of projects of pan-European significance, contributes to achieve the Renewables target by facilitating the integration of electricity from

[158] COM (2016) 420 final, Commission Staff Working Document Accompanying the Document Report Energy Prices And Costs In Europe

renewable sources into the grid.[159] Within a few years, several power PCIs have been developed with the specific objective of facilitating imports and exports of electricity generated from renewable energy sources (e.g. Irish-Scottish ISLES project, South-West project of the Biscay Gulf). Gas PCIs can also have a (more limited) positive impact on the feasibility and costs of reaching the RES targets, to the extent that they facilitate the injection of biogas or hydrogen (conversion from RES based power to hydrogen allows for the avoidance of curtailment of RES production) into the gas grid at the European scale, and offer perspectives for the transmission of biogas in Europe.

The effective impact of PCIs on energy efficiency and the 2020 target is unclear, as concrete detailed figures and quantitative assessments are currently not available. Nevertheless, it is assumed that additional gas and electricity interconnection capacity is effectively improving the overall system efficiency, to the extent that most energy efficient installations at EU level can be used to meet energy demand. Furthermore, the competitiveness of gas-fired plants, whose system efficiency is higher than that of coal plants, is likely have increased compared to coal on markets where gas can be procured from different sources and via different routes, thanks to the realisation of gas PCIs; this situation would improve further if carbon prices increase in the future. One could also assume that the higher interconnectivity is supporting the trend towards electrification of the energy system via heat pumps, electric vehicles, etc., which would also have a positive impact on the overall system efficiency.

The review of the ENTSO-E scenarios developed in its TYNDPs as well as the METIS study[160] show that the electricity network reinforcements facilitated by the development of PCIs effectively have a positive impact on the overall effort to reduce GHG emissions in Europe: on the one hand, the reduction of RES curtailed volumes thanks to PCIs (see section 4.4.4) contributes to lower CO_2 emissions; on the other hand, enhanced PCIs can also foster the shift from coal-fired to gas-fired generation units, again with an increased effect in case of high CO_2 prices. In this context, interconnectors facilitate the deployment of lower carbon technologies and enable wind and solar installations to cover a growing share of energy consumption, to the detriment of generation based on fossil fuels. The deployment of PCIs is thus expected to contribute to the achievement of the EU GHG 2020 objective. Accompanying carbon pricing policies supporting strengthened carbon price levels would be appropriate to help achieve the objective.

The Connecting Europe Facility (CEF) represents a critical tool for leveraging investments in PCIs. Since 2014, investments granted to CEF-E have been dramatically increasing, concretely supporting projects which should allow for a better RES integration and efficiency at the European level: from EUR 647 million supporting 34 actions in 2014 to EUR 707 million supporting 27 PCIs in 2016[161]. The main objectives of the CEF are to "increase the share of renewables through new electricity lines" and "replace the use of more carbon-intensive fuels (e.g. fuel-oil, oil products or LPGs) by natural gas"[162].

Among actions financed, several directly refer to such objectives, which will strongly help reach EU 2020 targets; in particular massive investments have been granted to actions part of PCI 3.7.1 which aims at reinforcing the interconnection between Bulgaria (Marista East) and Greece (Nea Santa) in order

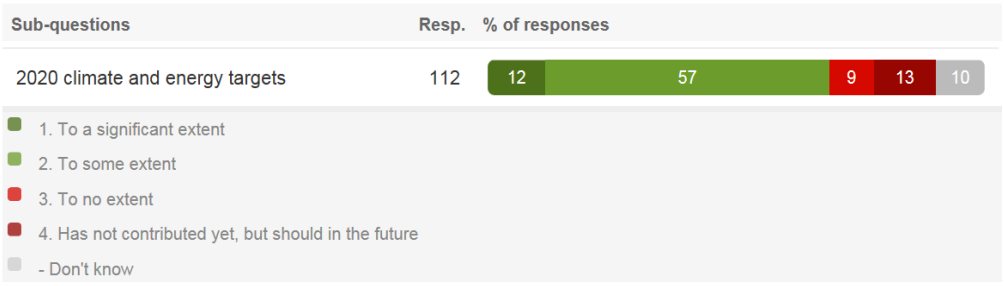
[159] Artelys (2016), Metis Studies – Study S02: Assessing TYNDP 2014 PCI list in power and ENTSO-E (2015a), TYNDP 2016 Scenario Development Report
[160] Artelys (2016), Metis Studies – Study S02: Assessing TYNDP 2014 PCI list in power
[161] EC, available from : https://ec.europa.eu/energy/en/topics/infrastructure/projects-common-interest/funding-projects-common-interest
[162] EC, available from: https://ec.europa.eu/inea/sites/inea/files/cef_energy_keyfigures_2017_leaflet_final_0.pdf

to better manage the expected future renewable energy generation in northeast Greece and northeast and southern regions of Bulgaria. Action for a better interconnection between Hungary and Slovakia is also supported (Gönyű-Gabčíkovo line) to help integrate available RES. Regarding gas, the building of the Islandmagee Underground Gas Storage facility (PCI 5.1.3) partially financed by CEF-E aims at "supporting the achievement of national renewable and carbon reduction targets"[163].

Stakeholder consultation

Most respondents of the **targeted survey** confirmed that TEN-E effectively contributes to reaching the 2020 targets, in particular as it facilitates RES deployment. 69% believes that TEN-E contributes to the 2020 climate and energy targets; while 13% believes that TEN-E has not contributed yet, but will in the future. Only 9% believes that TEN-E does not contribute towards the 2020 climate and energy goals.

Figure 5-3 Results targeted survey to the question: "To what extent do you think TEN-E has contributed to the following objectives/goals" - 2020 climate and energy targets



Stakeholders mentioned that increased interconnection will enable better deployment of RES and enhanced market efficiency, supply security and system adequacy. However, there are diverging opinions regarding TEN-E's encouragement of gas projects; some stakeholders argued that the high number of gas PCIs undermines the benefits from electricity PCIs which encourage installation of more RES[164], while others mentioned that natural gas should underpin the process of reducing GHG emissions in the EU.[165]

Several respondents agreed on the positive contribution of TEN-E to the 2020 targets, but focused on the "*need to look at 2030 and beyond*". In this context, CCS (and CO_2 transport corridors) is considered as offering a (promising) longer-term contribution to climate targets.

Several respondents highlighted that it is too soon to assess the impacts of TEN-E, while being optimistic that once implemented, PCIs will contribute to the climate and energy targets.

During **interviews**, an energy sector representative considered that the contribution of the regulation to reaching the energy and climate objectives is different depending on the energy vector considered, e.g. most oil PCIs do not contribute to the decarbonisation target[166] while electricity and gas do (to a different extent). The effective contribution of infrastructure to market integration (and security of supply) also depends on the implementation of policies and market rules (the existence of

[163] EC (2016), Connecting Europe Facility, Supported actions - update May 2016 Energy.
[164] A stakeholder mentioned that the financial and political support that these gas projects receive should rather be allocated to RES and other low carbon technologies.
[165] A stakeholder mentioned for example that the role that specific gas-sector related infrastructure (such as LNG bunkering facilities supporting CO_2 savings in the transport sector, power-to-gas facilities, etc.) can play in contributing to sustainability needs to be accurately recognised as part of the PCI framework and selection process.
[166] In the context of TEN-E, the main drivers for oil PCIs are security of supply and environment.

infrastructure as such is not sufficient; its efficient use is key). The TEN-E Regulation effectively stimulates investments but the real market integration progress also largely depends on other issues.

Conclusion

A quantified assessment of the contribution of TEN-E, and of PCIs in particular, to meeting the EU 2020 energy and climate targets is not yet available, but both existing studies and stakeholder feedback clearly indicate that the regulation positively contributes to the 2020 climate and energy targets. The deployment of electricity PCIs (both interconnections, highways and smart grids) in particular is considered as an effective enabler for meeting the 2020 targets (mainly by supporting RES integration and avoiding RES curtailment), while oil PCIs are not contributing to these targets as they are mainly serving supply security or environmental purposes.

The role of gas interconnectors in this respect is less clear. Gas interconnectors can also contribute to the achievement of targets if they prove to ease shifts from coal to gas in the power generation sector, but the risk of competing with electricity PCIs that facilitate installations based on RES must be considered as well; some gas PCIs definitely contribute to the GHG emissions reduction target as they enable power generators and industrial end-users to have (more competitive) access to gas and thus facilitate the substitution of coal and oil products by gas (which has a lower carbon intensity). Furthermore, the CEF financing of actions directly targeting RES integration and CO_2 emission reductions shows the effectiveness of TEN-E regulation, through the implementation of projects supporting the achievement of EU 2020 targets.

5.1.3 How effective has the regulation been in contributing to the move towards a low carbon economy by 2050?

The EU has set an ambitious 2050 GHG reduction target aiming at decreasing domestic GHG emissions by 80% compared to 1990 levels. In its Roadmap for moving to a competitive low carbon economy in 2050[167], the EC analyses the most cost-effective way to achieve this objective. At sectoral level, reaching the 2050 GHG reduction target is estimated to require a GHG emission reduction of 96% to 99% in the power sector by 2050[168], which means moving towards an almost fully decarbonised power generation system by this horizon.

Evaluation based on literature review

As mentioned in sections 4.4.4 and 5.1.2, TEN-E has paved the way towards decarbonisation by fostering the achievement of EU targets both at horizons 2020 and 2030. If actions must be extended beyond this timeframe, the TEN-E regulation appears as a natural tool for supporting long-term efforts. Currently, only very few studies provide a precise and quantified assessment of how TEN-E can help reach a decarbonised energy system by 2050, which is supposed to decrease CO_2 emissions, partly by significantly increasing the share of RES in the power sector.

The EC Impact Assessment of the Energy Roadmap 2050[169] estimates that the share of renewables in power generation would reach 60% to 83% by 2050 according to the different decarbonisation scenarios

[167] COM(2011) 112 final, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the regions: A Roadmap for moving to a competitive low carbon economy in 2050
[168] EC (2012), Energy Roadmap 2050
[169] SEC(2011) 1565- Impact Assessment, Energy Roadmap 2050.

considered; it could even increase to 97% according to Greenpeace's Advanced [R]evolution scenario. These studies show that an advanced integration of RES in the power system is crucial in the long-term. In the context of decarbonisation, power interconnectors have a crucial role to play. According to Energynautics' European Grid Study 2030/2050[170], the realisation of the Advanced [R]evolution scenario (80% reduction of GHG emissions and 97% reduction of renewables in power generation by 2050) under a regional configuration (i.e. no major imports from North Africa) requires an increase in European transmission capacities from 36% to 47% compared to the transmission capacity installed in 2030, this range depending on assumptions considered in particular for energy efficiency and demand side management in 2030. In addition to the necessary development and upgrade of transmission networks within the EU, the transition towards a low-carbon energy system by 2050 would also require a high level of demand-side management (to be enabled by for instance smart grids) and storage capacities. Currently, only few PCIs are targeting smart grids and storage capacities; the development of such technologies will be essential to reach the long-term low-carbon ambition.

The EWI study [171] highlights the strong need for interconnectors expansion in the future to reach a 80% RES share in the electricity sector and a 80% CO_2emission reduction (compared to 1990) in 2050. Moreover, it shows that the most cost-optimal pathway to this decarbonisation future is realised when substantial investments in interconnections and grid expansion are made: more than 225,000 km of lines are added at the European level over 2010-2050, including major reinforcements between Belgium and the Netherlands, France and Spain, Norway and Sweden and between Germany and West Denmark.

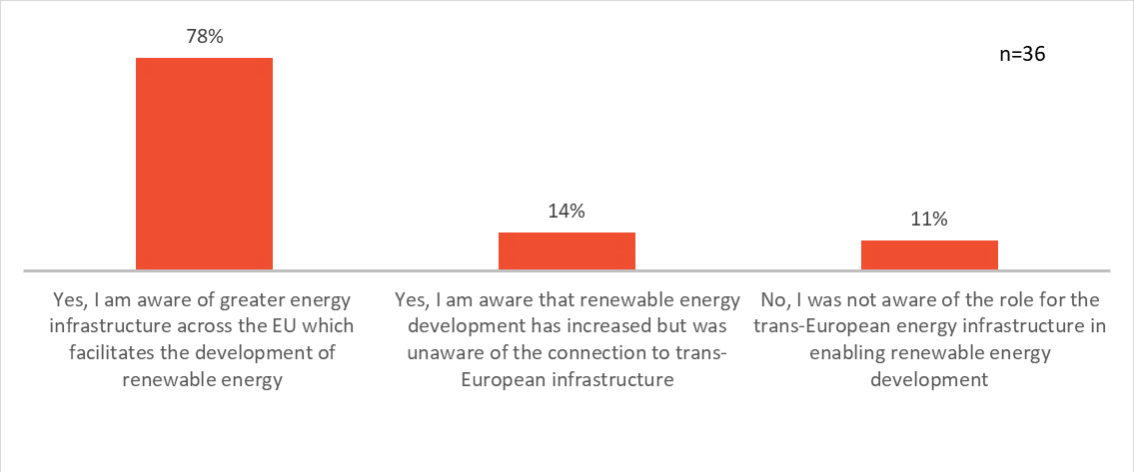
The Impact Assessment for the EU Energy Roadmap 2050[172] mentions that the different decarbonisation scenarios would require a gross inland energy consumption reduction of 26% to 29% compared to 2005 levels (versus 4.2% in the Reference scenario). Such a decrease in energy consumption requires significant energy efficiency gains in the different sectors of the economy. Electricity is considered as an enabler for the transition to a low carbon supply, and its share in the energy mix would thus increase; electricity demand is indeed expected to grow substantially (+16% to +43% in 2050 compared to 2005 levels according to the decarbonisation scenarios considered). In this context, the TEN-E regulation, which focuses on the enhanced development of adequate transmission and cross-border networks as well as on electricity highways, smart grids and storage facilities is essential, and effectively contributes to the move towards a low carbon economy by 2050.

Stakeholder consultation

Through the **public consultation**, respondents indicated their awareness of the positive impact of the TEN-E Regulation on RES development. The results are shown in Figure 5-4, indicating that most respondents (78%) are aware that additional trans-European energy infrastructure across the EU facilitates the development of renewable energy. 14% of the respondents indicated to be aware that renewable energy development has increased, but were unaware of the effective impact of the trans-European infrastructure on this development. And 11% of the respondents were not aware of the role of trans-European energy infrastructure in enabling renewable energy development.

[170] Energynautics (2011), European Grid Study 2030/2050
[171] EWI (2013b), The role of grid extensions in a cost-efficient transformation of the European electricity system until 2050- Working paper.
[172] SEC(2011) 1565 Commission Staff Working Document: Accompanying document 'Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the regions - - Impact Assessment, Energy Roadmap 2050'.

Figure 5-4 Public consultation results to the question "Do you think the implementation of the TEN-E Regulation and development of trans-European energy infrastructure is helping Europe to develop more renewable energy?"



Conclusion

The TEN-E regulation, which focuses on enhanced development of adequate transmission and cross-border networks as well as on electricity highways, smart grids and storage facilities effectively contributes to the move towards a low carbon economy by 2050. This transition will require a significant energy consumption reduction and an almost fully decarbonised power system, in which renewable energy sources will represent a major share. To support the cost-effective integration of this high RES level, electricity transmission (including interconnections and highways) capacity needs are expected to increase significantly, thus underlining the strong need for further implementation of the TEN-E regulation. The TEN-E will thus continue to make a major contribution to this transition. The public consultation reveals that most respondents (78%) are aware that TEN-E infrastructure effectively facilitates the development of renewable energy and thereby the move towards a low carbon economy by 2050.

In addition to network expansion and upgrade, the energy transition will necessitate a significantly higher level of demand-side management and storage capacities. PCIs targeting smart grids and storage capacities, and enabling the integration of RES, will continue to be relevant.

5.2 EG.2 – Progress in PCIs

5.2.1 What progress has been achieved in the planning, development, construction and commissioning of PCIs? (Article 17.a)

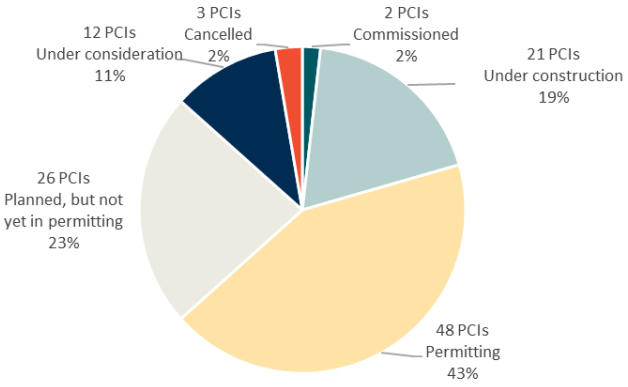
The Regulation lays down rules for the planning, timely development and construction of PCIs and sets guidelines for streamlining the permitting processes for major energy infrastructure projects that contribute to developing integrated European energy systems. This question aims to provide relevant input into and an evaluation of the progress achieved.

Evaluation based on literature review

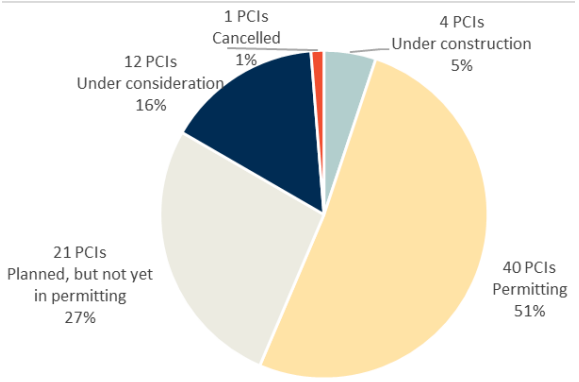
According to the analysis of ACER (2017a), as of 31 January 2017 64% of the **electricity** PCIs were at a relatively advanced stage of implementation (commissioned, under construction or permitting). For **gas**, just over half of the projects were beyond the planning stage (56%), with most of them going through permitting (51%). No single gas PCI has been commissioned since 2015 (Figure 5-5).

Figure 5-5 Current implementation status of electricity and gas PCIs. Source: Figures 2 and 26 in ACER (2017a)

Implementation status of electricity PCIs



Implementation status of gas PCIs



For **oil** PCIs, the PCI Progress Watch[173] reports that two projects were in the 'design and permitting' category, two projects were in the planning phase, two projects were listed as 'ongoing' and one PCI was filed under the 'design' phase.[174] The 'design and permitting' category corresponds to the 'permitting phase' label used by ACER. No further progress indication is publicly available on oil PCIs.

Progress of PCIs

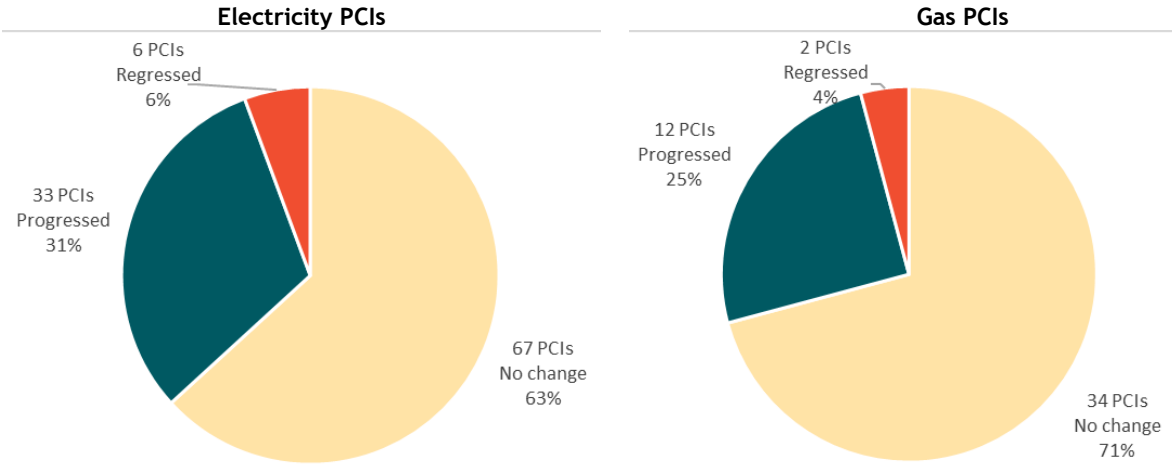
Considering the progress of works, i.e. *any* kind of activity performed on the project, no (detailed) information has been provided for 17 electricity PCIs and 13 gas PCIs regarding their progress in the course of 2016 (ACER, 2017a). This raises doubts on the effective progress and further planning of these projects.

The progress of the PCI implementation can be derived from the changes in their status over 2016-2017: the large majority of **electricity PCIs** (78%) did not change their status, while only 11% moved to a next phase. When assessing the evolution of the status of electricity PCIs from 2015 to 2017[175], 31% of the PCIs moved to the next phase (see Figure 5-6). PCIs progressed mostly in the less advanced categories. However, most of the electricity PCIs (78%) which were in the permitting phase in 2015 were still in the same phase in 2017.

With regard to the evolution of the status of **gas PCIs** from 2015 to 2017[176], 25% of the PCIs moved to a next phase. With regard to electricity PCIs, they progressed mostly in the less advanced categories and only few (4%) reported to be in a less advanced implementation stage in 2017 than in 2015, indicating 'backward progress'.

[173] An internal project status monitoring tool used by DG ENER and INEA staff; file dated 23 March 2017. Provided by DG ENER, received by e-mail.
[174] The implementation status of the seven oil PCIs is only known on the basis of 2015 technical documents, reported in the PCI Progress Watch, using a slightly different taxonomy than the five status types used by ACER for electricity and gas PCIs.
[175] The analysis was performed for 106 PCIs for which information on their status is available for both rounds of PCI monitoring since 2015. ACER examined how the status of these PCIs changed over the last 3 years to provide a picture on PCIs' progress over a longer period.
[176] The analysis was performed for 49 PCIs for which status information is available for both rounds of PCI monitoring since 2015.

Figure 5-6 Project status progress of electricity and gas PCIs between 2015 and 2017. Source: Based on Figure 4 and 28 in ACER (2017a)



To track the progress of PCIs over time, ACER assessed the results of the PCI lists of 2015 and 2017 for which data is available. ACER (2017a) concluded that 36% of the **electricity** PCIs (38 PCIs) have maintained their initial commissioning date[177] (with no delays or reschedules). 20% of the electricity PCIs have been repeatedly behind schedule since 2015, and 44% were once behind schedule over the last two years. For **gas**, 28% (22 PCIs) maintained their original commissioning date, 27% have been continuously behind schedule, and 31% were once behind schedule over the last two years.

A similar assessment was performed by ACER (2017a) by comparing the commissioning dates mentioned in the reporting documents with those provided in 2012/2013. Out of 68 electricity PCIs, only 13 have maintained the same commissioning date (20%). All other electricity PCIs are behind their original schedule, on average by 2.75 years. For gas PCIs, only three out of 41 projects still plan to be commissioned in the same year as the one provided in 2013. Nine gas PCIs have delays of maximum two years, and the remaining 29 gas PCIs have been postponed by four years on average. These results cast a shadow on the ability of the ongoing PCIs to be commissioned within the next few years and suggest that the implementation process of PCIs remains complex and slow. It is also important to keep in mind that not all PCIs will eventually be implemented (as some are competing projects).

On the basis of this analysis, we can conclude that the effective realisation of most PCIs is still lagging behind their initial planning; delays are mainly due to permitting issues, notwithstanding the positive impact of the legal provisions in the TEN-E Regulation on the lead time of the permitting phase of PCI projects. According to ACER (2017a), the most frequent reason for delays in the realisation of PCI projects was permit granting (for 20 out of 33 delayed electricity PCIs). This included delays due to environmental issues (4 electricity PCIs), national law changes affecting permitting (6 electricity PCIs), and the involvement of several countries (3 electricity PCIs).[178] For gas PCIs, the main reasons for delay include changes in national tendering procedures/longer administrative procedures, obstacles in land acquisition,

[177] As defined at the time of the applications for the 2015 PCI list
[178] Issues reported include, for example, introduction of legal obligations to build underground cables; different, irregular and unpredictable approaches in the permit-granting process, extensive public consultation and examination of alternative routes because of public; local opposition forced relocation of part of the projects; political and public opposition in both hosting Member States; permitting issues related to environmental problems; longer than expected permit granting compared to what the Competent Authority initially indicated; different interpretation of requirements by each concerned National Competent Authority; design update resulted in issuance of modified permit which was a prerequisite for the EIA submission; delays due to risks related to the national regulatory framework or uncertainty of regulatory decisions; changes in approach to public consultation.

the permitting process and prolonged administrative procedures related to EIAs / appeals against a decision on environmental conditions.

Rescheduling of electricity PCIs has been necessary due to uncertainties regarding the implementation of another investment, because of investors prioritising other projects or because of changes in overall planning data. For gas PCIs, the main reasons for rescheduling were the need to bring the project in line with the results of a market test which took place after the initial application (6 gas PCIs), uncertainties in the gas market (5 gas PCIs), reprioritisation against other investments (3 gas PCIs), and lack of financing (2 gas PCIs).[179]

Implementation lead time

The average lead time of electricity PCIs – the time period starting from the date of request for the planning approval[180] up to the commissioning date – is about 10 years. This information is based on a sample of 80 projects for which the relevant data was reported. The 70 projects which are considered 'old' PCIs, projects which were already included in the 2013 Union list, also report an average lead time of 10 years. For 8 new PCIs, the expected lead time can be determined to be 9.9 years, as derived from the PCI Progress Watch[181], which is very similar to the overall figure. In 2011, the PCI lead time was found to lie on average between 7 to 13 years.[182] This is in line with the current lead times as established by ACER in the 2016 report[183], and suggests that the average implementation lead time has not significantly improved since the entry into force of the TEN-E Regulation.

Stakeholder consultation

Through the **targeted survey** project promoters were asked whether TEN-E has contributed to accelerating the progress of their projects. Almost two thirds (65%) answered that they did not experience accelerated progress as a result of the Regulation, while 35% reported a positive impact, which in about half of the cases was explained by the fact that financial support could be obtained. Especially the grants for studies under CEF were considered as an important driver for accelerated progress, as depicted by the following comment of a project promoter: "Even if our project is still in its basic design stage, being a PCI has made the project eligible to obtain CEF grants for the preparatory studies required to initiate the permit granting process and thus has significantly contributed to the progress of the project."

Interviewees confirmed that there is progress in the planning and realisation of PCIs (for example shorter lead times for permitting), but deemed it difficult to correlate this progress to the existence of the TEN-E Regulation. Some of them suggested that the political willingness to accelerate specific projects has had a more important impact than the regulation. During the **focus groups meetings,** several stakeholders highlighted that the priority status and PCI label were strong drivers for political support at local level.

[179] ACER (2017a), Consolidated Report on the progress of electricity and gas projects of Common Interest for the year 2016
[180] Planning approval is the approval (at the level of national development planning) by the NRA or by the competent Ministry or national competent authority, as provisioned in the national law of each country. Source: ACER (2016a), Consolidated report on the progress of electricity and gas projects of common interest for the year 2015
[181] An internal project status monitoring tool used by DG ENER and INEA staff; file dated 23 March 2017. Provided by DG ENER, received by e-mail.
[182] SEC (2011) 1233, Commission Working Paper: Impact Assessment accompanying the document 'Proposal for a Regulation on guidelines for Trans-European Energy Infrastructure and Repealing Decision No 1364/2006/EC'
[183] ACER (2016a), Consolidated report on the progress of electricity and gas projects of common interest for the year 2015

Conclusion

Although the average implementation lead time of PCIs does not seem to have improved significantly since the entry into force of the TEN-E Regulation, there has been some progress in the permitting phases of PCIs (compared to the pre-2013 situation). Almost two thirds of the promoters, however, did not experience accelerated progress as a result of the Regulation, and only about a third (35%) confirmed having experienced accelerated progress of their PCIs as a result of TEN-E, mostly driven by CEF access. The effective realisation of most PCIs is still delayed compared to their initial planning. The main reason for delays remain permitting issues, notwithstanding the positive impact of the legal provisions in the TEN-E Regulation on the lead time of the permitting phase of PCI projects.

5.2.2 *What evidence is there that the introduction of EU level infrastructure planning was successful and e.g. PCIs effectively receive priority status treatment at national level?*

Article 7(3) of the TEN-E Regulation requires Member States to allocate priority status of the highest national significance possible to PCIs (where such status exists in national law). This priority status entitles PCIs to administrative and financial support, and is intended to ensure that their permitting is given the most rapid treatment legally possible.[184]

Evaluation based on literature review

According to the Milieu (2016) study, the priority status exists in the national law of 16 Member States, although in six of these MSs national rules were not fully compliant with Article 7(3).[185] Moreover, this priority status differs across countries "with the type of projects to which the status can be granted, possible benefits linked to the status, and the method of allocating the status showing considerable variation". Key issues identified by Milieu (2016) include the fact that the priority status does not always exist across the whole national territory (such as in Belgium and the UK) and that in some cases the status cannot be allocated to all PCIs (because the competent authorities can refuse that allocation).

Table 5-1 Status of the highest national significance. Source: Milieu (2016)

Member States with priority status in place	Member States with no priority status in place
Compliant with Art. 7(3): Bulgaria, Germany, Greece, Finland, Hungary, Italy, Latvia, Netherlands, Poland, Slovenia **Not compliant with Art. 7(3):** Croatia, Ireland, Lithuania, Portugal, Romania, Slovakia	Belgium, Cyprus, Czech Republic, Denmark, Estonia, Spain, France, Luxembourg, Malta, Sweden, UK

As mentioned in section 5.5, project promoters expect the permitting procedure of PCIs to take less time as a result of the entry into force of TEN-E Regulation.

[184] Milieu (2016), Analysis of the manuals of procedures for the permit granting process applicable to projects of common interest prepared under Art.9 Regulation No 347/2013.
[185] "Non-compliance is, in all concerned MSs, related to the fact that it cannot be guaranteed that all PCIs are allocated this priority status – due to the imposition of additional criteria or given practical experience."

Stakeholder consultation

As discussed in Section 5.2.1, the majority (65%) of the project promoters answering the **targeted survey** did not notify having experienced accelerated progress of their project as a result of TEN-E. About a third of the respondents, however, did confirm a positive impact (35%) potentially reflecting the effectiveness of the priority status. The main positive impact was attributed to access to financial support for studies. While the priority status was not explicitly mentioned, three stakeholders mentioned the PCI status or label (which provides wider recognition of the strategic importance of the project at EU level and allows access to CEF). Other reasons mentioned for accelerated progress included:

- National and political support for PCI projects
- Accelerated permit granting and authorisations
- Streamlined/aligned regulatory framework and improved regulatory treatment
- The one-stop shop

The survey included a specific question asking whether the Regulation contributed to allowing a promoter's project to proceed. The received feedback gives us an indication of the effectiveness of the priority status treatment and of other provisions of the TEN-E Regulation. The majority (61%) of the promoters notified there was no noticeable impact; while 39% indicated that TEN-E did effectively allow their project to proceed (while it would not have done otherwise), especially as its continuation was secured by CEF funding. Other given explanations regarding the effective continuation as a result of TEN-E were: the PCI label itself inducing support from authorities, the CBCA decisions, and DG ENER's intervention when a bilateral agreement between promoters was required. One promoter specified the effective impact of the priority status was especially relevant for PCIs from the first list, as the "label created higher awareness and gave projects higher priority compared to projects without the label".

Conclusion

Priority status for PCIs exists in 16 EU MS, although the concerned national approaches are fully compliant with Article 7(3) in only 10 out of 28 Member States. While both the PCI label itself and the national/political support for PCIs were mentioned as important reasons for accelerated progress of PCIs, it is difficult to assess to what extent the priority status plays a role.

35% of the surveyed project promoters mentioned that TEN-E effectively accelerated the PCI progress, and 39% mentioned that their projects continued as a result of TEN-E and they would not have proceeded otherwise. The main reason for both accelerated progress and project continuation, is access to CEF. Continued support from authorities for projects carrying the PCI label is also considered as an important driver. However, for 61% of the project promoters, TEN-E had no noticeable impact in allowing their projects to proceed when it might not have done so otherwise.

5.2.3 Which factors outside the TEN-E Regulation affected the progress towards the specific objectives? (e.g. new additional obligations in national law such as legislation on grounding the cables in DE, budget cuts at MS level, etc.)

The TEN-E Regulation addresses, among others, permitting, public acceptance and cross-border cost allocation in order to facilitate the planning and realisation of trans-European energy infrastructure.

However, there may be additional factors, which are not addressed by the Regulation, which facilitate the progress of large energy infrastructure projects or hinder/prevent their implementation.

Evaluation based on literature review

As most trans-European energy infrastructure asssets have regulated revenues, PCI investments are mainly driven by adequate regulation, that guarantees investors a reasonable and predictable return on equity. Overall barriers affecting investments in the energy industry include[186]:

- Lack of regulatory certainty due to inadequate policies, in particular frequently changing and poorly harmonised national legislations;
- Lack of public acceptance of new infrastructure;
- Inappropriate regulatory framework (including complex permit granting procedures); and
- Economic factors including low electricity demand growth, lack of proper electricity and carbon markets price signals, low profitability of non-subsidised power generation, long lead times and high upfront capital requirements for most infrastructure projects.

Specific market developments and policy measures affect the need for trans-European energy infrastructure projects and impact their realisation. The realised and planned decommissioning of nuclear and fossil fuel based power plants in several EU MS and the large scale development of decentralised RES across the EU require a huge expansion of the transmission grid and additional interconnection capacity. Facing this and other longstanding transmission challenges, Germany adopted specific legislation in stages, starting with the German Energy Line Extension Act (EnLAG) in 2009. EnLAG accelerated the approval process for four demonstration projects and provided clear guidelines on the use of underground cables instead of overhead lines. Due to lack of clarity, EnLAG had mixed results. To resolve some of the legislation's shortcomings, the Bundesrat in 2011 approved the NABEG policy, which requires utilities to underground any 110kV line if the comparative cost factor to an overhead line is not above 2.75. Partial undergrounding of HV lines is more expensive, but is expected to facilitate public acceptance and permitting and hence speed up construction, which in turn will contribute to improved competition and reduced electricity prices. In October 2015, the German cabinet endorsed a draft law that gives preference to high-voltage underground cabling over overhead infrastructure. This political decision to opt for the main north-south trunk of 1,000 km for HVDC cables follows strong resistance to overhead lines from local politicians and citizens' groups. The extra cost is estimated at between EUR 3 and 8 billion.[187] In several other Member States, authorities and TSOs are also increasingly opting for underground HVDC or HVAC cables; this evolution has a positive impact on public acceptance of PCIs on the one hand, but induces higher budget needs on the other hand.
The main benefits of underground cables are: reduced visual impact, less grid losses, less operating costs, reduced electrical and magnetic fields (less potential health concerns) and increased system reliability (less disruption due to extreme weather). Overhead lines are cheaper, easier to construct and to fix,and more flexible in terms of maximum load capacity.
The investment cost for underground cables is 80% to 140% higher than for overhead lines.[188] Also taking into account the operating costs (life-cycle approach), underground cables are still more

[186] Trinomics (2017), European energy industry investments. Study for the ITRE Committee.
[187] http://www.elp.com/articles/powergrid_international/print/volume-16/issue-10/features/going-underground-european-transmission-practices.html
https://www.stjornarradid.is/media/atvinnuvegaraduneyti-media/media/fylgigogn-raflinur-i-jord/24-germanlegislation.pdf
http://www.dw.com/en/german-cabinet-opts-for-underground-power-cabling/a-18765966
[188] https://renewables-grid.eu/fileadmin/user_upload/Files_RGI/Event_material/Cable_workshop/Michael_Ritzau_Understanding_the_Costs_of_Undergrounding.pdf

expensive, but this option can be appropriate for specific HV sections in order to avoid delayed grid extension and the related cost of bottlenecks.

Public budget measures at MS level also affect the realisation of trans-European energy infrastructure. Equity financing ought to play a large role in enabling energy infrastructure investments; however, if TSOs are (partly) publicly owned and their public shareholders impose a low gearing ratio and/or a high pay-out ratio, the access of the TSO to capital might be more difficult and expensive, as these ratios could send the negative signal to the financial market that the TSO is undercapitalised.[189]

Stakeholder consultation

33% of the respondents to the **public consultation** indicated that they are aware of national or local policies which conflict with the idea of enhancing trans-European energy infrastructure. Some highlighted conflicts are listed below:

- National construction permitting law, which has no enabling regime for PCIs (respondent from Slovakia).
- Storage rules in Poland which practically prevent EU companies to import gas hamper optimal use of existing infrastructure and distort investment signals in this part of Europe.
- The recent decision to split up the German-Austrian electricity bidding and price zone counteracts the refurbishment and enhancement of the grids in both countries.
- A stakeholder considered some provisions in the EIA regime in Austria as an obstacle to investing in energy infrastructure, as in his opinion these provisions lead to complex and long procedures (which deter investors).
- The TEN-E support of oil and gas infrastructure contradicts national policies aimed at reducing energy demand and GHG emissions.

During an **interview**, an NRA stated that national initiatives have also contributed to the development of interconnections. An energy association representative argued that an efficient overview of external factors could be achieved by analysing the infrastructure planning at EU-level. In this respect, ACER's role could be more significant: a multitude of national regulatory procedures is a hurdle that slows down the realisation of an EU vision. Negative impacts of national procedures that lack homogeneity could be reduced by allocating additional powers and resources to ACER.

An NRA representative pointed to the problem of unharmonised and inconsistent competences in national law with regard to investments approval and other decisions that affect them (e.g. CBCA).

Conclusion

Factors outside the TEN-E Regulation that negatively affect energy infrastructure investments, are specific weaknesses in the national legal and regulatory framework (lack of predictability and stability, insufficiently coordinated national – e.g. energy and environmental - legislation and regulation), and specific public budget considerations in some EU MSs. Insufficient harmonisation amongst national legislative and regulatory frameworks is in particular a barrier for cross-border infrastructure for which several MSs intervene; this issue is addressed in the TEN-E Regulation but remains a concern.

[189] DG ENER (2015), Study on comparative review of investment conditions for electricity and gas TSOs in the EU

Some market developments and national policy measures affect the need for trans-European energy infrastructure projects and impact their realisation, e.g. ongoing and planned decommissioning of nuclear and fossil fuel fired power plants, large scale development of RES and pressure on electricity TSOs to opt for HVDC or HVAC cables instead of overhead lines. This evolution will increase the budget needs for new electricity PCIs but might positively impact their realisation.

5.2.4 *How many energy islands were addressed/alternative supply routes created by the PCIs implemented so far?*

The TEN-E Regulation aims to improve the interconnection of energy islands by supporting the development of key gas and electricity infrastructure to offer them alternative supply routes. Article 4(2) defines market integration (specifically lifting the isolation of at least one MS) as one of the criteria that gas and electricity infrastructure projects can contribute to in order to be eligible as a PCI.[190]

Evaluation based on literature review

According to the latest report on the State of the Energy Union[191], several Member States are not on track to reach the 10% electricity interconnection target by 2020, and some of them can thus be considered as virtual energy islands. 11 MSs, including the largest MSs (Germany, France, the UK, Poland, Italy and Spain)[192] as well as less populated MSs (islands) such as Cyprus and Ireland, remain under the 10% target.

A successful example on an instance in which a PCI supported improved interconnection is the Baltic States, where there was no grid interconnection with other EU Member States before 2006. The implementation of PCIs[193] has increased the electricity interconnection level of the region with other EU-countries from around 4% in 2010 to almost 23% in 2015.[194] The Poland – Lithuania gas interconnector (GIPL, PCI code 8.5) will end the gas isolation of the Eastern Baltic Sea region by December 2019.[195]

The Iberian Peninsula still has a very low electricity interconnection capacity with the rest of Europe. It's current capacity is only 2.4% of the installed generation capacity in Iberia and will reach 4.1% in 2020, assuming that the new western undersea interconnection cable will be commissioned by 2020.[196] PCIs from the NSI West Electricity corridor in the Iberian Peninsula concern different electricity

[190] The other criteria PCIs can contribute to are sustainability, security of supply and competition. Each PCI should contribute to at least one of these criteria.
[191] SWD(2017) 32 - Second Report on the State of the Energy Union - Monitoring progress towards the Energy Union objectives – key indicators.
[192] This is linked to the fact that the interconnection target is currently based on the overall national generation capacity per MS, which is not an adequate criterion.
[193] The following interconnectors, which were part of the Baltic Energy Market Interconnection Plan (BEMIP), are now in place:
- ESTLINK 1 (350 MW) and ESTLINK 2 (650 MW) between Estonia and Finland, completed in 2006 and 2014.
- NordBalt (700 MW) connecting Lithuania to Sweden in 2015 (PCI code 4.4.1).
- LitPol (500 MW) connecting Lithuania to Poland in 2015 (PCI code 2013 4.5.1 – no longer a PCI). This led to a doubling of Poland's interconnection capacity (reaching 4%).

Source: SWD(2017) 32, Second Report on the State of the Energy Union, Commission Staff Working Document, 'Monitoring progress towards the Energy Union objectives – key indicators'.
[194] Trinomics (2017), European energy industry investments. Study for the ITRE Committee; and SWD(2017) 32, Second Report on the State of the Energy Union, Commission Staff Working Document, 'Monitoring progress towards the Energy Union objectives – key indicators'.
[195] SWD(2015) 247, Commission Staff Working Document accompanying the document Commission Delegated Regulation amending Regulation (EU) 347/2013 of the European Parliament and of the Council as regards the Union list of Projects of Common Interest C(2015) 8052.
[196] Trinomics (2017), European energy industry investments. Study for the ITRE Committee.

interconnection lines between the Iberian Peninsula and France (PCI codes 2.7[197], 2.8 and 2.27) and interconnection between Spain and Portugal (PCI Code 2.17[198]), as well as territorial expansion of the grid within Spain (PCI code 2.6 – no longer PCI[199], 2.25.1, 2.25.2, 2.26) and Portugal (PCI code 2.16.1, 2.16.2 – no longer PCI, 2.16.3).[200]

The TEN-E Regulation has also contributed to enhancing the security of supply and market integration of islands such as Cyprus and Malta, where investments in energy infrastructure are usually economically less attractive than on the mainland. While Cyprus remains an isolated energy system, Malta has had a 200 MW electricity interconnection to Italy since 2015 and its interconnection level jumped from 0% to 35%[201]. There are two PCIs aiming to connect Cyprus' electricity network with Israel (PCI 3.10.1) and Greece (PCI 3.10.2) and one PCI aiming to remove bottlenecks for gas transmission (7.3.2). There is also a gas PCI aiming to connect Italy and Malta (PCI 5.19).

The UK has also benefited from the PCI framework. The UK electricity PCIs (comprising internal lines and ensuring interconnections with Belgium, France, Ireland and Norway) should allow the United Kingdom to reach the 10% target and to have less congested interconnections.[202] However, its interconnection level has not increased yet, and remains at 6% (as in 2014[203]); however, it should be noted that some of these PCIs are now under construction[204]. Similarly, PCIs could lead to a substantial increase in interconnection capacity for Ireland. Already via an EEPR project connecting Ireland with the United Kingdom, its interconnection level went up from 3% in 2011 to 7% in 2013. Its interconnectivity is expected to exceed 15% in 2020, when PCIs from the first list are commissioned.[205] Projects linking Ireland and the UK to the continent (such as the Viking Link and the Celtic interconnector) are expected to bring both the UK and Ireland above the 10% interconnection target.[206]

Regarding gas, new interconnections and LNG terminals have also led to increase security of (gas) supply and are reflected in the N-1 rule for gas infrastructure.[207] Only two MSs remain below the 100% threshold[208]. For example, CEF funds have been allocated to the interconnector linking gas networks in

[197] PCI 2.7 (electricity interconnection between France and Basque country, Spain) was expected to again double the interconnection capacity between France and Spain
[198] PCI 2.17 (electricity interconnection between Portugal and Spain) was expected to increase the interconnection capacity of 7%, bringing Portugal above the 10% target by 2016. Source: COM (2015)82, Energy Union Package. Communication from the commission to the European Parliament and the Council 'Achieving the 10% electricity interconnection target - Making europe's electricity grid fit for 2020'
[199] PCI 2.6 which was supported by EEPR was supposed to double the interconnection capacity between France and the Iberian Peninsula after its inauguration in 2015. *Source: COM (2015)82.* However, according to the 2015 NSI West Progress Report the electricity exchange capacity between France and Spain had not yet reached the expected capacity of 2800 MW, corresponding to a doubling of the initial interconnection capacity (1400 MW), after the project began commercial operation in September 2015. The progress report from the HLG mentioned that the implementation plan would "prioritise all remaining necessary works on the Spanish network side to double the capacity". *Source: High Level Group on Interconnections for South-West Europe (2015), Progress Report: March - December 2015.*
[200] Trinomics (2017), European energy industry investments. Study for the ITRE Committee
[201] SWD(2017) 32 final. Second Report on the State of the Energy Union, Commission Staff Working Document, 'Monitoring progress towards the Energy Union objectives – key indicators'.
[202] COM(2015) 82 final. Energy Union Package. Communication from the commission to the European Parliament and the Council 'Achieving the 10% electricity interconnection target - Making europe's electricity grid fit for 2020'.
[203] SWD(2017) 32 final. Second Report on the State of the Energy Union, Commission Staff Working Document, 'Monitoring progress towards the Energy Union objectives – key indicators'.
[204] NEMO (PCI 1.1.1) and the Norway – UK interconnection (PCI 1.10 A). Source: PCI Progress Watch. An internal project status monitoring tool used by DG ENER and INEA staff; file dated 23 March 2017. Provided by DG ENER, received by e-mail.
[205] COM(2015) 82 final. Energy Union Package. Communication from the commission to the European Parliament and the Council 'Achieving the 10% electricity interconnection target - Making europe's electricity grid fit for 2020'.
[206] SWD(2015) 247, Commission Staff Working Document accompanying the document Commission Delegated Regulation amending Regulation (EU) 347/2013 of the European Parliament and of the Council as regards the Union list of Projects of Common Interest C(2015) 8052.
[207] N-1 rule for gas infrastructure is an indicator of infrastructure adequacy defined in the security of gas supply regulation. It refers to the resilience of the system in ensuring that gas demand on extremely cold days can be covered even if the largest infrastructure fails.
[208] Excluding countries with a derogation. Source: SWD(2017) 32 final. Second Report on the State of the Energy Union, Commission Staff Working Document, 'Monitoring progress towards the Energy Union objectives – key indicators'.

Romania, Bulgaria, Austria and Hungary and to the Balticconnector project, the first gas pipeline to link Estonia and Finland.[209]

Oil PCIs contribute to addressing security of supply; however, none of the seven oil PCIs is located in a geographical island.

Stakeholder consultation

No information was gathered via stakeholder consultation.

Conclusion

Several islands (Cyprus, Malta, UK and Ireland) and peninsulas (e.g. Iberia) are benefiting from electricity and gas PCIs which improve their interconnectivity with other EU member states, and offer them substantial benefits in terms of security of supply and access to energy under more competitive conditions. The TEN-E Regulation has also significantly improved the integration of virtual energy islands (e.g. the Baltic region) into the EU electricity and gas systems and markets.

5.3 EG.3 – Alignment of Third Countries with European Framework

5.3.1 What evidence is there of climate/energy policy benefits of giving more prominence to projects linking EU States with those outside the EU?

The Regulation applies to all countries of the European Economic Area (EEA), i.e. the 28 EU Member States, plus Norway, Iceland and Liechtenstein. This question explores the PCIs linking EU MSs with countries outside the EU, as well as their climate and energy policy benefits.

Evaluation based on literature review

There are 16 PCIs (eight electricity PCIs, seven gas PCIs and one oil PCI) that involve third countries, as shown in the table below. The gas PCIs mainly focus on enhancing the security of supply (diversified gas routes and sources), while the electricity PCI projects also contribute to the EU's climate and energy goals.[210] For example, interconnections with Switzerland and Norway[211] enhance the flexibility of the European electricity system and facilitate the integration of intermittent renewable energy sources. The electricity generation/storage assets (both existing assets and potential developments) of several third countries (in particular Switzerland and Norway) are highly complementary to the electricity system in the EU. These third countries can provide competitive balancing capacity and energy to the rest of Europe, on the basis of their large scale hydro-based electricity generation assets. PCIs provide an important way of linking these systems and utilising this flexibility source, thus enabling the EU to reach its climate and energy targets at lower costs.

Gas PCIs with third countries play a particularly important role to enhance security of gas supply and to improve the gas market functioning in the Balkan region, via the Central and South Eastern Europe Gas

[209] SWD(2017) 32 final. Second Report on the State of the Energy Union, Commission Staff Working Document, 'Monitoring progress towards the Energy Union objectives – key indicators'.
[210] There is also one oil PCI connecting Ukraine with Poland.
[211] Norway, Liechtenstein and Iceland are part of the EEA and of the European internal market, and they are eligible for TEN-E.

Connectivity (CESEC)[212]. Within CESEC, three subgroups covering the three infrastructural corridors in SEE (South-East, Central-East and Adriatic) have been created to identify specific projects of importance to security of supply. The MoU allows for a similar cooperation structure to be established with regard to electricity, once the natural gas infrastructure objectives of the current Action Plan have been met. The large number of electricity PCIs in the CESEC countries, of which some run through Energy Community Contracting Parties, highlights the need for additional infrastructure in this region to plug the gaps in the regional networks, namely a reinforced electricity grid and an appropriate balancing system to integrate electricity from renewable energy sources.[213]

Table 5-2 List of PCIs involving third countries. Source: PCI Progress Watch[214]

Corridor	Name	Countries involved
1. NSOG (electricity)	1.8 Interconnection between Wilster (DE) and Tonstad (NO) [currently known as "NordLink"]	Germany, Norway
	1.10 Norway – United Kingdom interconnection	UK, Norway
	1.13 Interconnection between Iceland and United Kingdom [currently known as "Ice Link"]	UK, Iceland
2. NSI West Electricity	*2.11.1 Interconnection between border area (DE), Meiningen (AT) and Rüthi (CH) [NO LONGER PCI]*	Austria, Germany, Switzerland
	2.14 Interconnection between Thusis/Sils (CH) and Verderio Inferiore (IT)	Italy, Switzerland
	2.15.1 Interconnection between Airolo (CH) and Baggio (IT)	Italy, Switzerland
	2.15.2 Upgrade of Magenta substation (IT) [NO LONGER PCI]	Italy, Switzerland
3. NSI East Electricity	*3.5.1 Interconnection between Banja Luka (BA) and Lika (HR) [NO LONGER PCI]*	Croatia, Bosnia and Herzegovina
	3.10.1 Interconnection between Hadera (IL) and Kofinou (CY)	Cyprus, Israel
	3.19.1 Interconnection between Villanova (IT) and Lastva (ME)	Italy, Montenegro
	3.22.1 Interconnection between Resita (RO) and Pancevo (RS)	Romania, Serbia
5. NSI West Gas	*5.15.1 Emden (from Norway to the Netherlands) [NO LONGER PCI]*	Netherlands, Norway
	5.20 Gas Pipeline connecting Algeria to Italy (via Sardinia) [currently known as "Galsi " pipeline]	Italy, Algeria
6. NSI East Gas	6.10 PCI Gas interconnection Bulgaria – Serbia [currently known as "IBS"]	Bulgaria, Serbia
	6.21 Ionian Adriatic Pipe line (Fieri (AB) - Split (HR) [NO LONGER PCI]	Croatia, Albania, Montenegro
	6.25.2 Pipeline system from Greece to Austria [currently known as "Tesla"]	Hungary, Greece, Austria, FYROM, Serbia
7. SGC (Gas)	7.1.1 Gas pipeline to the EU from Turkmenistan and Azerbaijan, via Georgia and Turkey, [currently known as the combination of "Trans-Caspian Gas Pipeline" (TCP), "Expansion of the South-Caucasus Pipeline" (SCP-(F)X) and "Trans Anatolian Natural Gas Pipeline" (TANAP)]	Turkmenistan, Turkey, Azerbaijan, Georgia
	7.13 Gas pipeline from Greece to Italy via Albania and the Adriatic Sea [currently known as "Trans-Adriatic Pipeline" (TAP)]	Italy, Greece, Albania, Turkey
	7.4.1 Compressor Station at Kipi (EL)	Greece, Turkey
	7.4.2 Interconnector between Turkey and Bulgaria [currently known as "ITB"]	Bulgaria, Turkey

[212] The following states have signed the CESEC MoU: Austria, Bulgaria, Croatia, Greece, Hungary, Italy, Romania, Slovakia, Slovenia, Albania, Bosnia and Herzegovina, FYROM, Serbia, Moldova and Ukraine
[213] CEPS (2016), A Roadmap to Enhanced Regional Energy Policy: Cooperation in South East Europe and CESEC non-paper (https://ec.europa.eu/energy/sites/ener/files/documents/CESEC%20new%20horizons%20non%20paper%20-%20FINAL.pdf)
[214] An internal project status monitoring tool used by DG ENER and INEA staff; file dated 23 March 2017. Provided by DG ENER, received by e-mail.

Corridor	Name	Countries involved
9. OSC (Oil)	9.1 Adamowo – Brody pipeline: pipeline connecting the JSC Uktransnafta's handling site in Brody (Ukraine) and Adamowo Tank Farm (Poland)	Poland, Ukraine

A study[215] compares decarbonisation scenarios for 2050 with different grid expansion assumptions. This study concludes that a scenario with limited imports from outside the EU may be more economical in terms of grid upgrades. However, when considering additional costs (such as the need for increased generation capacity and storage needed to accompany the increase in solar PV), the overall costs may exceed those in a scenario which includes imports from countries outside the EU.

Stakeholder consultation

In the **targeted survey**, the issue of projects connecting a single MS and a single non-EU Energy Community Contracting Party was mentioned as a hurdle to be resolved. Under the current framework, such projects are not eligible to obtain PCI/PECI status or for EU funding (CEF).[216] A stakeholder mentioned that *"All ENTSO-E members have to take part in preparing TYNDP in accordance with European scenarios considering large scale RES integration and decarbonisation objectives. When applying infrastructure projects between EU and non-EU Member States for the PCI list, these projects are not eligible. We consider that unfair."* It was suggested that infrastructure projects between EU and Energy Community (non-EU) countries should be treated equally to projects between EU MSs, as they are as important as "internal" projects in achieving European decarbonisation targets and increasing EU security of supply.

Stakeholders also suggested that, in line with the Neighbouring Policy Strategy of the EU, it would be appropriate toalso include neighbouring non-EU Member States in the perimeters of Priority corridors, in particular North African or Energy Community Countries. In this way, the regional planning of infrastructure could also consider projects involving non-EU Member States which are of key importance to develop infrastructure corridors and to integrate isolated systems.

During an **interview**, an energy association representative argued that interconnection projects with non EU Member States should be evaluated on the basis of their overall welfare contribution on the one hand and their social welfare contribution for the EU on the other hand: a fair sharing of costs should be agreed upon.

Conclusion

Several PCIs – which have been selected for their contribution to the EU's energy and climate goals, in particular competitive and secure gas supply and development of renewable energy sources – include non-EU Member States. 16 PCIs (and five previously labelled PCIs) involve non EU Member States (three of which include EEA countries: Norway and Iceland).

In order to optimally value the potential contribution of infrastructure projects with third countries to the EU's climate and energy goals, we suggest, also on the basis of stakeholder consultation input, to reconsider certain rules of the policy framework, in particular the treatment of joint projects

[215] Energynautics (2011), European Grid Study 2030/2050.
[216] While the stakeholder mentioned that these projects could not access any EU funds, this is not correct. These projects could, however, obtain pre-accession funds (IPA – Instrument of pre-accession assistance). Current beneficiaries are: Albania, Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia, Kosovo*, Montenegro, Serbia, and Turkey.

with non-EU Member States that are either members of the Energy Community or on the perimeter of priority corridors. Projects that link EU Member States with those outside of the EU and that offer a substantial social welfare contribution for the EU, could be assimilated and get the same treatment as "internal" PCIs; interconnections with North-African countries can in particular offer substantial energy and climate policy benefits, as they can help balance the European electricity system and facilitate the integration of renewable energy sources.

5.3.2 *What evidence is there that e.g. Energy Community and EuroMed frameworks for promotion of specific energy transmission projects would benefit from a closer alignment with the PCI framework?*

The **Energy Community** deals with energy policy, bringing together the EU and non-EU Member States from South East Europe and the Black Sea region.[217] The **Union for the Mediterranean (UfM)**[218] is an intergovernmental organisation which was set up in 2008 as a continuation of the Euro-Mediterranean Partnership (Euro-Med) to further enable cooperation between the EU and the Mediterranean countries, and to progressively integrate their electricity networks and markets. The main objective is to achieve a regional electricity market in which electricity can be exchanged across borders without physical, technical or regulatory barriers.

Evaluation based on literature review

According to the Energy Union 2030 scenario, in the long run, the significant development of RES will be the main driver of pan-European transmission network expansion.[219] In this context, additional interconnections between EU and non-EU Member States might offer substantial benefits to both parties. A closer alignment of the legal and regulatory framework would be helpful to facilitate the realisation of economically feasible interconnectors.

The **Energy Community's** Energy Strategy[220] establishes the concept of Projects of Energy Community Interest (PECI). The current process of identifying PECIs and facilitating their implementation mirrors the EU framework on PCIs.[221] In 2015, the EnC's Permanent High Level Group recommended full incorporation of the TEN-E Regulation into the Energy Community acquis, setting a target model to be applied as of 2016. The Target Model agreed upon by the Energy Community seems a good basis for further aligning the legal and regulatory frameworks and facilitating the implementation of interconnections between the EU and non-EU Member States of the Energy Community. However, while the Energy Community has become a "useful forum for debate, capacity building, and exchange of best practice", progress on the implementation and enforcement of internal energy market legislation has been slower.[222] A way forward, proposed by Dimitrova et al (2016) is to increase coherence between the PCI list and PECIs and to align them with the CESEC HLG priorities.

Following the TEN-E experience and the steps taken by the Energy Community, the Mediterranean Energy Regulators (MEDREG) recommended – in the framework of the UfM - to also consider a list of

[217] Energy Community webste (https://www.energy-community.org/)
[218] It consists of 28 EU member states, 15 Southern Mediterranean, African and Middle Eastern countries.
[219] OIES (2016), Business model for cross-border interconnections in the Mediterranean basin.
[220] Energy Community (2012), Energy Strategy of the Energy Community
[221] ECRB (2015), Risk – related regulatory investment incentives for Projects of Energy Community Interest - A Recommendation Paper.
[222] Dimitrova, A. Egenhofer, C. and A. Behrens (2016), A Roadmap to Enhanced Regional Energy Policy: Cooperation in South East Europe. A CEPS special report.

infrastructure projects that are of interest for the larger region including, in particular, electricity corridors (including a link between Morroco and Spain and between Tunisia and Italy) and gas interconnections between North-Western Africa and North-Western Europe, as well as the Trans-Anatolian Pipeline (to be connected to the Trans-Adriatic Pipeline).[223]

The **Euro-Mediterranean Energy Platform** linking the countries of the EU, North Africa and the Eastern Mediterranean, was launched in 2015 and focuses on the development of gas infrastructure, encouraging renewable and boosting interconnections. It aims to ensure greater convergence between the policies of the concerned countries, to cooperate in the security area, and to work together in promoting regional energy security. This platform will in principle contribute to meeting the specific interconnection objectives.

Stakeholder consultation

During an **interview**, an energy association respondent stated to be in favour of a closer cooperation and aligment, given that a holistic view, cross-regional and cross-continent PCI development will benefit the economy by reducing costs and facilitating RES development.

Conclusion

There is limited evidence concerning the concrete impact of a closer aligment of the legal and regulatory framework of the EU and its neighbouring regions on the realisation of energy transmission infrastructure. However, several potential interconnection projects between EU and non-EU Member States have been identified wich would offer economic benefits by enhancing security of supply and facilitating future RES development.

Both the Energy Community and UfM frameworks already aim to implement, to a certain extent, the framework proposed by the TEN-E Regulation. The EuroMed Platfom will in principle contribute to ensure greater convergence between the policies of the concerned countries. It would be useful to further assess the benefits and feasibility of a closer alignment of the legal and regulatory framework of EnC and EuroMed in order to facilitate the realisation of identified economically feasible interconnectors.

5.4 EPA.1 – PCIs under the Transitional Arrangements from Article 19

5.4.1 How many PCIs are caught by the transitional arrangements (Art. 19)?

Article 19 of the TEN-E Regulation states transitional provisions through which the permit granting process (as defined by Chapter III of the TEN-E Regulation) does not apply to PCIs which submitted an application file before 16 November 2013.

Evaluation based on literature review

Based on the reporting of the project promoters to ACER in 2017[224], it was found that permitting procedures of 30 electricity and 20 gas PCIs started before 16 November 2013. The concerned PCIs are

[223] MedReg (2015), Interconnection Infrastructures in the Mediterranean: A Challenging Environment for Investments.
[224] Underlying monitoring reporting data for ACER (2017a) 'Consolidated report on the progress of electricity and gas projects of common interest for the year 2016'. Provided by DG ENER, received by e-mail.

shown in Table 5-3. According to the 2016 reporting from MS Competent Authorities[225] to DG ENER, three oil PCIs started their permitting procedure before 16 November 2013, implying that according to the most recent available data, **53 PCIs** are subject to Article 19.

The list of the electricity and gas PCIs in the 2016 CA reports, however, is slightly different. According to this source, 57 PCIs were reported to fall under the transitional provisions. Based on the reporting of the project promoters to ACER in 2016[226], 54 PCIs are captured by Article 19, while the associated consolidated report (ACER, 2016a) concluded that 59 electricity and gas PCIs started their permitting procedure before 16 November 2013. PCIs codes which do not recur in all assessed data sources are presented in italics and bold in Table 5-3.

Table 5-3 PCIs subject to Article 19 of the TEN-E Regulation. Source: Prepared by Trinomics based on 2017 reporting by project promoters (electricity and gas) to ACER[227], complemented by 2016 reporting by Competent Authorities to DG ENER[228] for oil projects (corridor 9: OCS).

Corridor	PCIs subject to Article 19
1. NSOG	**7 PCIs:** ***1.3.1***; 1.3.2; 1.4.2; 1.4.3; 1.5; 1.10 (&1.10.B)
2. NSI West Electricity	**8 PCIs:** 2.5.1; 2.12; 2.15.1; 2.17; 2.18; 2.20; 2.21; 2.22
3. NSI East Electricity	**8 PCIs:** 3.1.1; 3.1.2; 3.4; ***3.9.1***; ***3.9.2***; 3.13; 3.15.1; 3.19.1
4. BEMIP Electricity	**7 PCIs:** 4.1; 4.2.1; 4.2.2; ***4.4.2***; ***4.5.2***; ***4.5.5***; ***4.7***
5. NSI West Gas	**5 PCIs:** 5.1.3; ***5.3***; ***5.11***; 5.20
6. NSI East Gas	**11 PCIs:** ***6.1.1***; ***6.1.12***; ***6.2.2***; 6.5.2; 6.8.1; 6.9.1; 6.10; ***6.18***; ***6.20***; ***6.26.2***; ***6.26.5***
7. SGC	**2 PCIs:** 7.1.3; 7.1.4
8. BEMIP Gas	**2 PCIs:** 8.1.1; 8.1.2.2
9. OSC	**3 PCIs**: ***9.2***; ***9.3***; ***9.5.1***
10. Smart grids	-
Total	**53 PCIs**

PCI codes which did not recur in the 2016 reporting by project promotors to ACER[229] and/or 2016 reporting by Competent Authorities to DG ENER[230] are shown in italics.

Stakeholder consultation

No information on this issue was gathered via the stakeholder consultation.

[225] Competent Authorities (2016). Reporting to DG ENER – Information received by email
[226] Underlying monitoring reporting data for ACER (2016a) 'Consolidated report on the progress of electricity and gas projects of common interest for the year 2015'. Provided by DG ENER, received by e-mail.
[227] Underlying monitoring reporting data for ACER (2017a) 'Consolidated report on the progress of electricity and gas projects of common interest for the year 2016'. Provided by DG ENER, received by e-mail.
[228] Competent Authorities (2016). Reporting to DG ENER – Information received by e-mail
[229] Underlying monitoring reporting data for ACER (2016a) 'Consolidated report on the progress of electricity and gas projects of common interest for the year 2015'. Provided by DG ENER, received by e-mail.
[230] Competent Authorities (2016). Reporting to DG ENER – Information received by e-mail

Conclusion

The information regarding the number of PCIs caught by the transitional arrangements of Article 19 is not fully consistent. According to the most recent available data sources, Article 19 applies to 53 PCIs, composed of 30 electricity, 20 gas and 3 oil projects. However, other data sources indicate that up to 62 PCIs are captured by Article 19. The number of PCIs which started their permitting process before 16 November 2013 thus lies **between 53 and 62**; less than a third of the PCIs are caught by the transitional arrangements of Article 19.

5.4.2 What pre-application schemes do the MSs use?

Article 10 of the TEN-E Regulation determines the permitting procedure and its two stages (pre-application and statutory permit granting procedure). It also defines the different steps for the pre-application procedure.

Evaluation based on literature review

Most Member States have implemented some or all of the specific pre-application requirements foreseen in Article 10 of the TEN-E Regulation, with regard to the one-stop shop, material to be submitted, the detailed schedule for application and draft application file, and requests for additional information. Effective compliance with these requirements could, however, be improved. Out of the 15 Member States assessed by Milieu[231], only four (FR, GR, IE, NL) were fully compliant with the workflow requirements and two were partially compliant (DE, UK). The Milieu report describes the various reasons for non-, and partial compliance including, for example, the continued application of pre-existing rules (HR, CZ, LT, PL, RO, SE) and issues with the timing of the EIA (LV, SE, ES).

Stakeholder consultation

During the **Permitting and Public Acceptance Focus Group meeting,** stakeholders gave the following specific comments with regard to the permitting procedure in their Member State.

A stakeholder from the **UK** mentioned there are two different routes for permitting, depending on the size of the project. The same stakeholder referred to the struggle of the CA with interpreting the term 'comprehensive decision' and added that additional secondary and tertiary consents are still required after the comprehensive decision has been issued.

A stakeholder from **Germany** stated that the reduction in the permitting time is the result of both changes in national law and the adoption of the TEN-E, and that no additional permits are needed after the comprehensive decision has been issued. In Germany, the framework consists of three steps: 1) NDP elaboration (scenario and planning), 2) pre-application procedure, and 3) statutory permit granting.

Although **Lithuania** opted for a collaborative scheme, its national framework already ensures a project is able to obtain all permits within 13 months (since authorities have 20 days to issue permits/decisions). Each authority involved in the permit granting process is part of a steering committee and no additional permits are needed after the comprehensive decision has been issued.

While national legislation in **Poland** set time limits for authorities to make intermediate decisions regarding national projects (including PCIs), the TEN-E time limits apply to the whole process.The Polish permitting process starts with three parallel procedures (i.e. water permit, environmental

[231] Milieu (2016), Analysis of the manuals of procedures for the permit granting process applicable to projects of common interest prepared under Art.9 Regulation No 347/2013.

decision, consultation of policy institutions) and then becomes sequential, leading to the permit to construct.

The main permits issued in **France** are the declaration of public utility and the national permit to build and operate. However, there are several other permits that are granted at a later stage and not considered in the 3.5 year time limit.

Conclusion

Most Member States have implemented some or all specific pre-application requirements foreseen in Article 10 of the TEN-E Regulation in their national framework; however, compliance with these requirements could be further improved. The concrete application of the permitting provisions at Member State level varies; Member States seem to respect the objectives and principles of Article 10 of the TEN-E Regulation, but some practical details of their actual permitting procedures are not (yet) fully compliant.

5.5 EPA.2 – Permit Granting Duration

5.5.1 The average and maximum duration of the permit granting processes for PCIs, including the duration of each step of pre-application in comparison to that foreseen in Article 10(4)

Article 10(1) states that the pre-application procedure should take place within two years, while the statutory granting procedure should take place within one year and six months. These time limits may be extended by a maximum of nine months for both procedures combined, on a case-by-case basis.

The 3.5 year time limit is applicable to all projects which started applying for permits after 16 November 2013,which shall be referred to as '**post-2013 PCIs**'. In other words, the benefit of having the permitting process take no longer than three years and six months shall only apply to post-2013 PCIs,shall start elapsing from the date of signature of the acknowledgement of the notification by the Competent Authority (CA)[232] and be concluded once the comprehensive decision is taken by the CA.

The permit granting duration for pre-2013 PCIs is calculated based on the date of submission of the first permit application (or an estimation) and the date when the last permit was obtained (or is expected to be obtained).

Evaluation based on literature review

Considering that the Regulation entered into force on 1 June 2013, the extent to which compliance with the overall time limit of three years and six months can be determined is rather limited. However, based on the dates provided by project promoters under the PCI monitoring framework, it was possible to come up with actual figures for 5 post-2013 electricity PCIs and 4 post-2013 gas PCIs. Based on these figures, the average timespan of the permitting procedure is 22 months for post-2013 electricity PCIs and 30 months for post-2013 gas PCIs. It should be noted that the sample is rather small due to the limited number of PCIs which started and finished the permit granting process after November 2013. For all other PCIs, it should be noted that the figures contained herein are not actual, but estimate timespans (i.e. how long project promoters expect the permit granting would last).

[232] The date of the start of the permit granting process of a PCI where two or more MSs are concerned is the date of the acceptance of the last notification by the CA concerned.

ACER has analysed the duration of the permit granting processes for electricity and gas PCIs. Given that only a limited number of PCIs had concluded the permitting procedure at the moment of the ACER reporting, as the TEN-E Regulation entered into force on 1 June 2013, it follows that it is too early to assess compliance with the overall time limit of three years and six months; hence, most figures contained herein concern expected durations.[233] For oil PCIs, this information is not publicly available.

According to the analysis of ACER in 2016 (ACER, 2016a) based on an assessment of 96 **electricity PCIs**, the average duration for permitting was 3.5 years.[234] As of 31 January 2016, 58 projects have started the permitting procedure and 12 have obtained all permits. About a third (35 out of 96) are pre-2013 PCIs, and almost two thirds (61 out of 96) are considered post-2013 PCIs. An overview of the permit granting durations is given in Table 5-4. Seven post-2013 PCIs (six transmission, one storage) reported a very short duration of the permit granting process (one year or less), while only one pre-2013 PCI reported such a short duration.

ACER recalls in its report the obligation for authorities to respect the timeframe, as seven electricity project promoters still reported expected permit granting durations above the maximum duration of 3.5 years (up to five years).

Table 5-4 Expected[235] duration of permit granting process of electricity PCIs. Source: pp 51 in ACER (2016a)

Duration	pre-2013 PCIs	post-2013 PCIs
Minimum	only #1 PCI 'less than one year'	3 months (#2 PCIs) *(#7 PCIs less than one year)*
Average	5.5 years (*#35 PCIs)*	2.3 year (#61 PCIs)
Maximum	NA	up to 5 years (#7 PCIs > 3.5 years)

(# indicates number of projects)

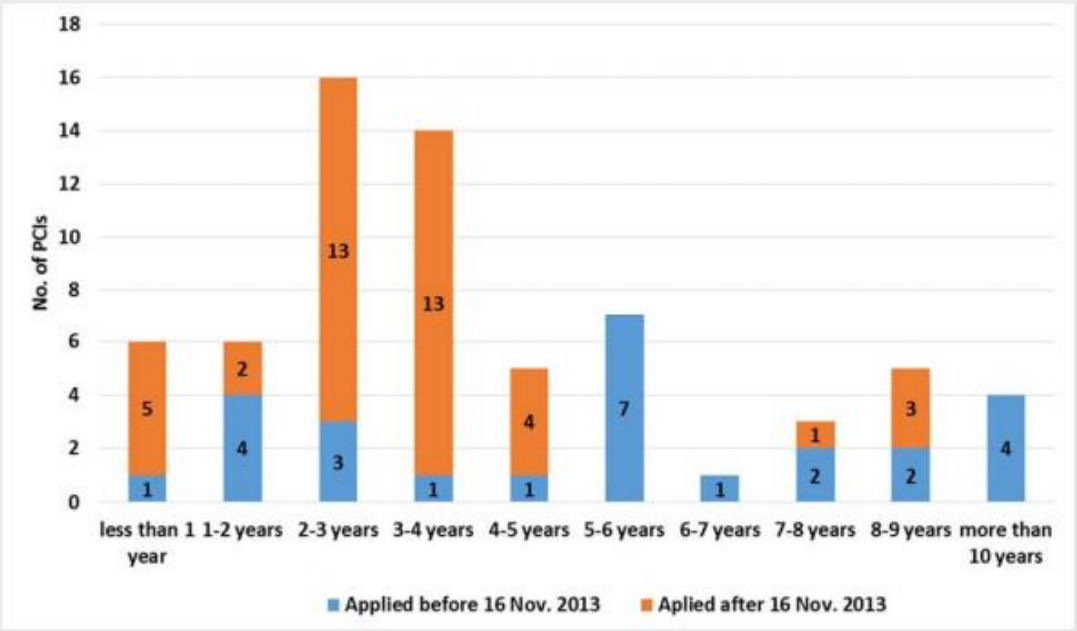
ACER (2017a) states that the average permitting duration for both pre and post-2013 electricity PCIs is 4.1 years, with an expected duration for most PCIs between two and four years, as shown in the figure below.[236]

In its 2016 analysis, ACER noted that in some cases project promoters did not consider the preparation of environmental reports as part of the permit granting process, which is in conflict with Article 10(1) (a) of the Regulation. This may partly explain the relatively low permit granting lead time of 3.5 years found in 2016. In its 2017 report, ACER also confirmed that "PCIs which applied for permit granting after 16 November 2013 are in general more optimistic about the expected duration of the permit granting than those which applied before"; the average duration of permit granting is 3.5 years and 5.5 years respectively for post and pre-2013 electricity PCIs.

[233] Underlying monitoring reporting data for ACER (2017a), provided by DG ENER (by e-mail), suggest that about a fifth of the figures is based on actual durations, and this is more often reported by pre-2013 PCIs.
[234] ACER (2016a), Consolidated report on the progress of electricity and gas projects of common interest for the year 2015
[235] As the permitting procedure was reported to have been concluded for only 12 electricity PCIs (ACER, 2016a), these figures are mostly expected and not actual permit granting durations. Underlying monitoring reporting data for ACER (2017a), provided by DG ENER (by e-mail), similarly suggest that about a fifth of all figures is based on actual durations, and this is more often reported by pre-2013 PCIs.
[236] The assessment includes 26 out of 35 projects that applied before 16 November 2013, and 41 out of 74 projects that applied after 16 November 2013. 42% of the PCIs reported an expected duration of permitting within this timeframe, 19% reported less, 39% reported more.

However, whereas the average lead time of pre-2013 PCIs did not change since the 2016 report, the 2017 report revealed a longer lead time from 2.3 years (as shown in Table 5-4) to 3.5 years for post-2013 PCIs.

Figure 5-7 Expected[237] duration of permit granting for electricity PCIs[238]. Source: Figure 14 in ACER (2017a)



For gas the average permit granting duration was 3.2 years for a total of 21 pre- and 33 post-2013 PCIs. For this sector as well, the effective permitting duration was significantly shorter for the post-2013 PCIs (1.5 years) than for the pre-2013 PCIs (5.9 years).[239]

The duration is analysed in a slightly different way for gas PCIs, making a distinction per type of project (transmission, LNG or storage) and reporting average annual overrun times (see Table 5-5).

For transmission projects, the permit granting duration was reduced from 6.8 to 1.3 years, for underground gas storage (UGS) projects it decreased from 4.4 to 2.7 years. For LNG, no permit duration could be determined for the post-2013 projects. Pre-2013 LNG PCIs had an average lead time of 3.9 years.

The overrun time for the transmission projects was substantially reduced from 4.1 to 0.8 years. Note that the mentioned overrun time for storage post-2013 PCIs is only based on one single PCI and therefore not representative. Overall, the average overrun time for gas PCIs decreased from 3.3 to 1.2 years. These results seem to indicate a major success of the Regulation. Nonetheless, with only seven gas PCIs actually having concluded the permitting procedure, the other figures are based on expected durations of the promotors.

[237] It is unclear how many projects of this analysis have already completed the permit granting procedure. Underlying monitoring reporting data for ACER (2017a), provided by DG ENER (by e-mail), suggest that about a fifth of the figures is based on actual durations, and this is more often reported by pre-2013 PCIs.
[238] 35 projects who applied for permit granting before 16 November 2013, 26 were taken into consideration. For the 74 projects who applied after 16th November 2013 only 41 were taken into consideration
[239] According to ACER (2016a) 'Consolidated report on the progress of electricity and gas projects of common interest for the year 2015' a total of 54 projects reported the relevant permit dates, of which 21 were pre-, and 33 were post-2013 PCIs

Table 5-5 Expected[240] duration of permit granting process and average overrun (>3.5 years) of gas PCIs. Prepared by Trinomics based on table 9 in ACER (2016a)

Duration	pre-2013 PCIs				post-2013 PCIs			
	Transmission	LNG	Storage	All gas types	Transmission	LNG	Storage	All gas types
Average process	6.8 years (#14 PCIs)	3.9 years (#5 PCIs)	4.4 years (#2 PCIs)	**5.9 years (#21 PCIs)**	1.3 years (#30 PCIs)	NA	2.7 years (#3 PCIs)	**1.5 years (#33 PCIs)**
Average overrun	4.1 years (#12 PCIs)	2 years (#3 PCIs)	0.9 year (#2 PCIs)	**3.3 years (#17 PCIs)**	0.8 year (#5 PCIs)	NA	3.3 years (#1 PCIs)	**1.2 years (#6 PCIs)**

(# indicates number of projects)

A comparison between the current permit granting process durations and those mentioned in the 2011 impact assessment[241] also indicates that the permit granting durations have shortened.

In 2011, the average duration of the permit granting progress was still between four and ten years.

With electricity PCIs having an average lead time for permit granting of 5.5 (pre-2013) versus 2.3 (post-2013) years - according to ACER (2016a), or of 3.5 years according to ACER (2017a) - and for gas PCIs an average duration of 5.9 (pre-2013) versus 1.5 (post-2013) years, the permit granting duration clearly seems to have improved since the entry into force of the TEN-E Regulation judging from these (mostly expected) permit granting dates.

Steps of permit granting process

There is no data available for each step of the pre-application procedure, which is applicable under Article 10(4) for post-2013 projects.

By using the most recent reporting of project promoters to ACER in 2017[242] we were, however, able to assess the duration of the two separate stages of permit granting: the pre-application procedure (2 year limit) and statutory procedure (1.5 year limit).

However, the availability of required data is limited to only 27 PCIs[243], of which only one has in fact completed both procedures. The resulting 'total permit granting' duration figures are therefore inconsistent with the numbers presented above. They do, however, give a useful indication of the duration of the two stages.[244]

[240] As the permitting procedure was reported to have been concluded for only 7 gas PCIs, these figures should be considered as the expectations of the promoters (ACER, 2016a). Underlying monitoring reporting data for ACER (2017a), provided by DG ENER (by e-mail), similarly suggest that about a fifth of all figures is based on actual durations, and this is more often reported by pre-2013 PCIs.
[241] SEC (2011) 1233, Commission Working Paper: Impact Assessment accompanying the document 'Proposal for a Regulation on guidelines for Trans-European Energy Infrastructure and Repealing Decision No 1364/2006/EC'
[242] Underlying monitoring reporting data for ACER (2017a) 'Consolidated report on the progress of electricity and gas projects of common interest for the year 2016'. Provided by DG ENER, received by e-mail. (Redacted version as of 21 June 2017).
[243] The availability of data is mostly limited due to the fact that "promoters did not appear to be aware of the sequence and the content of the pre-application and the statutory procedures, and of their overall place within the entire permit granting process". This may also be related to compliance problems, further discussed in 5.10.1) For the analysis of the duration of the two stages, the most recent ACER monitoring data is used (as of 21 June 2017) in order to obtain the most recent reliable data. The low sample – and the poor understanding of the two stages – is an important limitation of the resulting durations which should be viewed only as an indication.
[244] The sum of the separate analysis of both procedures (the total permit granting process) according to the data available as of 21 June 2017 is higher than was found in ACER (2016a) concerning PCIs for the year 2015): 2.7 (n=18) and 2.3 (n=11) years for respectively electricity and gas PCIs, compared to 2.3 (n=61) and 1.5 (n=33) years as found by ACER. However, ACER (2016a) does concern a different target year (2015). The average permitting time of post-2013 electricity PCIs in 2016 on the other hand amounted 3.5 (n=41) years (ACER, 2017a).

The available information shows that the pre-application procedure takes on average 1.2 years and the statutory procedure 1.4 years (see Table 5-6). The statutory procedure was observed to be shorter for the gas PCIs, but it should be noted that this sample is rather small. The average duration of the two permit procedures are below the maximum durations as provided in Article 10. In six cases (4 electricity, 2 gas PCIs), however, the maximum duration of the pre-application procedure (2 years) was exceeded. The highest duration found was 2.5 years. The maximum duration of the statutory procedure (1.5 years) was exceeded in ten cases (9 electricity, 1 gas PCIs) out of 27 PCIs considered, with one PCI reaching a duration as high as 4.1 years for this procedure. The total permitting procedure limit of 3.5 years was only exceeded by three (electricity) PCIs.

Table 5-6 Average (expected*) lead time of pre-application and statutory procedure for 18 electricity and 9 gas PCIs (all post-2013). Source: Prepared by Trinomics based on project promoter's reporting to ACER in 2017[245]

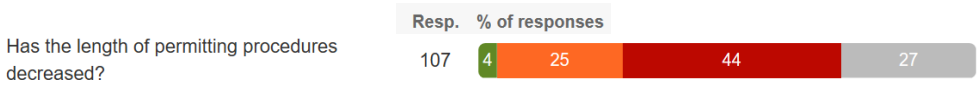
	Electricity (#18 PCIs)	Gas (#9 PCIs)	Electricity & gas (#27 PCIs)
Pre-application procedure (max 2 years)	1.2 years	1.2 years	1.2 years
Statutory granting procedure (max 1.5 years)	1.5 years	1.0 years	1.4 years
Total permit granting (max 3.5 years)	**2.8 years**	**2.2 years**	**2.6 years**

* Most durations are based on expected dates. In 16 of the 29 cases both stages of the permitting procedure are estimated durations (10 electricity, 6 gas). For 10 cases, the end-date of the pre-application is represented by actual achieved dates, but the statutory procedure duration uses expected dates (7 electricity, 3 gas). Only one single (electricity) PCI has completed both procedures.

Stakeholder consultation

The **targeted survey** revealed that 44% of the stakeholders are of the opinion that the lead time of the permitting procedures has 'to no extent' decreased (see Figure 5-8). 25% answered that the length of permitting has decreased to 'some extent' and only 4% was very positive indicating 'to a significant extent'. There was a clear difference between the types of stakeholders; project promoters were clearly more negative about possibly reduced permitting lead times, while MS Authorities were relatively more positive.

Figure 5-8 Results targeted survey on possibly decreased permitting procedures' lead times



Legend: green = 'to a significant extent', orange = 'to some extent', red = 'to no extent', grey = 'don't know'

Stakeholders commented on their answers, repeating that the permitting procedures' lead times have not decreased but remain lengthy and in some cases have even increased. A project promoter added that the latter can be a non-intended negative consequence of TEN-E.

A representative of an energy company/association highlighted that a possible explanation for the absence of decreased lead times is the fact "that there are no sanctions to exceeding the time limits prescribed by the Regulation". An MS Authority mentioned that the lead time may have decreased (to some extent), but rather because "the TSOs prepare their files much more in advance before engaging in the process". Several stakeholders highlighted the link with national procedures, which was considered an issue in cases where national procedures are not compatible with TEN-E provisions; in other responses it was mentioned that national procedures were already ensuring shorter lead times.

[245] Underlying monitoring reporting data for ACER (2017a) 'Consolidated report on the progress of electricity and gas projects of common interest for the year 2016'. Provided by DG ENER, received by e-mail. (Redacted version as of 21 June 2017).

Stakeholders also argued that (in some MSs) it is too early to assess the effect on possibly decreased permitting procedures' lead times, with only few projects having gone through the permitting process completely.

Interviewees confirmed that the duration of the permit granting process for PCIs has on average effectively decreased, but a TSO representative pointed to the fact that the realisation of projects is still delayed by permitting isssues (including public opposition) and by the uncertainty with regard to commercial interests for new infrastructure (e.g. new gas supply contracts).

Conclusion

The average duration of the permit granting process is estimated at 3.5 to 4.1 years for electricity PCIs, while gas projects need on average 3.2 years.

There is a clear diference between the (expected) permit granting duration for PCIs which started the permitting before and after November 2013: pre-2013 electricity PCIs have an average lead time of 5.5 years, compared to 2.3 to 3.5 years for post-2013 PCIs. For gas PCIs, pre-2013 lead times were 5.9 years, compared to 1.5 years for post-2013 PCIs. Similarly, the maximum duration of the permitting procedure for electricity PCIs decreased from 10 years for pre-2013 PCIs to 8-9 years for post-2013 PCIs. For gas, only the maximum overrun times are known, which decreased from 3.3 to 1.2 years.

Concerning the duration of the two steps of the permitting procedure, data is only available for a limited number of electricity and gas PCIs, showing an average (indicative) duration of 1.2 years for the pre-application and 1.4 years for the statutory granting procedure.

The average durations are compliant with the limits set by the Regulation, but some individual figures for electricity PCIs are exceeding the limits set by the Regulation.

These results seem to indicate that the Regulation has effectively contributed to shortening the permitting procedures. It is important to note, however, that the available information is limited, and that data on the post-2013 PCIs mostly relies on expected durations. Moreover, issues have been identified with the reliability of reported dates.

Given that the Regulation entered into force less than four years ago, almost half of the stakeholders (44%) indicated that they have not experienced decreased permitting lengths in spite of the 'measured' progress. Stakeholders also referred to incompatibilities between the Regulation and national procedures that counteract the intended acceleration, whereas others indicated that shorter lead times were already ensured by national frameworks.

5.6 EPA.3 – Public Participation and Acceptance (Article 9)

5.6.1 The level of opposition faced by PCIs. Has the regulation improved engagement with the public and public acceptance? Which aspect of the regulation has helped most?

Article 9 of the TEN-E Regulation introduces requirements on transparency and public participation. The purpose of these requirements is to improve the quality, consistency and transparency of public engagement and thereby to (ideally) reduce public opposition. Article 9(3) of the Regulation requires promoters to submit a concept for public participation within three months of the start of the permit granting process while Article 9(4) requires the promoter (or competent authority if required by law) to carry out at least a public consultation in the pre-application stage (before submission of the application file).

Evaluation based on literature review

Studies[246] highlight that there are still several issues regarding the public participation requirements established by the TEN-E Regulation. In particular:

- Uncertainty regarding the interpretation of Article 9(4) which imposes a public consultation needs to take place before the submission of the application file. Some MSs argue that only one consultation is mandatory while others interpret this Article as meaning that this consultation is in addition to those in the framework of the EIAs. Furthermore, there may be a lack of clarity regarding responsibilities. In Poland, it is not clear which authority should assess whether the promoter has properly carried out the required consultations according to the TEN-E Regulation, or when this should happen by.[247]
- Uncertainty regarding the content and level of detail of the concept for public participation. The usefulness of the concept notes depends on practical implementation. For example, in the Czech Republic, the concepts are "*very short, very formal and not very informative documents*".[248]

The 2016, National Competent Authorities' reports to DG ENER mention a range of problems with regard to the public acceptance of specific PCIs[249]. PCIs are still facing public opposition, but on the basis of the available information it is not possible to determine the extent to which the regulation has contributed to improving the public acceptance of PCIs, and more specifically which aspects have been most helpful. It is also not clear to what extent the regulation has encouraged project promoters to engage with the public earlier in the process.

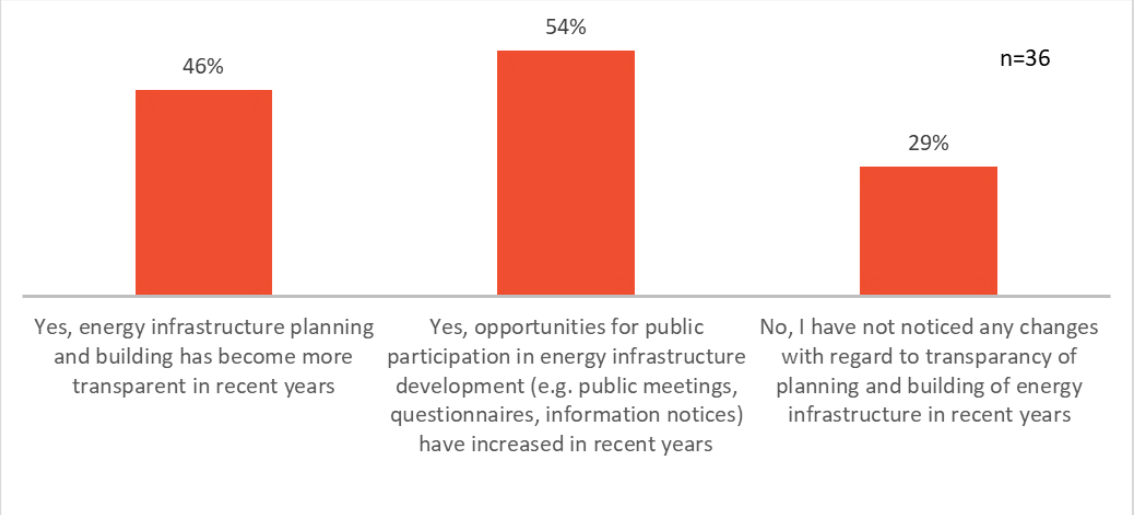
According to Justice and Environment (2017), the proposed instruments have the potential to increase transparency and enhance public participation; however, according to the assessment they performed in a selection of MSs, there is an inadequate design and implementation of these instruments. Furthermore, there is a lack of guidance to help stakeholders gain information and participate in the PCI permitting procedures, which according to Justice and Environment (2017) may undermine effective public participation. Also, they identified a lack of proper enforcement mechanisms to be taken by the CA regarding the project promoter obligations detailed in Article 9 (i.e. concept for public participation, public consultation and project website).

[246] Milieu (2016), Analysis of the manuals of procedures for the permit granting process applicable to projects of common interest prepared under Art.9 Regulation No 347/2013; and Justice and Environment (2017), Energy Infrastructure Projects of Common Interest (PCI) - National Implementation of the EU Permitting Rules
[247] Justice and Environment (2017) , Energy Infrastructure Projects of Common Interest (PCI) - National Implementation of the EU Permitting Rules
[248] Justice and Environment (2017), Energy Infrastructure Projects of Common Interest (PCI) - National Implementation of the EU Permitting Rules
[249] Specifically, public opposition remains a major issue for the following PCIs: PCI 2.17 (Portugal - Spain electricity interconnection), PCI 3.1.2 (Internal electricity line in Austria), PCI 3.4 (Austria-Italy electricity interconnection), PCI 3.19.1 (Italy – Montenegro electricity interconnection); PCI 4.2.2 (internal electricity line in Estonia); PCI 6.8.1 (Greece - Bulgaria gas interconnection); PCI 6.10 (Bulgaria – Serbia gas interconnection); PCI 6.18 (Adriatica gas pipeline); PCI 6.20.2 (Gas storage in Bulgaria); PCI 6.24.2 (Romanian part of the BG-RO-HU-AT corridor); PCI 7.1.3 (Greece – Italy gas pipeline); PCI 8.5 (Poland – Lithuania gas interconnection).

Stakeholder consultation

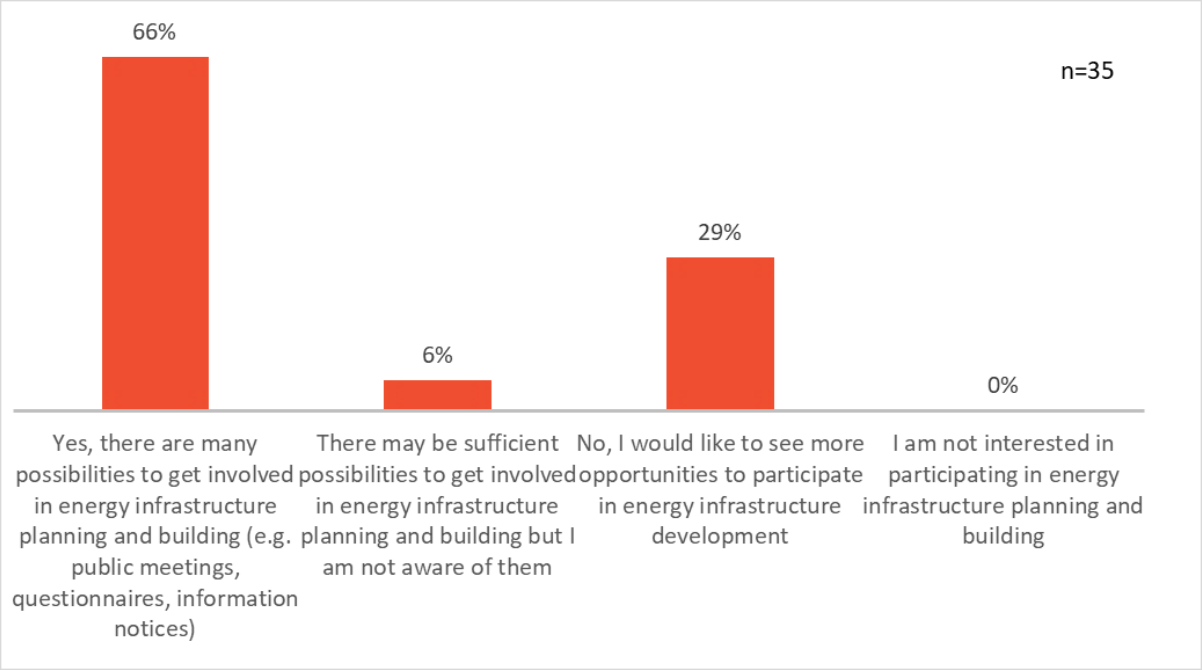
More than half of the respondents to the **public consultation** (54%) indicated an increase in opportunities for public participation in energy infrastructure development and 46% reported an increased transparency in energy infrastructure planning and building (Figure 5-9).

Figure 5-9 Impact of TEN-E Regulation in transparency of energy infrastructure planning and development.
Question: One of the aims of the TEN-E Regulation is to improve the transparency of the planning and development of energy infrastructure projects. Have you noticed any change in the transparency of the planning and building process since the TEN-E Regulation was implemented in 2013?



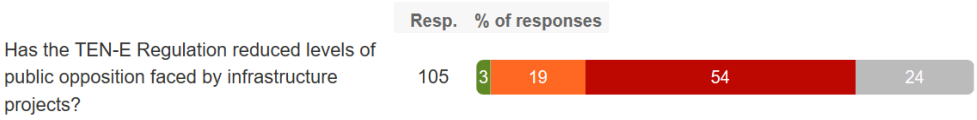
Regarding opportunities for participation in energy infrastructure planning and development, 66% of the respondents indicated there are many possibilities for the public to get involved; while 29% would like to see more opportunities (Figure 5-10).

Figure 5-10 Opportunities in energy infrastructure planning and development. Question: Do you feel that there are sufficient possibilities in your country to provide input into the planning and building process of energy infrastructure projects?



The respondents to the **targeted survey** confirmed that public opposition to PCIs is still an issue, and most of them are of the opinion that in general TEN-E has not contributed to a reduction in the level of public opposition. More than half of the respondents (54%) answered that public opposition is reduced 'to no extent' as a result of the Regulation. 19% of the respondents indicated a positive impact 'to some extent', and only 3% referred to a positive effect 'to a significant extent' (see also Figure 5-11) . Considering the different stakeholder types, project promoters and NRAs in general had a slightly more negative perception of the impact of TEN-E on public opposition, while MS Authorities were more positive, indicating that they felt public opposition had reduced 'to some extent' as a result of TEN-E.

Figure 5-11 Results targeted survey on possible reduced levels of public opposition



Legend: green = 'to a significant extent', orange = 'to some extent', red = 'to no extent', grey = 'don't know'

Stakeholders were also asked to specify how the level of opposition had been affected. In line with the above, the majority (59%) indicated that public opposition showed 'no change' as a result of TEN-E. 18% was 'not sure' about its impact. 24% of the respondents experienced a change in timing and number of the complaints/objections. 9% of the respondents observed more complaints, while another 9%, on the contrary, indicated there were fewer complaints.

More than half of the 39 stakeholders providing comments added in their comments that public opposition has not decreased (remaining high or even showing increased levels) or that TEN-E has not significant influenced the levels of opposition. The reasons mentioned were lack of public awareness and the public remaining uninformed about (the need for) infrastructure projects in general and PCIs in particular. Project promoters added that public opposition seems mostly related to a project's local

impact and the absence of benefits for the local community. Applying good practices to engage the public has not been sufficient to solve this issue. Another explanation given for the lack of (positive) impact of TEN-E on this aspect, is that public consultation was already properly dealt with before the entry into force of TEN-E. Nonetheless, three stakeholders indicated that public opposition can further be mitigated through a proper implementation of the Regulation.

Two stakeholder (both project promoters) commented on the positive impact of TEN-E and on the specific aspects of the Regulation that contributed to reduced public opposition in particular. The first promoter highlighted that "early participation of the public has created balanced effects, with earlier and better structured opposition to projects, for which promoters can be better prepared". The other promoter mentioned that stressing the PCI status of the project helped to improve public acceptance.

Notwithstanding the fact that opportunities for public participation in energy infrasctructure projects have increased, public opposition remains an issue. However, this does not necessarily mean that the provisions in the Regulation in view of increasing public participation would not have had positive effects; citizens might in general have become more critical towards large infrastructure which does not offer direct benefits to local communities.

Stakeholders present at the **Permitting and Public Acceptance Focus Groups' meeting** all agreed that a high level of transparency and involvement of the concerned public facilitates the implementation of infrastructure projects. By establishing early contact with the community, stakeholders (either promoters or authorities) can anticipate issues that may arise later in the project. Additionally, a TSO mentioned that the consultations are also an appropriate forum to discuss compensation for land owners.

Several participants stated that the Regulation has, in general, a limited effect on public engagement and acceptance. TSO representatives mentioned that similar public consultation was already required by national regulation before the entry info force of the TEN-E Regulation. More details on these views are provided below:

- In the UK, there is a duplication of efforts since national practices also impose a consultation before the pre-application stage; this extensive consultation is indeed reducing the level of opposition because the community has multiple opportunities to engage in the process. Project promoters suggest to better coordinate and align the TEN-E consultation requirements with the national ones in order to avoid duplication of efforts. This is particularly relevant when there are several countries involved in the PCI.
- In France, more and earlier consultation at local level is not leading to an increase in opposition, although (potential) opponents have early notice of projects, which could in principle lead to better organised and more argued opposition. Promoters also get earlier feedback, which they can learn from. Consultations on the national level mostly take place with energy experts, and limited citizens' participation.
- In Germany, the national framework imposes consultation from a very early stage (scenario development). Each stage of the process is discussed with citizens, who thereby understand better why and how infrastructure projects are being developed, and there is in general a positive feedback from the public. A DG ENV representative added that there is indeed a decrease in the number of complaints from German citizens about energy projects, which might be a consequence of organising this dialogue at national and local level.

Most **interviewees** confirmed that a high level of interaction between project developers, authorities, stakeholders and citizens has proven necessary to reduce the risk for public opposition. The effective public involvement is very high in most MSs.

A TSO representative suggested to mainly give priority to projects that are really needed to achieve the interconnection targets (e.g. PCI+ list). A structure that worked well in the past to address the high level of public opposition for the new FR-ES electricity interconnector (before the PCI Regulation) was to assign an EU mediator to provide an additional political push. The High Level Groups (HLGs) and PCI status do help to position projects as European priorities, but public opposition remains very high. In this context, the stakeholder considers that the procedure and methodology for the public consultation in the Regulation are very methodical and allow for good coordination between the different TSOs, NRAs, and ministries from the involved countries.

An energy sector representative considered that public acceptance is a more critical issue than permitting. Public acceptance should be underpinned by high quality CBAs, which should be based on realistic assumptions and forecasts: some TSOs are currently using (too) conservative utilisation figures which can lead to underinvestments in infrastructure, while other TSOs use (too) optimistic assumptions, which can lead to "missing money" problems.

An NRA representative referred to feedback from project developers which suggests that local opposition is often better overcome with local engagement, rather than leaning on the TEN-E framework. The stakeholder added, however, that anecdotal evidence suggests that the 'PCI label' brings an element of seriousness/gravitas/reputational benefits, which can be helpful to ensure the project is progressed via (e.g.) discussions with authorities and landowners.

An NGO argued that, whereas the TEN-E Regulation intends to improve transparency and public participation in the permitting stage of PCIs, it does not address adequate information sharing and involvement in the planning stage, which takes place before the permitting. The issues relevant for the public, like environmental or health issues, doubts about the need for the project or the deployed technique, are decided upon during the planning stage. The public should thus get involved earlier in the process, and should be offered the opportunity to give an opinion on some specific aspects of the project during the planning stage. Therefore, although the TEN-E Regulation considerably improves participation instruments and the timelines of participation in the permitting procedures, more attention should be paid to transparency and public participation in European (i.e. TYNDP and PCI Designation Process), and especially, national energy infrastructure planning processes.

Conclusion

- Most public consultation respondents indicated an increase in public participation opportunities and transparency in energy infrastructure planning. They also believe there are many possibilities for the public to get involved in energy infrastructure planning and building.
- Most survey respondents are of the opinion that public opposition has not reduced as a result of TEN-E.

- Lack of public awareness and acceptance of the need for energy infrastructure projects remainmain issues; TEN-E provides guidelines for PCI related transparency and public participation (Annex VI) but does not specifically tackle public awareness in general.
- Stakeholders present at the focus group confirmed that TEN-E has had a limited effect on public engagement and acceptance, partly because in most MSs similar public consultation was already required by national regulation (before TEN-E).
- Aspects that were singled out as being most helpful in addressing public opposition: early information to/participation of the public, HLGs and the PCI status itself.
- Stakeholders at the focus group agreed that a high level of transparency and involvement of the concerned public facilitates the implementation of PCIs.

So far, TEN-E has had a limited impact on the level of opposition experienced by PCI promoters. The fundamental reason for public opposition remains a lack of awareness about the need for (new) energy infrastructure and a lack of willingness to accept local impacts of such infrastructure of national (and international) importance. These aspects are not specifically addressed in the TEN-E Regulation.

There is potential to further improve the timing and quality of the consultation, in order to enhance its positive impact on public opposition. Stakeholders point to some problems of process duplication in order to comply with both TEN-E and national procedures (especially where pre-existing national procedures were similar to TEN-E). This partial overlap between EU and national procedures is expected to gradually decrease with the updating of national frameworks.

5.7 EPA.4 – Best Practices regarding Stakeholder Involvement

5.7.1 Examples of best and innovative practices in stakeholder involvement and mitigation of env. impact during permit granting and project implementation (Article 17.d)

According to Article 17(d) of the TEN-E Regulation, the Commission shall publish a report which provides an evaluation of the permit granting and public participation. Within the framework of the Regulation, project promoters can make use of different practices for stakeholder involvement and mitigation of environmental impacts. The Regulation states that "Member States should be encouraged to exchange best practices and administrative capacity-building for permit granting processes." This question aims to highlight best and innovative practices.

Evaluation based on literature review

Different initiatives and best practices that aim to improve stakeholders involvement and mitigate environmental impacts have been identified. Examples include:

- The **Grid Infrastructure Communication Toolkit,** launched by the EC, aims to "facilitate and inform the stakeholder dialogue necessary to implement European grid development projects with the highest possible acceptance". [250] It includes detailed descriptions of essential

[250] See website on "Grid Infrastructure Communication Toolkit" (https://webgate.ec.europa.eu/multisite/gridcommunicationstoolkit/en) and Roland Berger (2016), Cost-effective financing structures for mature projects of common interest (PCIs) in energy.

elements for successful, inclusive project communication and a constructive multi-stakeholder dialogue for the development of grid infrastructure in Europe. It provides the following good practice examples:

  - Early-stage town hall meeting to create trust and to establish a spirit of transparency and openness, by 50Hertz (Germany)
  - Mobile exhibition - "A highway behind the wall socket. Electricity from the power station to your home" by REE (Spain)
  - Tennet grid development initiative including early stage stakeholder dialogue (Germany)
  - School science programme: "From power to playstation" by Eirgrid (Ireland)

- The **Renewables Grid Initiative** (RGI): consists of the project BESTGRID[251], the 'Good Practice' database[252], and the 'European Grid Report – Beyond Public Opposition'[253], including key lessons learned across Europe. BESTGRID led to two handbooks, the first on transparency and participation, and the second on grid development and nature protection.[254]
- **ENTSO-E's paper on best practices[255]** which lists several examples to gain public acceptance and obtain permits for infrastructure:
  - Reduce environmental effects;
  - Develop new designs and technologies;
  - Use information and communications technology (ICT) tools and geographical information systems (GIS);
  - Reduce or substitute existing grids;
  - Involve citizens and the local population in the project and plan citizen conferences to facilitate dialogue;
  - Identify acceptance conditions and build shared solutions; and
  - Develop local employment opportunities during and after the construction.
- **ENTSO-E's handout** on the Energy Infrastructure Forum[256] lists the following elements to help address public opposition so that better projects can be delivered on the ground:
  - Aim to recover costs for enhanced stakeholder dialogue (and resulting measures in project implementation) via tariffs;
  - Favour collaborative approaches involving civil society and local communities;
  - Explore joint solutions aimed at delivering better projects for the people and nature when required and/or desired by local stakeholders; and
  - Monitor and communicate lessons learned and best practices.
- **The Milieu report[257]** mentions that the procedures manual should be improved, by explaining in more detail the practical implementation of public participation. It also provides recommendations regarding the permit process, particularly:
  - Early coordination and information;
  - Facilitating public participation;
  - Use of electronic systems;

[251] The BESTGRID project was based on five concrete pilot projects, located in the UK, Belgium and Germany. Three projects (the German projects Bertikow-Pasewalk and SuedLink, and the Belgian Waterloo - Braine-l'Alleud) implemented new approaches to ensure the engagement of stakeholders. Two projects (the UK Nemo Link project and the Belgian Stevin project) conducted retrospective assessments of engagement and environmental protection and permitting activities that had already taken place.
[252] The database is regularly updated, allowing to search for specific topics like 'Engagement with Stakeholders'.
[253] RGI (2013), European Grid report: Beyond Public Opposition. Lessons Learned across Europe.
[254] BestGrid (2015), Testing Better Practices – Final report of the BESTGRID project
[255] ENTSO-E (2016a), Real life implementation of electricity PCI – Best practices.
[256] Provided to us by a stakeholder: "Supporting regulations for the timely implementation of grid projects" (May 2017), Handout for Energy Infrastructure forum 1-2 June 2017.
[257] Milieu (2016), Analysis of the manuals of procedures for the permit granting process applicable to projects of common interest prepared under Art.9 of Regulation No 347/2013.

- Streamlining the permitting process; and
- Legal implementing/facilitating measures.

Stakeholder consultation

Through the **targeted survey,** stakeholders shared a long list of best practices. Two concrete examples were mentioned by multiple stakeholders. The first is the Viking Link's practices for public engagement (a bottom-up, rather than a top-down, local approach to engagement), which also won RGI's 2017 Award for Good Practices[258]. The second example is the Strategic Environmental Assessment (SEA) Round Table process[259], applied for different PCIs. Other concrete examples of best practices that were mentioned are:

- Citizens' jury for Lonny Seuil Vesles HV line project
- Crowd-funding associated to new HV line Avelin - Gavrelle
- Co-design/territorial restructuring in Haute Durance
- 'Rock Doctors to the Rescue' - Public CCS education and outreach event at Edinburgh International Science Festival
- CCS education and outreach concession at the Shell 'Make the Future' event in London
- Website, bi-annual newsletter, explanatory leaflet and informative events for Amfilochia HPS
- Web map with grid development projects and forum service by Fingrid
- Bürgerdialog Stromnetz
- EirGrid framework for grid development
- GIS based participation system for largest German DC line which allows citizens to point towards ecological or societal barriers during the planning process
- SuedLink WebGIS platform for public opinion
- Invite neighbouring citizens to become shareholders in local windpark e.g. Storm wind in Belgium
- Visitor center in neighbourhood and 'conversations at the kitchen table' for new 380 kV high-voltage line between Wateringen and Bleiswijk
- Local consultation and attempts to obtain local 'buy-in' in Northern Ireland, including using local supply chains to assist with research activities and including local fishermen to assist with completion of seismic surveys in a sea lough
- Friends of the Supergrid's "Energy Education", an initiative aimed at promoting energy education/communication among people through the understanding of the nature and role of energy in the world

Survey respondents also identified more general best practices. Five practices were mentioned by multiple stakeholders:

- Appointment of a liaision/communication officer with local communities
- Engage a large spectrum of stakeholders: citizens, landowners, local associations and media
- Engage with the public early in the process
- Open, transparent and regular dialog during the entire process of the project
- Education needs to be involved, beyond solely divulging information

Other suggested best practices or recommendations are:

[258] RGI (2017), Good Practice of the Year
[259] http://www.partizipation.at/sea-round-table.html

- Meeting with public after EIA (in case of line constructions), higher maturity/documentation
- Dedicated meetings organised by mayors (and project promoters)
- Attendance of CA and project promoter in public hearings, allowing the project promoter to factor in public feedback when proceeding with further detailed studies
- Frequent personal contacts with directly involved citizens
- Local project information events
- Periodically updated information
- Use of different media: public events, newsletter, web, hotline
- Strategic stakeholder management with a mutual gain approach
- Let citizens take part in concrete decisions
- Compensate at communal level and create win-win situations
- Sustainable ecological corridor management
- Transparent corridor planning
- Innovations in tower design

Stakeholders demonstrated good knowledge of the platforms on which best practices are collected – and also engage in these platforms, such as the Renewables Grid Initiatives and the BestGrid project in particular, or more general meetings where best practices are exchanged, like the Copenhagen Infrastructure Forum. A stakeholder from an energy company/association made the point that "There are no golden rules. Very specific measures must be applied depending on the audience that must be addressed. Yet in order to reach a goal, public consultations must be consistent and regular, not just as a necessity to put a tick in the 'to do' list". An NRA added that "… the difficulty stands in linking these innovative practices to actual, real improvements and speeding-up the infrastructure development, especially permitting."

Stakeholders at the **Permitting and Public Acceptance Focus Group** highlighted that several aspects can be considered as best (and common) practice, such as informing the public at an early stage, carrying out workshops, involving the municipalities and towns, etc.

A TSO mentioned scanning social media as an innovative approach that allows project developers to identify relevant issues regarding concrete projects that need to be addressed. This TSO uses different tools depending on the type of stakeholders to engage with, for example, town hall meetings to access working and retired people versus social media to access younger people. The stakeholder also uses innovative stakeholder engagement approaches that provide a visual impact of the project, such as dedicated short films and a GIS system, that allow citizens to see the effective tracing of the planned line.

Another TSO representative mentioned that citizens often want information about the project's effect on their communities in terms of economic impact (e.g. jobs created, local supplies). His company addresses this issue early in the process during public meetings as well as later on in the process, and also uses tools such as newspapers and newsletters to inform the public.

A Competent Authority uses social media (e.g. a YouTube channel) and monitors social media activities with dedicated software. It also puts all relevant project-related information on its website, and prepares short films as well as flyers highlighting the different aspects of its infrastructure projects. It also organises formal and informal meetings and dialogues both before and during the permit granting

phase. These meetings have an increasing number of attendees and lead the public tends to have a more positive attitude towards energy infrastructure projects.

Conclusion

A large range of best practices for stakeholder involvement and mitigation of environmental impacts (and initiatives identifying and promoting such best practices) have been identified. Many of these (such as town hall meetings and early involvement of stakeholders) have become common practice, while other approaches are rather new (e.g. use of social media) and/or tailored to a specific type of public or projects. It would be useful to do some further research to assess to what extent these best practices effectively lead to improvements and facilitate/speed-up the realisation of energy infrastructure.

5.8 EPA.5 – Permit Granting Schemes (Article 8)

5.8.1 Relative success of Article 8(3) options - integrated scheme, coordinated scheme and collaborative scheme in meeting the time limits in Article 10

Article 8(3) of the TEN-E Regulation introduces the following three schemes for Competent Authorities (CA) to facilitate the issuing of the comprehensive decision:

- **Integrated scheme** -The CA issues the comprehensive decision (which is the sole legally binding decision), taking into account opinions from other relevant authorities.
- **Coordinated scheme** -The comprehensive decision comprises multiple individual legally binding decisions issued by several authorities, coordinated by the CA.
- **Collaborative scheme** -The comprehensive decision is coordinated and monitored by the CA which, in consultation with other authorities, establishes on a case-by-case basis a reasonable time limit within which the individual decisions shall be issued.

Evaluation based on literature review

Milieu (2016) reported that 15 MSs have implemented a collaborative scheme, 9 MSs a coordinated scheme, and one MS (Romania) an integrated scheme; while two MSs (Denmark and Greece) chose more than one scheme. ACER (2016a) analysed the different permit granting schemes and the resulting (expected) permitting duration for 96 electricity PCIs (see Table 5-7). If a PCI is hosted by multiple Member States applying different schemes, a project is considered as being exposed to a multi-scheme permit granting process (21 out of 96 cases).

This analysis suggests that the coordinated permitting scheme results in a shorter process duration than a collaborative scheme (2.8 vs 3.6 years). Concerning the integrated scheme, the sample is too small to give a robust indication of its permit granting duration. Moreover, as the application of the schemes can vary between MSs, a more in-depth analysis would be necessary to draw conclusions. No reporting was made on this issue in the 2017 consolidated report of ACER.

Table 5-7 Expected duration of permit granting for electricity PCIs depending on the permit granting schemes[260]. Source: Table 1 in ACER (2016a)

Scheme	Number of PCIs	Average expected duration of permit granting (years)
Integrated	4*	3.8
Coordinated	24	2.8
Collaborative	47	3.6
Multiple schemes	21	3.7

* Sample is too small to provide a robust indication of permit granting duration

Stakeholder consultation

In the **targeted survey,** one NGO stakeholder argued that effective streamlining of permitting is ensured by an integrated permitting scheme. Nevertheless, only Romania has opted for this scheme.

Participants at the **Permitting and Public Acceptance Focus Group meeting** highlighted that the option in the TEN-E Regulation to allow MSs to choose between three schemes is valuable. However, the high level of detail in the Regulation with regard to the schemes (and the difference in the level of detail for the three schemes) was questioned.

A Polish stakeholder mentioned that the added value of their chosen scheme (coordinated) was the improved coordination and follow-up throughout the process. A German stakeholder mentioned that their scheme (collaborative) is working well. A stakeholder from Lithuania added that his country has opted for a collaborative scheme due to the fact that a coordinated scheme would have required it to merge the competences of some ministries, which would be a disproportionate measure in a country with a small number of PCIs.

An **interviewed** energy sector representative argued that, irrespective of the EC's efforts and despite the interesting concept of the permitting schemes laid down in Article 8, in practice, there are few visible results at national level, and the time limits are not met. Since there are no sanctions for exceeding the time limits, the obligations are commendable but devoid of real substance.

An NGO stated that, according to its assessment (J&E TEN-E Implementation Study 2017[261]), Member States have only partly met the requirements of the TEN-E Regulation. Both in Poland and in the Czech Republic, implementation is still in progress. National rules might still have to be issued, particularly in the areas of enforcement, the clarification of competences and the applicable procedures in order to ensure proper implementation of the TEN-E Regulation. Experience shows that legally set time frames are not the driver for achieving faster permitting procedures. Rather, measures should be aimed at the possible causes of delay (e.g. better planned projects via thorough preparation phases, better public acceptance via early and effective public participation, etc.).

Conclusion

[260] This analysis was not carried out for gas PCIs on the ACER (2016a) 'Consolidated report on the progress of electricity and gas projects of common interest for the year 2015'

[261] Justice and Environment (2017), Energy Infrastructure Projects of Common Interest (PCI) - National Implementation of the EU Permitting Rules

Member States have made appropriate use of the Article 8 provision: 15 MSs use the collaborative scheme, nine the coordinated scheme, only one (Romania) the integrated scheme, and two (Denmark and Greece) use more than one scheme. Permit granting duration varies depending on the scheme chosen, ranging from 2.8 years (coordinated scheme) to 3.8 years (integrated scheme, though based on a very small sample). The coordinated scheme seems to be the most effective option to shorten the duration of the permit granting process.

Overall, the fact that the average permit granting duration is under four years shows that the permitting schemes and accompanying permitting provisions included in the TEN-E Regulation have reduced the duration of permit granting, as these values are lower than the average duration for pre-2013 PCIs (5.5 years for electricity and 5.9 for gas).

5.9 EPA.6 – One-Stop Shop

5.9.1 Has the creation of a one-stop shop added value (simplified, shortened) the permitting process?

Building approvals for energy infrastructure require in most cases regulatory and technical oversight by multiple national or local authorities or agencies, and one way to simplify this process is by establishing one-stop shops. However, the success of one-stop shops hinges on efficient coordination among all authorities involved and often requires overarching legislation that ensures information sharing and establishes oversight mechanisms.

Article 8 of the TEN-E Regulation requires Member States to designate a Competent Authority (CA) which is responsible for facilitating and coordinating the permit granting process for PCIs. The CA is in practice referred to as the one-stop shop. This designation of a single authority, as opposed to the pre-TEN-E situation in which multiple authorities would need to be contacted, is intended to help speed up and simplify the permitting process.

Evaluation based on literature review

One-stop shops should in principle allow for more efficient processes, enabling authorities to accelerate permit granting procedures and increase project developers' satisfaction.

The implementation of one-stop shops (in some cases even online) has, in several Member States, become common practice for permit applicants of small scale construction projects. For large energy infrastructure, however, the one-stop-shop was not a common practice at the moment of the entry into force of the TEN-E Regulation. Member States were thus obliged to adapt their legislation and procedures in order to comply with this provision.

Key findings from the study "Analysis of the manuals of procedures for the permit granting process applicable to projects of common interest prepared under Art.9 Regulation No 347/2013" prepared by Milieu (2016)

- All MSs have established the **one-stop-shop** for PCI permit granting. Two MSs (Estonia and Belgium) established a new competent authority, while most Member States granted specific powers to the existing

permit granting authority for energy infrastructure projects for the facilitation and coordination of the permitting of PCIs.

As mentioned in EPA.2, there has been a substantial decrease of the average duration of the PCI permitting process, though it is difficult to attribute causality to the implementation of a one-stop shop, along with other permitting provisions. For electricity PCIs, the expected permitting duration for post-2013 PCIs is siginificantly lower (2.3-3.5 years) than the duration for pre-2013 PCIs (5.5 years).[262] For gas PCIs, the permitting duration is also significantly lower for post-2013 PCIs; the average duration was between 3.9 and 6.8 years for pre-2013 projects and between 1.3 and 2.7 years for post-2013 projects. There is also a clear improvement compared to the assumptions made in the 2011 IA, which estimated an average duration of the permit granting process of between four and ten years. Stakeholder consultation

32% of the respondents to our **targeted survey** indicated that the one-stop procedure has 'to some extent' effectively streamlined and shortened the permitting process (see Figure 5-12). 6% even indicated that this positive impact has occurred 'to a significant extent', but another 30% indicated that the one-stop provision has 'to no extent' streamlined and shortened the permitting process. Project promotors and NRAs were in general rather negative or critical about the effect of the one-stop shop, while MS Authorities were clearly more positive.

Figure 5-12 Results targeted survey on possible effect of the one-stop shop

Legend: green = 'to a significant extent', orange = 'to some extent', red = 'to no extent', grey = 'don't know'

Of the 28 comments that were given on this statement, most respondents seemed to agree on the principle that a one-stop shop can offer advantages, but added that its practical implementation has often not led to the benefits that were expected. This opinion is for instance reflected in the comments of an energy company/association stakeholder: "Although the idea is certainly an excellent one, unfortunately in practice this has not been implemented in a satisfactory manner so that the permitting process remains much too complex and long for projects that are critical. One way to remedy this would be by creating an 'EU infrastructure permit', with a single approval at EU level". We consider that this idea might be attractive from a project developer perspective, but in practice it is not realistic for political (subsidiarity) and societal (public acceptance) reasons. Only one stakeholder elaborated on the experienced positive effects of the one-stop-shop (NRA: "A one-stop is helpful where multiple authorities are involved and clearly offers benefits by reducing administrative burden/bureaucracy"). Other comments focused on negative impacts, such as: inefficient processes (especially in federal countries), additional work, time-consuming administrative procedures and remaining inconsistencies, complexities and uncertainties for project promoters. Some stakeholders also mentioned that the one-stop shop provision is incompatible with their national framework (Sweden, Slovakia). Finally a few stakeholders pointed out that the competence of the one-stop shop (CA) is currently not sufficient, which hinders the process.

[262] ACER (2016a), Consolidated report on the progress of electricity and gas projects of common interest for the year 2015.

Stakeholders at the **Permitting and Public Acceptance Focus Group meeting** had diverging opinions regarding the impact of the one-stop shop provision laid down in the Regulation. Most stakeholders were rather critical with regard to the added value of this provision, for example:

- Representatives from France and Poland mentioned that TEN-E has limited added value in this regard, as their national frameworks already had similar procedures. The French stakeholder added that, in practice, the local authorities[263] grant the permits, but the Competent Authority (one-stop shop) puts pressure on the concerned parties to respect the timeline.
- In Germany, this specific provision has no added value for national projects, but it does for international projects since there are aspects that need to be coordinated with neighbouring Competent Authorities, and the common understanding between one-stop-shops from different countries based on TEN-E makes such coordination easier.
- A representative from Lithuania mentioned that, even though the Lithuanian authorities have not had any PCIs go through this process, they do not expect many changes because they have implemented a collaborative scheme.
- A TSO representative mentioned that the one-stop shop provision in the Regulation has no added value in the UK, as it has added a level of administration, duplicating (but slightly changing) the requirements under national legislation. Moreover, the Competent Authority in the UK seems to not have enough resources and no formal mandate to adequately fulfil its role as one-stop shop.

On the positive side, several stakeholders acknowledged the added value of the one-stop shop provision for the coordination of cross-border projects, in particular in view of streamlining national permitting procedures.

Stakeholders at the **Permitting and Public Acceptance focus group meeting** gave their opinion on the question of whether the implementation of a one-stop shop has reduced the number of authorities involved. They mentioned that in several cases, TEN-E has introduced an additional layer to the permitting process (e.g. Germany, Belgium and UK[264]). In these cases, the one-stop shop is formally the single point of contact but in practice project promoters also have direct contacts with other involved authorities (while keeping the one-stop shop informed of all major steps for follow up).

In Poland and Lithuania, the number of involved authorities did not decrease, but the one-stop shop ensures that the process is more coordinated. In France, there is also no decrease in the number of authorities involved, but there is not much additional work needed. The one-stop shop designates a coordinating authority and monitors the process.

DG ENER clarified that the Competent Authority is supposed to be the national single point of contact for formal submissions, without preventing promoters from getting in touch with local or regional authorities. The aim is to ensure coordination and that deadlines are respected, and to have one authority for promoters to contact in case of problems.

Most **interviewees** confirmed that the creation of a one-stop shop has offered added value, but a TSO representative referred to the specific situation in his country in which the implementation of this

[263] A TSO mentioned they were happy being able to promote/defend their project in front of all the consenting authorities.
[264] It was mentioned that in the UK, the burden is mostly on the promoter due to the lack of resources of the one-stop shop.

provision has led to an additional authority/step in the permitting procedure, leading to a higher complexity and duration of the process.

An NRA representative referred in particular to a multi-jurisdictional project for which the 'one-stop shop' provisions have been helpful in ensuring a joined-up approach from multiple authorities. Although the one-stop shop concept may not have shortened the permitting process in simple cases, it has simplified the more complex situations. A representative of an energy association supported the concept of a one-stop-shop EU permitting process that would replace national permits and could apply to any infrastructure projects of EU significance.

An NGO referred to its study (J&E TEN-E Implementation Study 2017[265]) which revealed that most of the assessed countries have assigned their Ministries (of commerce or energy) as competent authority. None of the assessed countries has opted for an integrated permitting scheme. Given the fact that most of the PCIs have to undergo an EIA when the competences lie with different authorities, the designation of competent authorities adds an additional layer to the national permitting frameworks.
On the basis of experience from EIA procedures (e.g. in Austria an integrated permitting scheme is used for EIA permits) a one-stop shop is only developing to full effectiveness when it is implemented as an integrated scheme: Austria has an "EIA-permit" which forms one consolidated development consent that covers any legal permitting requirements (including construction permit) for a certain project. This Austrian approach has proved to be successful and is widely accepted by stakeholders. The main advantage for EIA applicants is that they have all respective project permits after the EIA-permit was issued. This EIA based procedure shortens the duration of the project permitting procedure and is hence also favoured by investors. The NGO concludes that there needs to be more evidence on the functioning of the TEN-E permitting rules in PCI permitting procedures before recommending this approach as best practice for further procedures. It needs to be tested whether the TEN-E rules on public participation and transparency fulfil the requirement of being *"adequate, timely and effective"* as required by the Aarhus Convention (cp. Art 6 and 7).

Conclusion

38% of the stakeholders confirmed that the one-stop shop provision in the TEN-E Regulation has streamlined and shortened the permitting process. The PCI progress reports also revealed that the permit granting process' expected duration has effectively decreased after the implementation of the TEN-E permitting provisions (including the one-stop-shop). However, stakeholders formulated some rather critical comments with regard to the practical implementation of the one-stop-shop, reflecting the fact that 30% of the stakeholders believes the one-stop-shop has not yet streamlined or shortened the permitting process. Stakeholders mention that the practical implementation has often not been seen as adequate and the process remains complex and lengthy, in some countries even leading to an additional administrative layer. Several stakeholders mentioned limited added value from the one-stop shop, also because it duplicates pre-existing national efforts. Other stakeholders were more positive and concluded that the one-stop-shop has effectively added value as it has improved coordination and information sharing amongst all involved authorities.

[265] Justice and Environment (2017), Energy Infrastructure Projects of Common Interest (PCI) - National Implementation of the EU Permitting Rules

5.9.2 *Have one stop shops effectively used the powers conferred in the Regulation?*

The CAs which act as the one-stop shop, have different powers depending on the scheme selected (Article 8(2)). This can range from issuing the legally binding comprehensive decision (integrated scheme) to monitoring and/or coordinating the permitting process or taking a decision on behalf of another concerned national authority (coordinated scheme).

Evaluation based on literature review

All Member States have implemented a one-stop shop. Two Member States (Estonia and Belgium) have established a new competent authority to take up the role defined in Article 8(1), while most Member States have appointed a specific unit within existing regulatory or permit granting authorities, granting it specific powers for the coordination of the permitting of PCIs. [266] Due to the limited number of PCIs which have passed through these new procedures to date, there is little documentary evidence to assess them.[267]

As to the powers conferred to the one-stop shop, despite TEN-E Regulation being directly applicable in the national legal order, Milieu (2016) recommends its competences be established in national legislation in order to facilitate, monitor and influence the permit granting process and to establish and enforce time limits, if necessary.

Stakeholder consultation

DG ENER pointed out during the **Permitting and Public Acceptance Focus Group meeting** that in principle, Competent Authorities have the power to prepare a detailed schedule for permit granting and to impose time limits for specific permits. They can also take a decision on behalf of other authorities if needed.

A stakeholder reacted that the one-stop shop would not feel comfortable taking a decision for another authority without the appropriate knowledge, as this might lead to (legal) issues that could hinder the project implementation. The competent authority would indeed need to have the relevant expertise on aspects like permitting, legal requirements, health, environment, etc. in order to be able to take such decisions instead of relying on the dedicated authorities. A representative from Lithuania added that they did not opt for a coordinated scheme as the competent authority lacks the expertise needed to grant permits.

It was also mentioned that one-stop shops effectively use (some of) their powers, for example by putting pressure on other authorities to stick to the timeline or by setting checklists and monitoring the permit granting. A Lithuanian representative added that they use steering committees to ensure that all concerned authorities comply with the agreed timeline. In France, a checklist is used for electricity projects already at the pre-application stage; it lists the concerned authorities and the necessary permits with timeframes. In Germany, the one-stop shop organises a permitting monitoring meeting every four months (in line with the national framework). A similar procedure might be helpful for other MSs, particularly for cross border projects.

A stakeholder added that the Regulation provides enough powers for the one-stop shop, but that most MSs have not effectively used them yet. Another stakeholder mentioned these powers should be kept,

[266] Milieu (2016), Analysis of the manuals of procedures for the permit granting process applicable to projects of common interest prepared under Art.9 Regulation No 347/2013.
[267] ENTSO-E website (http://tyndp.entsoe.eu/insight-reports/common-projects/) accessed 21 April 2017.

even if they are not (fully) used yet, as a back-up solution. Another participant mentioned that powers and responsibilities should depend on the aim of TEN-E; if the competent authority is there to monitor and coordinate the process then the current Regulation makes sense. However, the same stakeholder added that it is too early (limited number of PCIs) to judge whether more (formal) power would be needed for the competent authority.

Conclusion

While all Member States have effectively implemented a one-stop shop for the PCI permit granting, it seems that in general the CAs only use some of the powers that have been conferred to them in the Regulation (such as preparing schedules for permit granting, monitoring the progress in the process, and coordinating the follow-up). CAs can in principle take comprehensive decisions, or can take specific decisions on behalf of other concerned authorities, but several stakeholders stated that most CAs lack the necessary knowledge and experience to do so, which might lead to legal cases and potentially jeopardise PCI implementation. Most one-stop shops seem to act in practice as a coordinator and facilitator rather than as decision making authority. Nonetheless, the CAs do not necessarily opt for all the powers they could have under TEN-E, such as taking decisions, but they use some of the powers (e.g. coordinating) in an effective manner.

5.9.3 Would it be beneficial to use the permitting and public acceptance procedures introduced in TEN-E Regulation for projects other than PCIs (e.g. all those in the TYNDP)?

Articles 8, 9 and 10 of the TEN-E Regulation define the permitting and public acceptance procedures for Projects of Common Interest, while for other energy infrastructure projects (including those in the TYNDPs) national legislation and procedures apply. This question is intended to examine if there are any potential benefits to extending the TEN-E permitting and public acceptance procedures to cover non-PCI energy infrastructure projects.

Evaluation based on literature review

No information was found in the literature regarding this topic.

Stakeholder consultation

The attendees of the **Permitting and Public Acceptance Focus Group** meeting agreed that applying the TEN-E permitting and public acceptance procedures to other projects than PCIs would not be beneficial.

An **interviewed stakeholder** mentioned that different national permitting and public acceptance procedures for PCIs versus other TYNDP infrastructure add complexity and lead to higher overall administrative costs. An NRA representative added that an extension of the Regulation to non-PCIs is at present not recommended; the first step is to ensure the effective use on PCIs.
An energy association expresses another opinion and deems it beneficial not to limit the application of the permitting and acceptance procedures to PCIs but rather open them to other projects as well, provided these procedures are appropriately implemented and applied in practice, and do not remain mere theoretical concepts.

From a theoretical perspective, we could conclude that it might be beneficial to only apply one harmonised procedure for all projects, including non-PCIs, since in some cases, MSs have introduced a

new framework which applies only for PCIs aside from their existing national frameworks applicable for other energy infrastructure projects. A harmonisation and streamlining of the procedures for all projects (including non-PCI energy infrastructure projects) on the basis of the provisions in the Regulation might, however, necessitate substantial changes in national frameworks, and might therefore not be considered as being proportionate. A cost-benefit analysis of this option versus the status quo would be necessary to underpin this preliminary conclusion.

Conclusion

Several stakeholders clearly indicated that applying the TEN-E procedures to other energy infrastructure projects than PCIs would not be beneficial, as it would lead to new changes in national permitting and public acceptance procedures and additional complexity in the processes. From a theoretical perspective it might be beneficial to apply the same procedures for all energy infrastructure projects but it is unclear whether the benefits of harmonised procedures for all TYNDP projects would effectively outweigh the additional administrative burden.

5.10 EPA.7 – Permitting Procedure

5.10.1 Has the two-stage pre-application/application procedure been an effective/useful distinction?

Article 10(1) of the TEN-E Regulation defines the two procedures of the permit granting process as follows:

- **Pre-application procedure** – which covers the period from the start of the permit granting process[268] until the acceptance of the application file (including the preparation of any environmental reports required).
- **Statutory permit granting procedure** – which covers the period from the acceptance of the application file until the comprehensive decision is taken.

This definition was intended to help standardise and speed up the process.

Evaluation based on literature review

No relevant information or evidence with regard to the appropriateness of the two-stage procedure was identified in the literature. However, as mentioned in section 5.4, many PCIs are still caught by the transitional arrangements, and some Member States have no experience (yet) with the two-stage process.

Stakeholder consultation

The results of our **targeted survey** show that 30% of the respondents take the view that the division of the permitting process into a pre-application and statutory phase has 'to some extent' been effective. 6% indicated it has been effective 'to a significant extent', but 24% answered it was 'to no extent' effective (see Figure 5-13). Many respondents (41%) indicated 'don't know' to this question. Project promotors and NRAs gave a rather negative opinion, while Member State authorities and energy company/association stakeholders were more positive about the effect of the two-stage procedure.

[268] Which is notified by project promoters to the CA in written form. The date of signature of the acknowledgement of the notification by the CA serves as the start of the permit granting process

Figure 5-13 Results targeted survey on possible effect of the two-stage procedure

Legend: green = 'to a significant extent', orange = 'to some extent', red = 'to no extent', grey = 'don't know'

36% of the respondents reported some positive effects while 24% indicated a negative impact. Additional comments pointed to an increase in complexity and administrative burden as a result of the two-stage application. Comments included that "the pre-application phase may increase the overall permitting duration", "in practice the division of phases means extra work" and the presence of "practical difficulty in holding consultations in each MS within two months". Only one respondent commented on the positive impact ('to a significant extent') of the two-stage procedure. This energy company/association representative explained that "it does help to increase the certainty of outcome since there are no surprises for any of the parties after the application".

In some cases respondents added that it is not possible to assess the effect of the two-stage procedure, because of a lack of practical experience with PCIs going through the process. This is due to the fact that this procedure is not yet effectively implemented in all MSs as mentioned in section 5.4.

Attendees at the **Permitting and Public Acceptance Focus Group meeting** referred to the extensive work needed before the formal start of the pre-application procedure, e.g. evaluate alternatives via pre-studies, political contacts (e.g. in view of changes of local or regional zoning plans), etc. It was also mentioned that national procedures are sometimes not fully in line with the Regulation. Another stakeholder mentioned that the detailed description of the two stages in the Regulation does not seem useful; in his country several aspects are done in parallel. A TSO representative mentioned that in practice the two-stage approach has led to limited changes in his Member State.

Conclusion

- The targeted survey indicated rather low added value from the provision in the TEN-E Regulation introducing the two-stage permitting procedure (with 36% reporting some positive effect and 24% reporting it had not been effective) . Some stakeholders are of the opinion that this provision has increased the complexity of the processes, while others responded that its effect is difficult to fully assess due to a lack of sufficient practical experience.
- There were divergent opinions in the focus groups regarding the effectiveness of this provision, highlighting – for example - the need for substantial preparatory work before the pre-application phase, the use of parallel procedures in some MSs and the fact that this provision led to limited changes in practice. It seems that in several MSs there is a misalignment of national procedures with the TEN-E Regulation.

Based on the limited practical experience to date, the two stage procedure appears to induce earlier and more detailed work to prepare project information and to assess its impacts. This is a change for some MSs and promoters but it is in line with the objectives of TEN-E (improving the quality and transparency of public engagement).

Stakeholders did not complain about steps or information requirements in this provision of the Regulation being superfluous, but there seems to be some duplication / lack of alignment with pre-existing national procedures. This lack of compatibility will be reduced when the TEN-E procedures become more familiar and the overlapping and/or non compliant MS procedures are adjusted where necessary.

5.10.2 Is the 3.5 years permitting maximum length appropriate (e.g. for completing all consultations and EIA)?

The TEN-E Regulation includes specific provisions to accelerate the permitting process, including time limits for the pre-application and statutory permit granting procedures. Article 10(2) states that the combined duration of the two procedures shall not exceed 3.5 years. Article 10(6), however, states that these time limits shall not apply if they affect obligations arising from international and Union law (such as certain environmental procedures, e.g. Environmental Impact Assessments (EIAs)).

Evaluation based on literature review

The Milieu study[269] found that most countries have problems complying with the time limit of 3.5 years to issue a comprehensive permit decision for PCIs. This assessment showed indeed that 16 MSs encounter difficulties in complying with the two year limit for the pre-application stage and 18 MSs with the 1.5 year limit for the statutory permit granting phase.

The main issues identified were the lack of intermediate time limits and of the enforceability of time limits in the national framework. Common problems include:

- Permit granting is sequential: A particular permit is a pre-condition for another permit, and its absence may block the entire process (e.g. Bulgaria and Estonia).
- There are no time limits for specific permits or steps in the pre-application and/or statutory permit granting procedures (e.g. Belgium, Estonia and France).
- Existing time limits are not enforceable (e.g. Finland, Luxembourg and Spain).
- Time limits are in place, but they are not complied with in practice (e.g. Italy and Slovenia).
- Spatial planning, EIA and SEA cause delays. They are often the justification for applications for extension of the deadlines.

Milieu (2016) identified potential compliance problems in most Member States with regard to the permitting time limits. Key issues of concern were the lack of intermediate time limits and the lack of enforceability of the time limits in national law.

In practice, Member States do not currently respect the time limit of 3.5 years for all PCIs. As presented in Section 5.5.1, the average duration of the permit granting process is estimated at 3.5 to 4.1 years for electricity and 3.2 years for gas (post 2013) PCIs. The maximum duration of the permitting procedure for electricity PCIs is currently 8 to 9 years, while for gas PCIs an overrun time of 1 to 2 years has been reported. These statistics clearly show that the above mentioned provision is in many cases not respected at the present.

[269] Milieu (2016), Analysis of the manuals of procedures for the permit granting process applicable to projects of common interest prepared under Art.9 Regulation No 347/2013.

ENTSO-E acknowledges that the TEN-E Regulation's provisions on permitting are going in the right direction; therefore, the focus should now be on their effective implemention.[270] ENTSO-E also recognises that "more clarity is needed surrounding the mandatory steps of the permitting process", as the ineffective implementation of European laws may not lead to real improvement in terms of accelerated permit granting of PCIs.[271] To improve this situation, national guidelines must include accurate definitions of the mandatory process items, including progression steps. This will expedite the process and should positively influence compliance with the 3.5 year time limit.

In a handout presented at the Energy Infrastructure Forum[272], ENTSO-E stated that "deployment of new grid infrastructure is in several regions confronted with fierce public opposition and behind schedule". This statement adds public opposition as a factor which jeopeardises compliance with the 3.5 year time limit.

Stakeholder consultation

A large share of the respondents (37%) to the **targeted survey** responded with a clear 'yes' to the open question of whether it is feasibile for national authorities to finalise the entire permit granting process for PCIs within a 3.5 year timeframe. The respondents highlighted that the PCI status enhances the feasibility of respecting this maximum duration. 22% of the respondents indicated that the 3.5 year time limit is feasibile, but added that this limit is challenging and at the moment not always respected due to different issues which hinder the process. Stakeholders also pointed out that respecting the deadline requires major and appropriate involvement of all authorities. Other respondents mentioned that critical issues are the early involvement of the public, the use of a common working language, support from the EC, and the appropriate functioning of the one-stop shop. Another 17% of the respondents highlighted that the feasibility of completing the permitting procedure in 3.5 years depends on several factors, the type and size of a project are considered as especially important factors; for large projects the time limit is less feasible. A few respondents added that with further streamlining of the implementation procedures, respecting the time limit would become more feasible, in particular if the practices referred to in the ENTSO-E handout[273] were applied. 12% of the respondents answered that it is not feasible to complete permitting in 3.5 years, or it is at least "very challenging" or "highly unlikely" with the current permit granting national frameworks in place.

Stakeholders at the **Permitting and Public Acceptance Focus Group** meeting mentioned that the time limit in the Regulation is a good indicative period, which seems achievable in most cases. The principle of setting time limits is a good one and authorities and promoters should strive to meet the set limits, but there are still concerns regarding practical implementation. A TSO mentioned that the interpretation of the "comprehensive decision" is unclear, and hence also the end of the permit granting period. Moreover, considerable preparatory work is needed to comply with all legislation (Habitat Directive, EEA, etc.). A Competent Authority acknowledged that for some projects, developers need to spend more time on certain aspects and proposed to change the wording of the relevant provision in the Regulation in order to make an extension of the time limit possible.

[270] ENTSO-E website, (http://tyndp.entsoe.eu/insight-reports/common-projects/) accessed 21 April 2017.
[271] Provided to us by a stakeholder: "TEN-E requires implementation guidelines to reap the benefits of accelerated permitting" (May 2017), Handout for Energy Infrastructure forum 1-2 June 2017.
[272] Provided to us by a stakeholder: "Supporting regulations for the timely implementation of grid projects" (May 2017), Handout for Energy Infrastructure forum 1-2 June 2017.
[273] Provided to us by a stakeholder: "Supporting regulations for the timely implementation of grid projects" (May 2017), Handout for Energy Infrastructure forum 1-2 June 2017.

Other interventions focused on the consequences of a permitting procedure taking longer than the time limit. DG ENER mentioned that it is the one-stop shop's responsibility to have the time limits respected. It can impose time limits for intermediate decisions and establish working groups (CA & permit granting authorities) to ensure that the TEN-E time limits are respected. The one-stop shop should have a good overview of the overall process and monitor its progress.

Participants confirmed that Member States attempt to finalise their permitting procedures within the time limit. For example, in Lithuania, deadlines have been defined by law per step; the involved authorities have to take their decision within a 20 days time limit. In France, there is a tool which provides guidelines including identification of relevant authorities and time lines for each project.

If the time limits are not respected, court procedures could be launched. The options of removing the PCI from the list and assigning a European coordinator (Article 6) were also briefly discussed. Although, as per the Regulation, a European coordinator can be designated if there are significant delays in the implementation phase (not related to the permit granting process), this provision has only been used for four TEN-E projects. Currently, the HLGs play a similar role for projects that are substantially lagging behind schedule.

DG ENV made the point that it is important to look at the specific reasons for delays, given that in many cases these are due to ongoing environmental procedures which are excluded from the time limits (Article 10.6).

Conclusion

- According to the statistics and studies, most countries have problems in practice to comply with the time limit of 3.5 years to issue a comprehensive permit decision for PCIs.
- Most respondents to the targeted survey were of the opinion that respecting the time limit of 3.5 years should in most cases be feasible, but this requires the appropriate involvement and cooperation of all concerned authorities. The time limit may, however, not be feasibile for certain types of projects (especially large projects).
- Stakeholders at the focus group also found the set time limits in the TEN-E Regulation appropriate, but they expressed concerns regarding their practical implementation. A rewording of the concerned provision in the Regulation was suggested in order to make an extension of the time limit possible.
- Public opposition remains an important cause for delays, jeopardising the feasibility of respecting the 3.5 year time limit.

The time limit in the TEN-E Regulation seems appropriate to accelerate the permit granting process for PCIs and it has been proven in several MSs that respecting it is feasible in practice. However, there are still some issues with the practical implementation of this provision in the TEN-E Regulation.

5.10.3 Has the quality of the documentation submitted improved since the TEN-E Regulation entered into force?

Article 9 of the TEN-E Regulation establishes transparency requirements, including the need for CAs to publish a manual of procedures for the permit granting process. Annex VI of the Regulation states that

this manual of procedures shall provide information regarding the scope, structure and level of detail of documents to be submitted by the project promoter.

Evaluation based on literature review

In accordance to article 9 and Annex VI of the Regulation, Member States seem to have timely (by 16 May 2014) elaborated and published a 'Manual of PCI procedures'; several documents are available online, amongst others from France, Germany, UK, the Netherlands, Belgium and Denmark.[274] The available documents are quite comprehensive and offer efficient guidance to project developers about the documentation to be submitted with the application for decisions.

Key findings from the study "Analysis of the manuals of procedures for the permit granting process applicable to projects of common interest prepared under Art.9 Regulation No 347/2013" prepared by Milieu (2016)

- All MS have published a **manual of procedures** for PCI permit granting. About half of the manuals include all relevant legislation as requested by Article 9(1) and Annex VI(1), while the rest are considered partly compliant. No manual was assessed as fully compliant with all of the Annex VI(1) requirements, nor was any manual entirely non-compliant. The main justification for lack of full compliance was to avoid over-burdening the manual.

Stakeholder consultation

No information was gathered on this topic via the stakeholder consultation.

Conclusion

There is in the literature no evidence that the quality of the documentation submitted would have improved since the entry into force in 2013 of the TEN-E Regulation. Nonetheless, member states have since then elaborated and published a 'Manual of PCI procedures', which offers efficient guidance to project developers about the documentation to be submitted with the application for decisions. On the basis of the publications available via the website, we notice that PCI procedures are at national level now better documented, and assume that this better guidance to investors has contributed to a higher quality of the documentation that is submitted in the context of a permit application. This assumption could, however, not be validated on the basis of literature findings or stakeholders feedback.

5.11 CBCA.1 – CBCA Decisions

5.11.1 The number of PCIs granted a CBCA decision and the outcomes of these decisions (Article 12)

[274] http://economie.fgov.be/nl/binaries/TEN-E_Projecten_van_gemeenschappelijk_belang_Handleiding_tcm325-263131.pdf (available in FR and Dutch)
http://www.pleanala.ie/publications/2014/pocimanual.pdf
https://ens.dk/sites/ens.dk/files/Forsyning/pci_haandbog_for_danmark.pdf (only available in Danish)
http://northsealink.com/media/1191/uk_manual_procedures_ten_e_regulation.pdf
https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Allgemeines/Bundesnetzagentur/Internationales/PCI/PCI_Handbuch.pdf;jsessionid=72FBFED73242606D758307E51F4D7525?__blob=publicationFile&v=1 (only available in German)
https://www.rvo.nl/sites/default/files/2016/09/Handleiding%20PCI%202016%20engels.pdf
https://www.ecologique-solidaire.gouv.fr/interconnexions-electriques-manuel-des-procedures

Article 12 of the Regulation introduces CBCA decisions as one of the regulatory tools to facilitate the implementation of PCIs. These are aimed only at certain PCIs, as detailed in Article 12 (excluding electricity storage, smart grid, oil and CO_2 transport PCIs, as well as projects having received an exemption related to third-party access rules or certain tariff-related obligations).

CBCA decisions are taken by NRAs (or by ACER) on the allocation of the costs of (mature) PCIs across borders after project promoters submit an investment request to NRAs including a request for CBCA. NRAs are required to inform ACER of these requests, and to keep ACER updated on the follow-up.

Evaluation based on literature review

ACER's overview of cross-border cost allocation decisions as of January 2017[275] shows that 24 investment requests have resulted in a decision on cost allocation. Including the decision of April 2017 for PCI 6.5.2 (HERA, 2017) and the decision for the 'EuroAsia interconnector' PCI cluster 3.10 of October 2017[276], there are currently 26 CBCA decisions (9 in electricity, 17 in gas). Only two requests were adopted by ACER, following Article 12(6)[277]. When multiple NRAs are participating in CBCA decisions, the decision date of each concerned NRA is mentioned. An investment request can cover several PCIs gathered under the umbrella of a cluster. 14 decisions were adopted in 2014, five in 2015, another five in 2016 and only two in 2017 (as of October 2017). Most CBCA decisions concern gas PCIs (17 out of 26); in particular in 2014 a large number of decisions were taken for the gas sector, despite its lower number of PCIs on the Union list. All CBCA decisions are shown in Table 5-8.

An examination of other monitoring sources (PCI Progress Watch[278], reporting of the project promoters to ACER[279] and the latest ACER (2016a; 2017a) consolidated reports) suggests that more PCI projects have filed for CBCA requests in the past, which may indicate that some requests are still pending (waiting for a decision) or have been declined or withdrawn. This report only focuses on CBCA decisions and their outcomes.

ACER (2016b) explains the relatively low number of submitted investment requests by the fact that projects need to have reached "a sufficient level of maturity" before they can file a request, as defined in Article 12(3) of the Regulation. Currently, only 62% of the electricity projects and 56% of the gas PCIs are in the permitting stage or beyond[280] (see also Section 5.2 EG.2 – Progress in PCIs), significantly reducing the pool of eligible projects. PCIs that received an exemption related to third-party access rules or certain tariff-related obligations (if some extraordinary conditions are met) are also ineligible for CBCA.[281] This is, however, a less significant factor, with only eight PCIs having applied for an exemption[282], while for some recently launched interconnection projects (e.g. Fab Link, IFA 2 and Viking Link) the concerned NRAs will also opt for a merchant-exempt route rather than for a regulated route. Considering future CBCA requests, promoters have indicated they intend to submit requests for 7 electricity and 13 gas PCIs.

[275] ACER (2017b), Overview of cross-border cost allocation decisions – Status update as of January 2017.
[276] Only the decion of Cyprus concerning PCI 3.10.2 and 3.10.3 has been published as of October 2017.
[277] Article 12(6) of TEN-E Regulation 347/2013 states that if NRAs have not reached an agreement after 6 months (or upon request), ACER takes the decision.
[278] An internal project status monitoring tool used by DG ENER and INEA staff; file dated 23 March 2017. Provided by DG ENER, received by e-mail.
[279] Underlying monitoring reporting data for ACER (2016a) and ACER (2017a) 'consolidated reports' respectively for the years 2015 and 2016. Provided by DG ENER, received by e-mail.
[280] ACER (2017a), Consolidated report on the progress of electricity and gas projects of common interest for the year 2016.
[281] This concerns the PCIs having received an exemption as depicted in Article 12(9) of the Regulation.
[282] ACER (2017a), Consolidated report on the progress of electricity and gas projects of common interest for the year 2016.

Table 5-8 CBCA decisions and related CEF grants for works. Source: prepared by Trinomics based on ACER (2017b), reporting of project promoters to ACER in 2017[283], (CERA, 2017), (HERA, 2017), CEF fiches[284], INEA's 'Lists of actions selected or funding' of CEF calls since 2014[285], consultation of INEA[286] and the PCI Progress Watch[287]

PCI code		Host(s)	CBCA decision date	Allocated amount (share of total CAPEX)	Cost allocation to involved MSs	Progress level (2017)	CEF call	% EU support to the action	Maximum EU contribution	Total estimated cost of the action
Electricity PCIs										
3.7.4	Internal line between Maritsa East 1 and Burgas	BG	24/04/2015	50% (assuming 50% of grants)	100% BG	permitting	2015-1	50%	€ 28,996,650	€ 57,993,300
3.8.1	Internal line between Dobrudja and Burgas	BG	22/04/2016	50% (assuming 50% of grants)	100% BG	permitting	2016-1	50%	€ 29,857,500	€ 59,715,000
3.8.4	Internal line between Cernavoda and Stalpu	RO	19/10/2015	50% (assuming 50% of grants)	100% RO	permitting	-	-	-	-
3.10.2	Interconnection between Kofinou (CY) and Korakia, Crete (EL)	CY & EL	CY: 10/10/2017 EL: Decision not yet published	100%	63% CY 37% EL	planned, not permitting	-	-	-	-
3.10.3	Internal line between Korakia, Crete and Attica region (EL)	EL		100%	100% EL	planned, not permitting	-	-	-	-
4.2.1	Interconnection between Kilingi-Nõmme (EE) and Riga CHP2 substation (LV)	EE & LV	LV: 23/04/2014 EE: 30/04/2014	25% (assuming 75% of grants)[b]	90.1% LV 9.9% EE	permitting	2014	65%	€ 112,301,701	€ 172,771,848
4.2.2	Internal line between Harka and Sindi	EE	LV: 23/04/2014 EE: 30/04/2014	25% (assuming other 75% of grants)[b]	100% EE	planned, not permitting				
4.2.3	Internal line Riga CHP2 and Riga HPP	LV	14/07/2016	100%[b]	100% LV	construction	2016-2	50%	€ 9,990,000	€ 19,980,000
4.4.1	Internal line between Ventspils, Tume and Imanta	LV	09/04/2014	50% (assuming 50% of grants)[b]	100% LV	construction	2014	45%	€ 55,089,000	€ 122,420,000
4.5.1	LT part of interconnection between Alytus (LT) and LT/PL border	LT	16/04/2015[a]	100%	100% LT	completed	2015-1	50%	€ 27,375,582	€ 54,751,164
Gas PCIs										

[283] Underlying monitoring reporting data for ACER (2017a) 'Consolidated report on the progress of electricity and gas projects of common interest for the year 2016'. Provided by DG ENER, received by e-mail.
[284] As of August 29th 2017, available on: https://ec.europa.eu/inea/connecting-europe-facility/cef-energy/projects-by-sector
[285] Lists of actions selected for funding' by INEA for 2014, 2015-1, 2015-2, 2016-1 and 2016-2, available on: https://ec.europa.eu/inea/en/connecting-europe-facility/cef-energy/calls
[286] Communications with INEA representative on 16/17 November 2017.
[287] An internal project status monitoring tool used by DG ENER and INEA staff; file dated 23 March 2017. Provided by DG ENER, received by e-mail.

PCI code		Host(s)	CBCA decision date	Allocated amount (share of total CAPEX)	Cost allocation to involved MSs	Progress level (2017)	CEF call	% EU support to the action	Maximum EU contribution	Total estimated cost of the action
5.2	Twinning of Southwest Scotland Onshore System between Cluden and Brighouse Bay	UK	06/05/2014	100%	100% IE[c]	to archive[e]	2014	36.5%	€ 33,764,185	€ 92,758,750
5.3	Shannon LNG terminal and connecting pipeline	IE	06/05/2014	100%	100% IE	permitting	-	-	-	-
5.7	Reinforcement of the French network from South to North	FR	25/04/2014	100%	100% FR	permitting	-	-	-	-
5.10	Reverse flow interconnection on TENP pipeline in Germany	DE	09/05/2014	100%	100% DE	planned, not permitting	2015-2	50%	€ 8,665,000	€ 17,330,000
5.12	Reverse flow interconnection on TENP pipeline to Eynatten interconnection point	DE	09-05-2014	100%	100% DE	to archive[e]	-	-	-	-
5.18	Reinforcement of the German network to reinforce interconnection capacities with Austria [Monaco pipeline ph. I] Haiming/BurghausenFinsing)	DE	DE: 10/04/2014 AT: 28/04/2014	100%	100% DE	to archive[e]	-	-	-	-
6.1[f]	The Polish – Czech Interconnector II Project	CZ & PL	PL: 24/06/2014 CZ: 23/06/2014	100%	59.8% PL 40.2% CZ	permitting	2015-1[g]	-	-	-
6.2.1	Interconnection Poland – Slovakia	PL & SK	28/11/2014	100%	73.0% PL, 27.0% SK	permitting	2016-2	40%[h]	€ 107,741,144	€ 269,352,860
6.5.1	Phased development of a LNG terminal in Krk	HR	HU-HR: 12/10/2016 HU: 02/11/2016	75-25% (assuming 25-75% of grants)	100% HR	permitting	2016-2	27.92%[i]	€ 101.400.000	€ 363,180,516
6.5.2	Gas pipeline Zlobin – Bosiljevo – Sisak – Kozarac – Slobodnica[j]	HR	HU-HR: 13/04/2017	52.8% (assuming 47.2% grants)	100% HR	permitting	-	-	-	-
7.1.5	Gas pipeline from Bulgaria to Austria via Romania and Hungary	BU, AT, RO & HU	HU-RO: 06/10/2015 RO: 07/10/2015 HU: 16/10/2015	100%	41% HU, 59% RO	permitting	2015-2	40%	€ 179,320,400	€ 448,301,000

PCI code		Host(s)	CBCA decision date	Allocated amount (share of total CAPEX)	Cost allocation to involved MSs	Progress level (2017)	CEF call	% EU support to the action	Maximum EU contribution	Total estimated cost of the action
6.13	Cluster Romania – Hungary – Austria transmission corridor						-	-	-	-
6.14	Romanian – Hungarian reverse flow at Csanádpalota or Algyő						-	-	-	-
8.1.1	Balticconnector	EE & FI EE & LV	EE-FI: 22/04/2016 FI: 26/04/2016[b]	100%	8.1.1: 52.0% EE, 48.0% FI 8.2.2: 100% EE	permitting	2016-1	75%	€ 187,500,000	€ 250,000,000
8.2.2	Enhancement of EstoniaLatvia interconnection							50%	€ 18,625,000	€ 37,250,000
8.1.2.2	Paldiski LNG termina	EE	EE-FI: 28/10/2016 FI: 28/10/2016	No need for CBCA from non- to hosting countries	100% EE	permitting	-	-	-	-
8.2.3	Capacity enhancement of Klaipeda – Kiemenai pipeline in Lithuania	LT	LV: 30/04/2014 LT: 29/04/2014	56.7%[d]	94.75% LT,5.25% LV[c]	completed	2014	45.5%	€ 24,739,293	€ 54,372,072
8.2.4	Modernisation and Expansion of Incukalns Underground Gas Storage	LV	LV: 30/04/2014 LT: 29/04/2014	100%	44.32% LV, 13.92% LT[a]&EE[c] (assuming 41.76% of grants)	planned, not permitting	-	-	-	-
8.5	Gas Interconnection Poland-Lithuania (GIPL)	LT & PL	11/08/2014[a]	100%	60.2% PL, 34.2% LT, 5.3% LV[c], 0.3% EE[c]	permitting	2014	60%	€ 266,386,516	€ 443,967,571
8.6	LNG Terminal Gothenburg	SE	01/10/2015	100%	100% SE	permitting	-			

[a] CBCA decision issued by ACER.
[b] Retained the right to revise the CBCA decisions in case of insufficient public funding.
[c] Non-hosting country.
[d] We assume 43.3% from grants, but this is not explicitly reported by ACER.
[e] As the project is no longer a PCI, the project is not monitored anymore. This disallows to say something about former PCIs as important attributes like current progress stage are not monitored anymore.
[f] Involved a cluster of 11 PCIs (6.1.1-6.1.11), prior to the reorganisation of PCIs for the 2015 Union list
[g] The foreseen grant of EUR 63.659.000 was cancelled at a relatively late stage, as the beneficiaries renounced the grant in August 2016.
[h] The grant agreement is in the final stage of preperation and expected to be signed in December 2017. The cost figure still has to be confirmed by the grant beneficiaries.
[i] The grant agreement is in the final stage of preperation and expected to be signed in December 2017.
[j] CBCA was issued in relation to just one element of PCI 6.5.2: Gas pipeline Omišalj_Zlobin_Bosiljevo_Sisak-Kozarac-Slobodnica - Phase I.

On the basis of ACER's (2017b) report, complemented by data available on the more recent decisions adopted for PCI 6.5.2 (HERA, 2017) and EURASIA interconnector cluster of PCIs (CERA, 2017), the following comments can be formulated on the outcomes of the CBCA decisions:

a) 73% of the CBCA decisions (19 out of 26) concerned projects with cross border impact but located in only one Member State; showing a similar trend as aboserved in the previous (2015) CBCA summary report.[288]
b) In approximately half of the cases[289], the concerned NRAs needed to carry out further work to verify CBA results, as shortcomings were identified in the latest TYNDPs (i.e. benefits calculated for a cluster of PCIs instead of for individual PCIs, use of a single scenario, lack of sensitivity analysis or non-consistent application of the discounting method/factors).
c) The overall investment costs of the concerned projects (for 24 decisions as assessed by ACER as of January 2017) amount to EUR 5.3 billion in gas versus only EUR 650 million in electricity. This data is, however, only indicative as cost data is provided based on different discount methods and/or for different reference years.
d) For most of the investment requests, the CBA showed generally net positive impacts in the hosting country/countries.
e) For most of the internal projects, 100% of the costs in the CBCA decision were allocated to the hosting MS. Exceptions were PCIs 5.2 (UK hosted), 8.2.3 (LT hosted) and 8.2.4 (LV hosted).
f) For all CBCA investment requests, the project promoter(s) indicated their intention to apply for EU grants. (Table 5-8 shows that for 16 projects[290] involved in CBCA decisions, a CEF grant for work has been assigned[291] already.) The funding percentage ranges from 27.92% up to 75% of the action covered by the grant.
g) In 22 cases, all investment costs were allocated to the hosting country(ies) of the project following the territorial principle (justified by a lack of net negative impact in the hosting country(ies) and/or a lack of significant impact: less than 10% of the total net positive impact). Only for the three internal PCI projects referred to above, and for PCI 8.5 (LT & PL hosted), costs were partially allocated to non-hosting Member States. All four cases in which part of the investment costs were allocated to non-hosting MSs, were in the gas sector, for wich all decisions were adopted in 2014. All decisions in 2015 and 2016 followed the territorial principle.
h) For a third of the cases (9 out of 26), only part of the investment costs was allocated. In these cases the project developers/NRAs relied on EU funds to fill the financing gap. This approach is mainly adopted for electricity PCIs (6 out of 9 decisions with partial cost allocation). The main reason for partial cost allocation was to avoid an excessive increase in transmission tariffs in a hosting MS, as indicated by the NRAs. In 5 cases[292] the NRAs retained the right to revise the CBCA decisions in case of insufficient external funding.
i) With regard to the geographical distribution of CBCA decisions, 48% (12 out of 26) concern BEMIP Electricity or BEMIP Gas priority corridors. However, within the total pool of PCIs, the BEMIP projects only represent 14% (27 out of 188).

[288] ACER (2015b), Summary report: Experience with Cross-Border Cost Allocation.
[289] Assessment of 24 decisions by ACER (2017b) up to January 2017.
[290] This includes 6 electricity CEF grants for works (involving 7 PCs) and 9 gas CEF grants for works.
[291] For two PCIs (6.1.2, 6.5.2) the grant agreement is in the final stage of preperation and expected to be signed in December 2017.
[292] Besides the four cases as mentioned in Table 5-8, footnote 'b', it remains unclear which PCI is the fifth case where the NRAs retained the right to revise the CBCA decisions in case of insufficient external as reported in ACER (2017a).

Conclusion

As of October 2017, **26 CBCA decisions were issued (24 by NRAs and 2 by ACER); decisions can cover several PCIs**. 9 decisions were adopted for electricity and 17 for gas. Oil and CO_2 transport projects are not eligible for CBCA decisions.

Regarding CBCA decisions:

- In the majority of the cases (22/26), the full investment costs were allocated only to the hosting country(ies) of the project following the territorial principle (justified by net positive benefits).
- In four cases, investment costs were partly allocated to non-hosting countries, three of which were single MS PCIs (5.2, 8.2.3 and 8.2.4) and one PCI (8.5) hosted by two MSs.
- In one third of the cases (9/26) partial allocation of the investment costs was decided in order to avoid excessive increase in transmission tariffs. For these cases, project developers/NRAs rely on EU funds to fill the finance gap. This is more often the case for electricity (6/9) than for gas (only 3/17). For 5 of these cases the NRAs retained the right to revise the decision in case of insufficient funding.
- 73% of the requests (19/26) concerned projects located in only one Member State.
- In approximately half of the cases, NRAs needed to further verify the CBA results, as shortcomings were identified in the CBA methodology used in the TYNDPs, which highlights the need for further improvement of the CBA approach (see Section 5.22.2.)
- There is a clear correlation between CBCA and CEF applications, so far 16 PCIs involved in CBCA decisions have received CEF grants for works, but all concerned promoters indicated their intention to apply for CEF.

5.12 CBCA.2 – Drivers for CBCA Requests

5.12.1 What motivates project promoters to request CBCA decisions?

The TEN-E Regulation establishes the Cross-Border Cost Allocation option (CBCA) to address PCIs for which there is a net negative benefit to at least one hosting country. PCI promoters can, in that case, submit a request for a CBCA decision to the concerned NRAs. A CBCA can lead to a reviewed allocation of the investment costs amongst the benefiting countries, which takes into account the project's externalities (e.g. impact on security of supply) and its impact on the social welfare (consumer and producer surpluses) in the different Member States.

Evaluation based on literature review

The publicly available information with regard to CBCA applications and decisions is limited. There are a relatively low number of CBCA decisions (26 decisions[293] on 195 PCIs) and most of them (73%[294]) concern internal projects (located in one MS), which suggests that project promoters aim to recover part of their investment costs from benefiting neighbouring countries. (See also Section 5.11.1 which presents an overview of the CBCA decisions.) Seven decisions concern projects located on the territory of two or more MSs. As most CBCA decisions do not allocate costs across borders of hosting country(ies) (22 out of 26 cases), this fact may indicate that the main motivation for submitting a CBCA request is

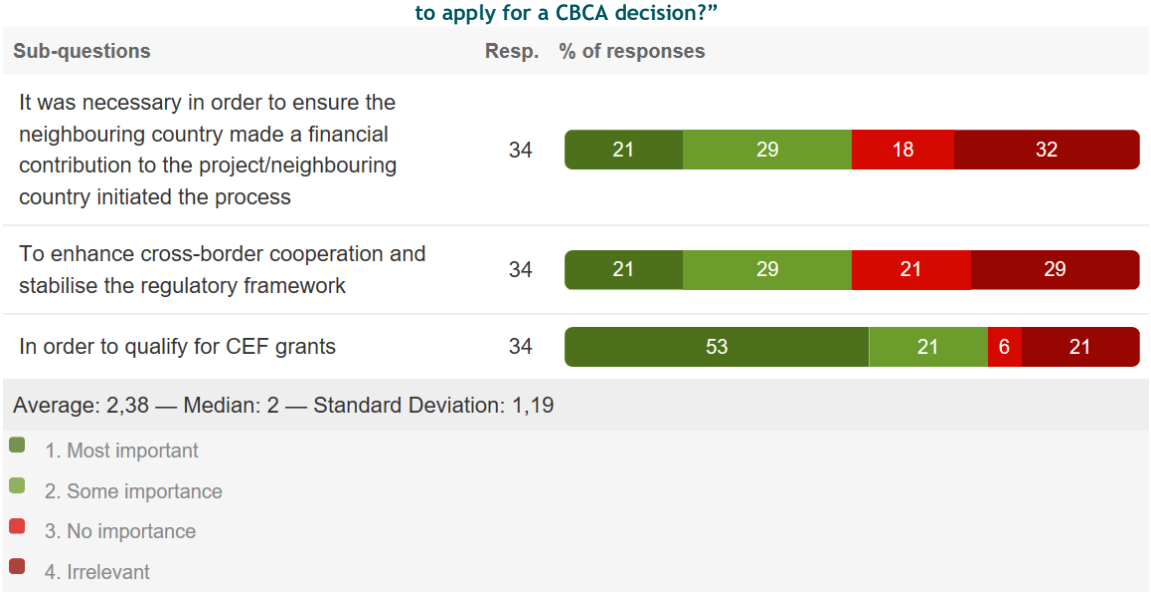
[293] CBCA decisions can involve several PCIs.
[294] 19 out of the 26 assessed by ACER (2017a), see also Table 5-8 in Section 5.11.1.

the access to CEF funding. Seven of the electricity projects and nine[295] of the gas projects with a CBCA decision are receiving CEF assistance for works according to the CEF fiches[296] and complementary information sources.[297] Moreover, ACER (2017b) states that the all promoters of PCIs which have submitted CBCA investment requests, have also expressed their intention to apply for EU grants (CEF).

Stakeholder consultation

In the **targeted survey,** project promoters, NRAs and CAs were asked for their opinion on three possible motivations behind CBCA requests. The results (Figure 5-14) clearly reveal that gaining eligibility for CEF grants is the main motivation behind CBCA applications. This motivation is considered the 'most important' by 53% of the respondents. Enhancing cross-border cooperation (and stabilising the regulatory framework) and ensuring financial contribution from a neighbouring country are also considered important drivers. Half of the respondents indicated that the latter two are 'most important' or 'of some importance' for CBCA applications.

Figure 5-14 Results targeted survey to the question: "How important are the following factors in your decision to apply for a CBCA decision?"



Respondents provided some additional comments on this topic. Concerning the link between CBCA and CEF, an NRA stated that access to CEF funding is indeed the main motivation for project promoters to apply for a CBCA decision, despite the fact that this process is considered as "highly-complex" and "a bothersome requisite" for CEF grants. The stakeholder also referred to the potential benefits of CBCA for cross-border cooperation, as a CBCA-request can "pave the way for bilateral discussions". Stakeholders also added that cross-border financial contributions can be an important motivation for CBCA requests, but it is only relevant in exceptional cases.

During the **Network Planning focus group meeting,** the assumption that several promoters use CBCA as a gateway to CEF was confirmed.

[295] For two PCIs (6.1.2, 6.5.2) the grant agreement is in the final stage of preperation and expected to be signed in December 2017.
[296] As of August 29th 2017, available on: https://ec.europa.eu/inea/connecting-europe-facility/cef-energy/projects-by-sector.
[297] Lists of actions selected for funding' by INEA for 2014, 2015-1, 2015-2, 2016-1 and 2016-2, available on: https://ec.europa.eu/inea/en/connecting-europe-facility/cef-energy/calls. And communications with INEA representative on 16/17 November 2017.

The **interviews** indicated the importance of the CEF funding that is potentially associated with CBCA requests. Project promoters mainly request CBCA decisions for projects with asymmetric costs/benefits between the concerned Member States, and for projects which present a "financial gap" after a market procedure and economic test. Project promoters would be particularly inclined to submit a CBCA request if they are not sure of their ability to recover the full investment cost on their territory via their national grid tariffs, and therefore request that part of the investment cost would be financed by another Member State and/or by CEF.

The interviewees noticed the fact that (as confirmed by the data) most CBCA decisions do not result in a transfer of investment costs from the hosting country to neighbouring countries, although this option is available and the decision on it is made by the regulators. The interviewees argue that the fact that there have been few decisions that have resulted in the transfer of funds suggests to them that applications to do so are not likely to be successful. Despite the (from experience) low chances of benefitting from transfer of funds, promoters continue to apply for CBCAs. An important additional motivation for project developers to request a CBCA decision (that they have confirmed) is to have access to CEF finance. Another expert added that a review of the procedure could be considered in order to provide access to CEF finance without the (time consuming) CBCA process.

A TSO representative also stated that access to CEF funding is the main reason to apply for a PCI status and CBCA decision, but the stakeholder added that the actual application procedure is rather difficult and complex, and that CEF decisions would not always be fully transparent and motivated.

Conclusion
Accessing CEF grants (for works) is the major driver for CBCA applications. Enhancing cross-border cooperation (and stabilising the regulatory framework) and ensuring financial contribution from a neighbouring country are less important motivations.

5.13 CBCA.3 – Effectiveness of CBCA Decisions

5.13.1 How effective are CBCA decisions at enabling investment decisions and effective investments?

CBCAs are meant to allocate investment costs of PCIs amongst the benefiting countries when there is a net negative benefit to at least one hosting country. Within six months of the investment request date, NRAs should take a (coordinated) decision on the allocation of investment costs to be borne by each system operator, as well as their inclusion in tariffs. NRAs may decide to allocate only part of the costs, or to allocate costs among a cluster of several PCIs.

Evaluation based on literature review

Based on the data analysis, only very few CBCA decisions have allocated part of the concerned PCI costs to benefiting non-hosting countries, while most of them (22 out of 26) have allocated the costs to hosting countries only.[298] Several CBCA decisions have, however, also served as a stepping stone to access CEF funding, and thus enabled PCI investments. 16 of the PCIs involved in CBCA decisions have

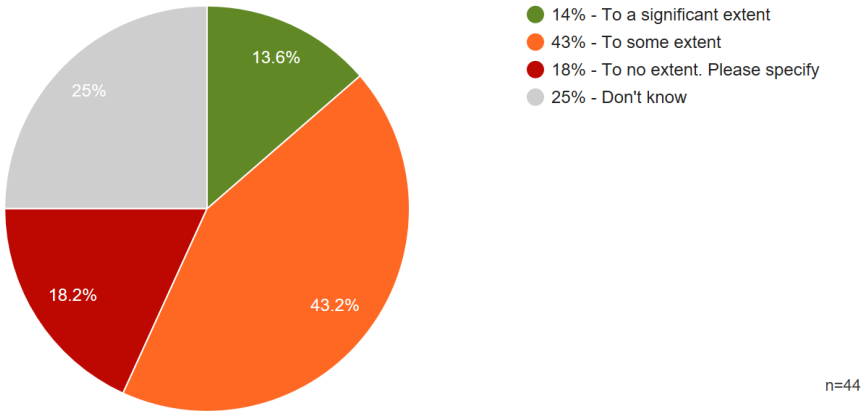
[298] A detailed list of CBCA decisions and the outcomes of the decisions is presented in Table 5-8 in Section 5.11.1.

been assigned grants for works.[299] Regarding the progress of these PCIs (shown in Table 5-8 in Section 5.11.1), most of them are in the permitting stage.

Stakeholder consultation

57% of the **targeted survey** respondents who are involved in CBCA decisions (promoters, NRAs and CAs) are of the opinion that CBCA decisions enable PCI investments 'to some extent' (43.2%) or 'to a significant extent' (13.6%); while 18.2% indicated that CBCA decisions enable investments 'to no extent'. A quarter of the respondents indicated 'don't know', but these stakeholders were mostly (87.5%) respondents without CBCA experience. The distribution of answers does not show striking differences between the different stakeholder types. A large majority across the different stakeholder types is of the opinion that there is a positive impact of CBCA decisions on PCI investments. However, TSOs answered more often that the extent to which CBCA enables investments was 'significant' (17% versus 7% of the answers by NRAs and CAs.)[300]

Figure 5-15 Results targeted survey to the question: "To what extent do the CBCA decisions enable PCI investments?"



Survey respondents who indicated that CBCA decisions 'to no extent' enable PCI investments were asked to specify their response. The main explanation why CBCA would not enable investments is that "it is only used for CEF funds" (project promoter). An NRA phrased this view as follows: "The majority of CBCA decisions are not substantial and seen purely as a prerequisite to apply for CEF funding afterwards. Only 4 out of 24 decisions included transfer of money 'across borders', which is the intrinsic nature of a CBCA decision (see ACER 2017 Overview of CBCA decisions).[301] However, for a few specific projects (with uneven benefits and costs across countries), CBCA may be an important enabler." Another project promoter also highlighted that "Most CBCA decisions lead to a 100%/0% result; the national regulatory framework ensures that TSOs can finance their costs through their network tariffs", making CBCA redundant.

Multiple stakeholders also highlighted the high complexity of the CBCA process, which could effectively deter promoters from applying for CBCA as it complicates and delays the process (and thus might hinder

[299] For two PCIs (6.1.2, 6.5.2) the grant agreement is in the final stage of preperation and expected to be signed in December 2017.
[300] TSOs (n=30): 17% (#5) answered 'to a significant extent', 40% (#12) 'to some extent', 17% (#5) 'to no extent' and 28% (#8) 'don't know'. NRAs (n=11) and CAs (n=3): 7% (#1 NRA) answered 'to a significant extent', 50% (#6 NRAs and #1 CA) 'to some extent', 21% (#3 NRAs) 'to no extent' and 21% (#1 NRA and #2 CAs) 'don't know'.
[301] Note that as of October 2017, there have been 26 CBCA decisions, with 4 cases with cost allocation tot non-hosting countries.

PCI investments).[302] One project promoter articulates this as follows: *"It [the CBCA procedure] may effectively deter project promoters from applying for investment requests and subsequently not enable investments with cross-border impacts, which results in delayed projects and additional regulatory risks."*

A participant at the **Network Planning focus group** mentioned that it is difficult for NRAs to decide on CBCA before knowing whether the project will receive CEF funding (and the amount). The stakeholder added that the way in which CEF funds are incorporated in the TSO accounts is also an issue (since grants are deducted from the RAB, they affect the TSOs' net income and dividends to their shareholders). Overall, the CBCA instrument could be rethought in such a way that it acts as a supplementary funding source to (only) finance the gap that is not covered by the market.[303] Another stakeholder mentioned that one could build in corrections in the CBCA decision to adapt its outcome to the effective coverage by the market.

An NRA participant at the **Regulatory focus group** argued that CBCA should be an exception to be imposed in as few cases as necessary. The concerned NRAs are supposed to allocate a "correct" amount of money; to avoid that this decision might be considered unfair, the best solution is to have a consensual approach.

The possibility of taking integrated CBCA decisions for several PCI projects within the same region (bundling of CBCAs) was discussed in the **Regulatory Focus Group**. An ACER representative suggested that bundling might not be very relevant, given the small number of CBCAs for which the same countries are involved. However, it would be advisable in some cases. There are indeed projects for which it is difficult to provide costs/benefits on PCI level because they are part of a cluster and the overall benefits cannot be properly disaggregated. Such projects should apply jointly for CBA/CBCA; however, maturity levels could be different, leading to delays.

An EC representative confirmed that the legal possibility for CBCA bundling is foreseen in Article 12 of the Regulation. There are indeed two investment requests for which one CBCA decision has been taken (involving EE and LV). NRA representatives argued that flexibility is needed; if projects are part of the same corridor, bundling might indeed be appropriate. Regional assessments could be initiated via the regional groups to underpin the identification of infrastructure needs (based on current and expected congestion) and to offer relevant input for CBAs/CBCAs. These regional assessments could be undertaken via regional cooperation between the concerned TSOs.

Commission **interviewees** considered that CBCA decisions could be seen (at face value) as effective at enabling investments, although in practice most CBCA decisions do not change the cost allocation between countries. CBCAs are seen as a way of accessing CEF.

An NRA representative noticed that decoupling CBCA and CEF has been discussed within the CEER. Some NRAs would favour full decoupling of these two instruments as each has a specific purpose. Decoupling these instruments would avoid CBCAs that are not needed (i.e. do not allocate costs across borders),

[302] These comments appear counterintuitive, as CBCA should be used when needed (i.e. when the project would not be carried out without the cross-border cost allocation); nevertheless stakeholders, clearly highlight that the CBCA process adds risks which may not outweigh the CBCA advantage of retrieving a (part of) the costs.
[303] Considering the shift from long term to short term bookings it is difficult to (1) underpin new investments with long-term contracts, and (2) predict the amount of bookings for short-term contracts.

and decrease the administrative burden both for promoters and NRAs. However, some parties are concerned that, if these instruments were decoupled, scrutiny of projects by NRAs would be needed for the CEF process (this is currently done only under CBCA). Another mentioned argument for keeping them separate is to solve financing issues first at national level (via national grid tariffs), then at regional regional level (CBCA), and finally at EU level (CEF) if necessary. However, this is more an issue of whether costs will be recovered via tariffs or subsidies. In this context, the question is which projects should receive EU subsidies. If there is no consensual CBCA decision, the project will be slowed down. The Regulation provides a good framework to structure the process and the discussion, but consensus amongst stakeholders is needed for a successful project implementation. ACER could have a mediating role to facilitate reaching a consensual position.[304]

Another NRA expressed concerns about the efficiency of the CBCA tool, mainly because it can be very dependent of the scenarios and assumptions used in the simulations. Consequently, NRAs/ACER may take CBCA decisions based on expected benefits which can be completely different in reality and hence lead to an unfair burden sharing. Furthermore, for the gas sector there is no specific and detailed methodology for the cost allocation and it is difficult to distinguish between infrastructure investments necessary for internal supply and those necessary for transit. The logical step would be for each country to pay the infrastructure cost on its own territory and recover the investments via tariffs.
A 3rd NRA referred to two specific CBCA decisions where the CBCA tool was used only to enable access to capex grants via the CEF framework. This stakeholder is concerned that the two processes are not properly aligned and/or that developers are sometimes applying for CBCA where this is not required.

A 4th interviewed NRA argued that CBCA is an important tool to implement PCIs, in particular for projects where the repartition of benefits and costs is not symmetric. Applying CBCAs necessitates a strong cooperation between countries, and is based on results from by definition imperfect models for the estimation of benefits. Therefore, when there is no net negative impact for one of the hosting countries, CBCAs would not be needed in order not to slow down the process. This position is in line with the ACER recommendation.

Conclusion

CBCA decisions can be considered as an effective enabler for the implementation of PCIs, for which hosting countries are not able or willing to recover the full investment cost on their territory via national access tariffs. In those cases, CBCA decisions provide clarity on the acceptance of the relevant costs to be covered by national system tariffs in each concerned Member State, and open the way for their financing, especially in case project promoters wish to apply for CEF support. CBCA decisions are hence mainly effective for PCIs with asymmetric cost/benefits, and for projects which cannot be fully financed by national system tariffs only.

In practice, most CBCA decisions allocate the cost of the concerned PCIs to the host countries according to the investment share on their territory; however, also for these cases, CBCAs can be considered as an enabler, as they offer certainty that the related costs can effectively be recovered. Only four CBCA decisions have allocated costs to benefiting non-hosting countries.

[304] Note that ACER is already assigned to take the decision if requested jointly by the NRAs or if the NRAs take longer than six months to reach a decision. However, there is no mediating role referred to in the Regulation.

Some stakeholders argued that the high complexity of the CBCA process may hinder PCI investments and delay their realisation. Notwithstanding this critical comment, most stakeholders (57% of the respondents) considered CBCA as an enabler for PCI investments. Several stakeholders stated, however, that CBCA is mainly (or only) used to access CEF, and added that with no actual cross-border cost allocation, the investments would have occurred anyway.

Given the close link between CBCA and CEF, it is difficult to conclude to what extent CBCA decisions are effective at enabling investments. All concerned promoters indicated their intention to apply for CEF after receiving the CBCA decision. So far, 16 of the PCIs involved in 26 CBCA decisions have been assigned grants for works. In those cases, CBCA decisions do play a role as a stepping stone in enabling investments. In order to avoid unnecessary administrative costs, the option to only apply CBCA for PCIs which have a net negative impact for at least one hosting country, could be considered and further assessed.

5.14 CBCA.4 – ACER CBCA Guidelines

5.14.1 To what extent do CBCA decisions comply with the ACER guidelines?

ACER issued specific guidelines[305] in 2013 and 2015 which include concrete recommendations for the preparation and assessment of CBCAs with regard to electricity and gas PCIs. The 2015 guidelines focus on the following topics:

Table 5-9 Content of the ACER Recommendation No 05/2015 on CBCA

Topic	ACER Recommendation No 05/2015
Regarding the submission of the investment request	• Promotes the identification of complementarities and where possible submission of joint investment requests • Defines conditions for 'sufficiently mature' projects • Establishes conditions fo the TSO consultation • Details the information to be provided with the investment request as well as the addressees and language of the request • Provides recommendations on the calculation of national net impacts
Regarding the treatment of the investment request	• Cooperation and coordination between NRAs (including the definition of a "Coordinating NRA") • Completeness of the request • Quality of the information provided with the request • Identification of costs to be allocated (definition of efficiently incurred investment costs) • Evaluation and choice of the scenarios for calculation of benefits (agreed by NRAs involved) • Allocation of costs • Mechanisms for adjusments of the cost allocation • Payments for implementation of the cost allocation • Agreement on the investment request and coordinated decisions • Inclusion of allocated costs in tariffs • Information to be provided by NRAs to ACER
Regarding reporting	• Annual reporting from project promoters to NRAs • Reporting from project promoters after commissioning to NRAs and TSOs of the MS to which costs have been allocated

[305] ACER (2013), ACER Recommendation No 07/2013 regarding the cross-border cost allocation requests submitted in the framework of the first Union list of electricity and gas Projects of Common Interest; ACER (2015a), ACER Recommendation No 5/2015 on good practices for the treatment of the investment requests, including CBCA requests for electricity and gas PCIs

Evaluation based on literature review

ACER Recommendations on CBCA are supposed to include the main principles that NRAs should follow when assessing an investment request and deciding on the allocation of costs across MS and on the inclusion of costs in tariffs.[306] Therefore, an assessment of the extent to which each individual decision followed the elements of ACER Recommendations is not available.

With regards to the submission of CBCA, project promoters should complete the following steps: consider complementarities between projects (with joint analyses and requests for investment if appropriate); apply at the correct stage of project maturity, so that a credible level of knowledge on the costs and benefits is available and the permitting procedures have begun; consult the relevant MS TSOs and completed their projects specific CBAs; be presented in the correct languages and with the correct sections completed; and identify which MSs have a positive and which have a negative benefit.

With regard to how these investment requests are treated, the guidance stipulates that: the NRAs involved should appoint a 'coordinating NRA'; initially review the completeness and quality of the request, requesting updates if either are lacking; and allocate the costs on the basis of the 'efficiently incurred investment costs'. The involved NRAs should agree on a consistent scenario for the calculation of benefits; agree on compensation if at least one MS is expected to have a negative benefit in one of the accepted scenarios; in general countries which receive a positive benefit should provide the compensation; if the costs turn out to be lower than expected, any compensation should be adjusted accordingly. Payments should be inflated to the year they occur and ideally take the form of a lump sum shortly after project completion. The costs should be met by a combination of congestion rents and tariffs – with double charging avoided.

Based on the experience of ACER,[307] some investment requests either diverged from the CBA methodology of ENTSO-E or lacked a sensitivity analysis. On the other hand, ACER mentioned there is still room for improvement when adopting CBCA decisions as some either lacked an assessment of the impact on tariffs or the costs had been allocated only in part. Nonetheless, it is acknowledged that the recommendations did help the NRAs to streamline the assessment process and that the criteria have been taken into account by NRAs and promoters.[308]

The 2017 ACER overview of cross-border cost allocation decisions[309] provides links to the decisions issued by NRAs; however, several links are outdated, and often lead to decision documents which are only available in the national language, without accompanying documentation. It is worth mentioning that since the publication of the ACER recommendation in 2015, ten CBCA decisions have been issued.

As shown in Table 5-8, in three cases, a CBCA decision was provided for a PCI which was still in its planning stage and had not reached the level of maturity required by the ACER guidelines at the moment of the CBCA application.[310]

[306] ACER (2017j) Cross-border cost allocation presentation
[307] ACER (2017j) Cross-border cost allocation presentation
[308] ACER (2017j) Cross-border cost allocation presentation
[309] ACER (2017a), Overview of cross-border cost allocation decisions – Status update as of January 2017.
[310] This excludes the EuroAsia project, reported under planning phase in 2016 (Progress Watch), but with a CBCA decision issued in October 2017.

Stakeholder consultation

An NRA participant at the **Regulatory focus group meeting** highlighted that the recommendations are a good instrument, as they provide some transparency and a standard, making CBCA decisions comparable, and guiding new parties through the process. Another NRA mentioned that it is difficult to assess the quality of the CBCA decisions and to evaluate whether they are in line with the ACER recommendation because the publicly available information is limited to the one page decisions and there is no access to all accompanying documents. It was also mentioned that the sections on transparency might be easier to check, and that a quality assessment is probably made by INEA as part of CEF procedure, but this information is also not publicly available. In any case, as there is no legal obligation for full compliance with the ACER recommendation, other approaches towards CBCA decisions which are satisfactory for all parties, are also acceptable.

An ACER representative mentioned that, so far, there are only a limited number of CBCA decisions which have been issued since the publication of the 2015 recommendation; therefore, an assessment is not yet possible on the basis of a representative sample. These recommendations are the outcome of long, thorough discussions and they cannot be assessed by measuring how many CBCA decisions allocate costs across-the borders, but rather by checking if they include all foreseen and relevant aspects (as done for LitPol and GIPL[311] by ACER).

ACER stated that the Regulation is binding and that CBCA decisions should be enforced. However, this is not ACER's role and was intentionally left out of the recommendations (which are non-binding, and therefore not enforced). The aim of the recommendations is to support promoters to submit correct applications and NRAs to issue good decisions. ACER suggested that the EC could take action to enforce the correct implementation of CBCA decisions. DG ENER reacted that the EC could indeed launch infringement procedures if deemed appropriate.

Conclusion

The ACER 2015 recommendation provides both general guidance as well as a common standard for NRAs regarding CBCA decisions and, although it managed to assist NRAs in streamlining the assessment process, there is still enough room for improvement in applying this regulatory tool. For example, out of the 10 CBCA decisions that have been issued since the 2015 recommendation was published, one CBCA decision was taken for a PCI which was still in its planning stage and had not reached the required level of maturity.

5.14.2 Do the ACER guidelines effectively guide NRAs into delivering useful CBCA decisions?

The 2015 ACER recommendation[312] regarding good practices for the treatment of investment requests including CBCA requests for electricity and gas PCIs, aims to facilitate the CBCA processes by providing guidelines and sharing good practices with project promoters and NRAs.

[311] Gas Interconnection Poland- Lithuania
[312] ACER (2015a), ACER Recommendation No 5/2015 on good practices for the treatment of the investment requests, including CBCA requests for electricity and gas PCIs

Evaluation based on literature review

ACER issued a first recommendation in 2013, which was updated in 2015. The 2015 recommendation[313] was prepared on the basis of challenges and open issues identified by ACER based on the first experiences with CBCA (see table below).[314]

Table 5-10 Challenges and open issues regarding CBCA. Source: ACER[315]

Challenge/Open issue	Reflection in ACER Recommendation No 5/2015
Treatment of interdependencies among projects	• Section 1.1, Determination of complementarities between projects • Annex I. Common recommendations for Electricity & Gas
How promoters should define to which NRAs to address the investment request	• Section 1.4, Addressees and language of the investment request
Lack of details of TSO consultation prior to submitting an investment request	• Section 1.3, TSO consultation
Assessment of sufficient maturity	• Section 1.2, Sufficient maturity
Definition of the start of the six-month period for NRAs to take coordinated decisions	• Section 2.2, Completeness of the investment request • Section 2.3, Quality of the information provided with the investment request
CBA as input for the CBCA calculations	• Section 1.6, Calculation of national net impacts • Section 2.6, Allocation of costs • Annex I. – Project-specific Cost-Benefit Analysis • Annex II – Calculation of national net impacts
Procedural aspects of NRA's CBCA process	• 2.1, Cooperation and coordination between NRAs
The identification of the eligible costs to be allocated	• Section 2.4, Identification of costs to be allocated
Criteria for the cross-border payments	• Section 2.8, Payments for implementation of the cost allocation
Inclusion of allocated costs in tariffs	• Section 2.10, Inclusion of allocated costs in tariffs
Guidance on calculations of the impact on tariffs	• Annex III – Evaluation of impacts on network tariffs
Adjustment of a CBCA decision	• Section 2.7, Mechanisms for adjustments of the cost allocation
The monitoring of the projects and the CBCA decisions	• Section 3, On reporting requirements of project promoters

Additional suggestions were provided by ENTSO-E[316] for further improving the CBCA process based on ACER's recommendations on good practices. ENTSO-E made the following four suggestions:

1) **Framing the involvement of countries on whose territory the infrastructure is not built** ("non-hosting countries"). If, for example, more than 50% of the benefits are allocated to the countries on whose territory the infrastructure is being built ("hosting countries"), limit the scope of any CBCA decision to a cost-distribution key, including only the hosting countries;
2) **10% significance threshold**: make the significance threshold relative to the "size" of the country (using criteria like GDP, annual demand or population);

[313] ACER (2015a), ACER Recommendation No 5/2015 on good practices for the treatment of the investment requests, including CBCA requests for electricity and gas PCIs
[314] ACER (2015b), Summary report: Experience with Cross-Border Cost Allocation.
[315] ACER (2015b), Summary report: Experience with Cross-Border Cost Allocation.
[316] Provided to us by a stakeholder: "Suggestions for further improving the CBCA process based on ACER's recommendations on good practices" (May 2017), Handout for Energy Infrastructure forum 1-2 June 2017.

3) **European Union (EU) funding:** Use an EU fund to cover the portion of the costs that exceed the benefits for the hosting countries and which is not reallocated to other countries; and
4) **Flexible methodologies**: ACER's recommendation needs a more flexible view of the scenarios used to allocate costs between different countries. The scenarios stated in ACER's recommendation are alternatives that project promoters, TSOs and NRAs, where relevant, are not obliged to follow strictly.

Stakeholder consultation

In the context of the **targeted survey**, a stakeholder mentioned that "*The guidance from ACER provides sufficient background and tools to follow the CBCA process*", while another one stated that "*ACER recommendations on good practices for CBCA require further improvements as for European Union (EU) funding.*"

A Commission representative made the point that the ACER guidelines refer to social / economic benefits within the CBCA process. These benefits are typically very large, much larger than the capital costs of the projects, and transfers of costs are only conducted when there is a negative balance between costs and social welfare. Member States seem happy to go along with this approach (and the ACER guidelines) as their view is that (typically) the costs and benefits of all the cross border projects they participate in will balance out (i.e. it's a zero sum gain), so there is nothing to be gained overall by a cost transfer on one project, as this will be compensated on another. Another Commission representative largely supported this view and expanded upon it by postulating that if ACER did the CBCAs it should help improve them, because ACER would have an impartial view on the reasonableness / realism of the data and figures used – this would help address the risk of the Member State NRAs playing games to avoid cost transfer. The ACER guidelines (on the socio/economic costs) skew the analysis against the capital costs. Operating costs could also be included in Article 12 (CBCAs). The US have a similar system of CBCAa, but its complexity often results in legal disputes. The Scandinavian model (pre TEN-E) appeared to work well.

An NRA mentioned during the **Regulatory Focus Group meeting,** that in most cases the legislation and guidelines are fine. However, there are issues with the more complex projects, in particular regarding the legitimacy of the CBCA decisions.

Conclusion

ACER recommendation No 05/2015 provides general guidance and a common standard for NRAs regarding CBCA decisions; it defines, inter alia, the necessary information for NRAs to issue CBCA decisions in a harmonised way, and seems to provide an effective guide for NRAs to deliver useful CBCA decsions. Several issues and challenges that arose during the first CBCA experiences (such as projects' interdependencies, maturity assessment, CBA as input, identification of eligible costs, etc.) have been addressed in this updated recommendation. However, there seems to be room for further improvement of certain aspects of the recommendation, such as the cost allocation methodogy and the legitimacy of CBCA decisions. Representativies of NRAs would also want to see a more direct link to CEF being introduced.

5.15 CBCA.5 – Cross-border Capacity Use

5.15.1 What evidence is there that cross-border transmission capacities are or are not utilised effectively?

This question relates to the cross-border transmission capacity that is effectively made available to and used by the market, compared to the overall physical capacity. This question is of interest because, if cross-border transmission capacities were not being used effectively, improving the effectiveness of their use would reduce the need for additional physical infrastructure.

Evaluation based on literature review

ACER and CEER's Market Monitoring Reports (MMR) provide an annual assessment of the (use of) cross-border electricity transmission capacities and gas interconnectors.

Electricity

The electricity MMR[317] show that the increase in effectively available tradable (i.e. available for trade) cross-zonal electricity transmission capacities in Europe was limited in recent years, despite investments in new interconnectors and advancements in the allocation method (introduction of flow-based market coupling). **Only around 30% of the available electricity transmission capacities is offered to the market:** on average only 28% of HVAC and 84% of HVDC interconnectors' physical capacity was effectively used for trading in 2015.[318] The losses of social welfare associated with this reduced commercial availability of cross-zonal capacities were estimated at EUR 1.1 billion for 2015.

The table below presents the ratio between the tradable and physical interconnection capacity in 2015. It shows that in several regions less than 30% of the interconnectors' physical capacity is used for trading.[319] The methods to calculate and allocate capacity to market parties have been improved, but these improvements have been partly cancelled out by increasing unscheduled and loop flows, which have a negative impact on the availability of capacity mainly in the CEE, CSE and CWE regions.[320] Practices adopted by TSOs to give priority to internal exchanges also have a negative impact on tradable capacities at the border. If the internal grid is not resilient to accommodate the national renewable energy production, available tradable cross-border capacities are reduced. In order to optimally use interconnection capacity, not only adequate calculation and allocation mechanisms are necessary, but Member States should also properly invest in their internal networks.

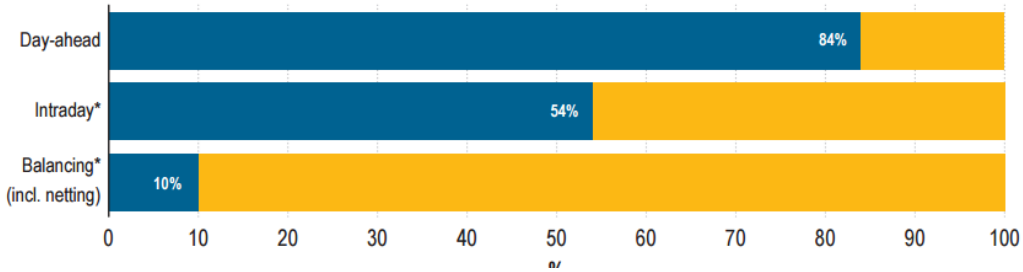
[317] ACER/CEER (2016a), Annual Report on the Results of Monitoring the Internal Electricity Markets in 2015; ACER (2016b), ACER Market Monitoring Report 2015. Key insights and recommendations
[318] ACER/CEER (2016a), Annual Report on the Results of Monitoring the Internal Electricity Markets in 2015; ACER (2016b), ACER Market Monitoring Report 2015. Key insights and recommendations
[319] ACER/CEER (2016a), Annual Report on the Results of Monitoring the Internal Electricity Markets in 2015
[320] ACER/CEER (2016a), Annual Report on the Results of Monitoring the Internal Electricity Markets in 2015

Table 5-11 Ratio between NTC and thermal capacity (regional performance) - 2015 (%, MW). Source: ACER/CEER (2016a)

HVAC/HVDC	Region	Tradable capacities (MW)	Physical capacities (MVA)	Ratio
HVAC	NORDIC	6,164	13,242	46.5%
	BALTIC	1,431	4,010	35.7%
	CWE	7,352	26,930	27.3%
	SWE	3,687	11,638	31.7%
	CSE	12,104	42,016	28.8%
	CEE	7,493	31,873	23.5%
	SEE	2,403	14,884	16.1%
HVDC	F-UK-I	3,303	3,500	94.4%
	BALTIC	913	1,000	91.3%
	CSE	384	500	76.7%
	NORDIC	4,741	6,130	77.3%

The MMR also reports on the efficient use of allocated cross-border capacities, which is defined as the available tradable capacity that is used in the "right direction" (i.e. from low price to high price zone). The **efficient use of electricity interconnectors increased over the period 2010 - 2015, partly because of further market coupling.** Thanks to market coupling at 31 out of 40 borders, the allocated cross-border capacity is more efficiently used in the day-ahead timeframe (increasing from around 60% in 2010 to 84% in 2015). **However, there is still room for improvement in the Intra-Day and balancing timeframes** (see Figure 5-16). Despite unused cross-border capacities and large disparities in balancing energy and capacity prices amongst MSs, the overall cross-border procurement of balancing services continued to be limited in 2015.

Figure 5-16. Level of efficiency (% use of commercial capacity available in the 'economic' direction) in the use of interconnectors in Europe - 2015. Source: ACER (2016b)



Congestion rents could be considered as a proxy for the economic cost of cross-border transmission capacities not being utilised effectively[321], with **increasing congestion rents illustrating the need for additional interconnection capacity.** According to data from ENTSO-E, the total amount of TSOs net revenues from congestion income increased from EUR 1.2 billion in 2011 to EUR 2.6 billion in 2015, which indicates that there is an increasing loss of social welfare due to insufficient interconnection capacity. Congestion rents should mainly be used to increase or maintain interconnection capacity; however, in practice, several EU member states use (part of) this income to lower their grid tariffs.

Gas

ACER reported that the physical utilisation of gas interconnectors could also be further improved. For the vast majority of Interconnection Points (IPs) – around 70% of IPs – average physical utilisation was

[321] Although the total economic cost in terms of social welfare will be higher as impacts on producer and consumer surpluses also need to be included.

below 50% in 2014 and 2015.[322] EU net welfare gains of up to EUR 0.4 billion would be obtained if all physical unused capacities were used in an optimal way.[323]

For gas contractual congestion (capacity hoarding) is a much more critical issue than physical congestion. The effective and efficient use of gas interconnection capacity can be enhanced by specific policy measures to prevent contractual congestion (e.g. UIOLI), which should be consistently implemented across the EU.

Physical congestion, indicated by actual interruptions of transport capacity, occurred (temporarily) at nine of the contractually congested interconnection points, mostly for only a few days in 2015.[324] The need for additional physical interconnection capacity is, for gas, mainly driven by security of supply considerations (diversified routes and supply sources), and only to a minor extent to reduce or avoid physical congestion.

Stakeholder consultation

An **interviewed** EU official confirmed that the cross-border transmission capacity for electricity and gas is at present not efficiently utilised. In some cases suboptimal congestion management is leading to the redispatch of generators and hence higher overall system costs. The non-efficient use of cross border capacity is more a management than a physical infrastructure issue. Several electricity TSOs reserve too much transmission capacity for system reliability purposes; congestion in gas interconnection points has decreased and is mainly caused by contractual arrangements rather than physical constraints.

Conclusion

- Only around 30% of the technical electricity interconnection capacity is offered to the market. At EU level in 2015, only 28% of HVAC and 84% of HVDC interconnectors' physical capacity was on average effectively used for trading. This is mainly due to inadequate allocation mechanisms and unscheduled flows. Efficient use of electricity interconnectors[325] has increased, mainly because of further market coupling and reviewed capacity calculation and allocation methodologies. Allocated cross-border capacity is rather efficiently used in the day-ahead timeframe (increasing from around 60% in 2010 to 84% in 2015), but there is significant room for improvement in the Intra-Day and balancing timeframes (which have efficiency levels of 54% and 10% respectively).
- Physical utilisation of gas interconnectors could also be further improved. For around 70% of Interconnection Points (IPs), average physical utilisation was below 50% in 2014 and 2015. Optimal use of physical capacities would lead to annual welfare gains of up to EUR 0.4 billion. Physical congestion occurred (temporarily) at nine of the contractually congested gas IPs, mostly for only a few days in 2015. Contractual congestion remains a more critical issue than physical congestion for gas.

[322] ACER (2016b), ACER Market Monitoring Report 2015. Key insights and recommendations.
[323] If the analysis was performed instead on the basis of available contractual capacity or on the basis of capacity available over peak monthly utilisation, the net welfare gains would be lower. Source: ACER (2016b), ACER Market Monitoring Report 2015. Key insights and recommendations.
[324] ACER (2016c), ACER annual report on contractual congestion at interconnection points for 2015
[325] Defined as the available tradable capacity that is used in the "right direction" (i.e. from low price to high price zone).

There is evidence that cross-border electricity and gas transmission capacities are not utilised effectively. Despite increasing physical **electricity interconnection capacities**, the availability and use of interconnection capacities for market purposes remains far from optimal. The effective availability of capacity on the market is still rather low and has even – due to increasing loop-flows - decreased in some EU regions. The allocated capacity is efficiently used in the day-ahead timeframe, but its use in the intraday timeframe and for balancing purposes is still very low and could be substantially improved.

For gas, the use of the overall physical interconnectors'capacity is low but rather efficient. Measures are taken to further optimise the use and to prevent contractual congestion.

5.16 CBCA.6 – Use of Congestion Rents for Interconnection Capacity

5.16.1 How effective is the use of the congestion rents for new electricity transmission capacities?

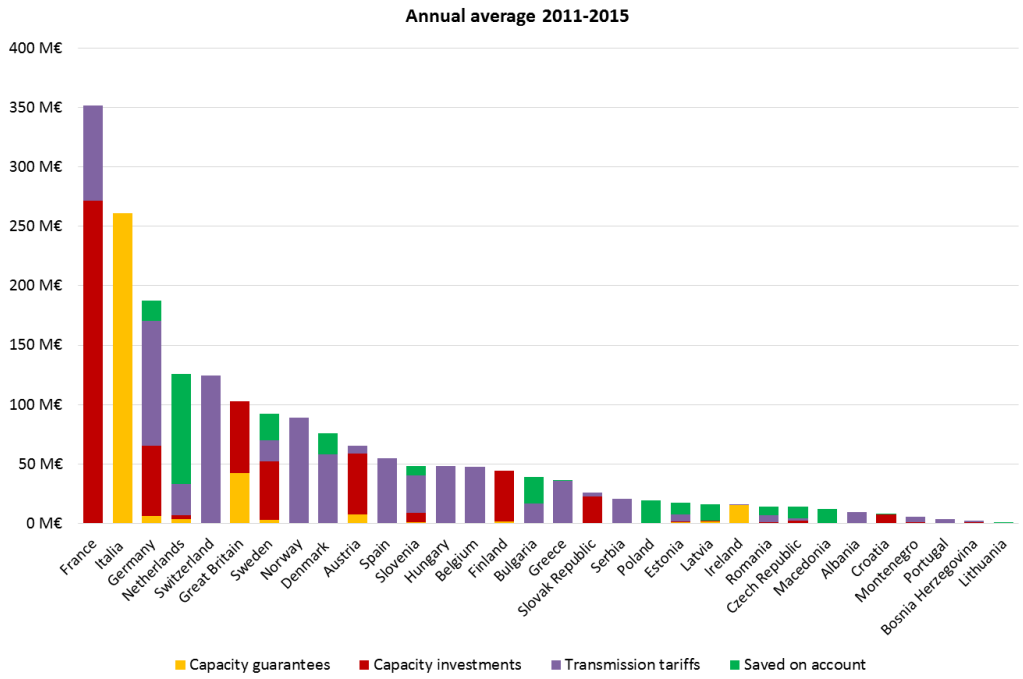
Article 16(6) of Regulation (EC) 714/2009 states that congestion revenues shall be used to maintain or increase interconnection capacity[326], addressing congestion in a long-term manner. This refers to costs to avoid or reduce congestion (e.g. redispatch), investments in network reinforcements, upgrading existing interconnections or investing in new interconnection.

Evaluation based on literature review

According to data from ENTSO-E, the total amount of TSO revenues from congestion management on electricity interconnections over the period 2011-2015 was, on average, EUR 2 billion per year (increasing from EUR 1.2 billion in 2011 to EUR 2.6 billion in 2015).[327] The income levels per MS, as well as how these revenues were spent, are provided in the figure below.

[326] Network reinforcements in national networks which limit the net transmission capacity of international transmission links are included as well.
[327] Trinomics, ECN, DCision! (2017), Study supporting the Impact Assessment concerning Transmission Tariffs and Congestion Income Policies. Study prepared for DG Energy.

Figure 5-17 Spending of congestion revenues by ENTSO-E Member States, 2011-15 (annual average, in million EUR country). Source: ENTSO-E (2011-15) as presented in Trinomics, ECN, DCision! (2017), Figure 2.



Note: Capacity investments include investments to maintain or increase interconnection capacity.

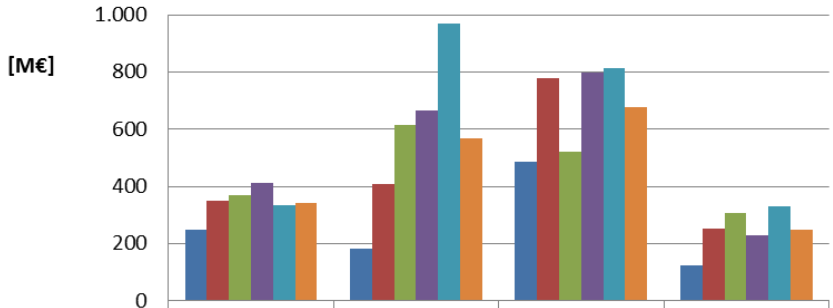
Congestion rents should preferably be used to fund interconnection investments. However, NRAs have the final decision on this, and look critically at the impact of new interconnection investments on their national tariffs and prices. Therefore, they tend to use congestion rents to serve national interests such as "controlling transmission tariffs for electricity end-users, in particular when there are no short-term opportunities to invest in interconnection projects that have a clear positive national (social) outcome."[328]

In 2011-2015, only 30% of the congestion revenues were (on average) used for interconnection investments, without any evidence that the socio-economic optimum (either national or European) was achieved. However, both the amount and the share of congestion revenue spent on maintaining/increasing interconnection capacity have increased significantly, from almost EUR 190 million in 2011 to nearly EUR 970 million in 2015 (i.e. from 18% to 40% of total congestion revenues spent in these years, respectively – see figure below).[329] One approach assessed to increase this share substantially and thus maximise the overall social welfare is to "restrict spending of congestion revenues on other purposes than guaranteeing, maintaining or increasing interconnection capacity, and earmark these resources for funding new investments in interconnection capacity." [330] Expenditure of congestion revenues can also be on investment in the internal network that have a direct positive impact on availability of cross-border capacity. By implementing this rule, the amount spent on enhancing interconnection capacity could increase by, on average, around EUR 680 million per year

[328] NRAs may also feel pressure in practice from national policy makers and/or TSOs to use congestion rents for serving particular national (short-term) interests.
[329] Trinomics, ECN, DCision! (2017), Study supporting the Impact Assessment concerning Transmission Tariffs and Congestion Income Policies. Study prepared for DG Energy.
[330] Trinomics, ECN, DCision! (2017), Study supporting the Impact Assessment concerning Transmission Tariffs and Congestion Income Policies. Study prepared for DG Energy.

maximum (if the option to use congestion rents on reducing network tariffs would no longer be allowed).[331]

Figure 5-18 Spending of congestion rents by all ENTSO-E Member States, 2011-15 (in million EUR. Source: ENTSO-E (2011-15) as presented in Trinomics, ECN, DCision! (2017), Figure 4.



	Capacity guarantees	Capacity investments	Transmission tariffs	Saved on account
2011	247	185	485	123
2012	352	409	779	255
2013	371	616	521	308
2014	412	666	797	230
2015	336	968	812	330
Av. 2011-15	343	569	679	249

The Trinomics report also states that, to use the money more efficiently, "the socio-economic optimum has to be formulated and harmonised rules (across potentially interconnected borders) have to be applied." [332] This can be done by creating more transparency in the spending of congestion rents[333] and addressing the reluctance of some Member States to contribute to the construction of additional interconnections which are not providing net benefits to their economy but which are globally beneficial for Europe (e.g. via the application of TEN-E's CBCA mechanism).

Stakeholder consultation

An **interviewed** EU official confirmed that a large part of the congestion income is currently not used to increase the effectively available electricity grid capacity by new investments and/or congestion management, but is used to reduce national grid tariffs. This situation, together with the high emergency margins reserved by TSOs, could be considered as a failure that should be addressed.
An interviewed NRA suggested that the tariff signals should be right for a range of different investors to bring forward projects. This ultimately helps to reduce the costs of the investment (via competition); whilst ensuring that no single TSO is over-stretched regarding financing. This also helps to reduce the need for underwriting by tariff payers (consumers).

[331] Trinomics, ECN, DCision! (2017), Study supporting the Impact Assessment concerning Transmission Tariffs and Congestion Income Policies. Study prepared for DG Energy.
[332] Trinomics, ECN, DCision! (2017), Study supporting the Impact Assessment concerning Transmission Tariffs and Congestion Income Policies. Study prepared for DG Energy.
[333] It was noted that "Although the available information provides total amounts for the spending of congestion rents to the purposes mentioned in Article 16 (6), it is not clear where this money has effectively been spent. Specifically, if figures are given for spending on new investments, it is not clear which costs of which link(s) have been covered by this spending (and how this would relate to the regulatory treatment of investments in these links)." Source: Trinomics, ECN, DCision! (2017), Study supporting the Impact Assessment concerning Transmission Tariffs and Congestion Income Policies. Study prepared for DG Energy.

An energy association representative suggested that, for the use of the congestion rents to truly be effective, competent authorities should examine more closely how the congestion rent is used in practice and national regulators should cooperate more with EU authorities to ensure the rent is used in the most efficient manner possible. A good use of the congestion rent presupposes that adequate measures have been taken to reduce internal congestion.

An interviewed NRA argued that the congestion rent can, to some extent, help develop new capacities, but this option also presents some limitations. As the congestion rent decreases when developing new interconnections, the aim should not be to reduce congestion rent to zero, which would not be economically efficient since the costs to attain this result would be higher than the benefits. The amount of congestion rent is also usually relatively small compared to the costs of new interconnections, thus other sources of financing are still necessary. Moreover, even if substantial interconnection revenues are availabale, these should only be spent on projects that are economically efficient.

Conclusion

TSO revenues from congestion management on electricity interconnections in 2011-2015 amounted on average to EUR 2 billion per year. While congestion rents should preferably be used to fund investments in interconnection capacity and to mitigate congestion risks in the short and long term, this is currently only partially the case. The share of congestion revenue effectively spent on maintaining/increasing interconnection capacity substantially increased between 2011and 2015 (from 18% to 40%), but more than 50% of the congestion income is still used to "reduce" national transmission tariffs. Several political measures to enhance the effective use of the congestion rents for new electricity transmission capacities have recently been evaluated, which has resulted in amended rules for the usage of congestion rents that are included in the "Clean Access to Energy for All Package" (Recast of article 16 (6) of Regulation 714/2009).

5.17 EI.1 – Awareness and Use of the Incentive Provisions (Article 13)

5.17.1 To what extent have the incentive provisions of the Regulation (Article 13) been taken up?

Article 13 of the TEN-E Regulation sets out that if a project promoter incurs higher risks for the development, construction, operation or maintenance of a PCI than for comparable investments, and the project's net positive impact is confirmed by a cost-benefit analysis (CBA), appropriate incentives shall be granted (by the NRA). These incentives are aimed only at "regulated" electricity and gas PCIs, as detailed in Article 13 (excluding, among others, oil and CO_2 transport PCIs, as well as PCIs that have received exemptions related to regulated third-party access).

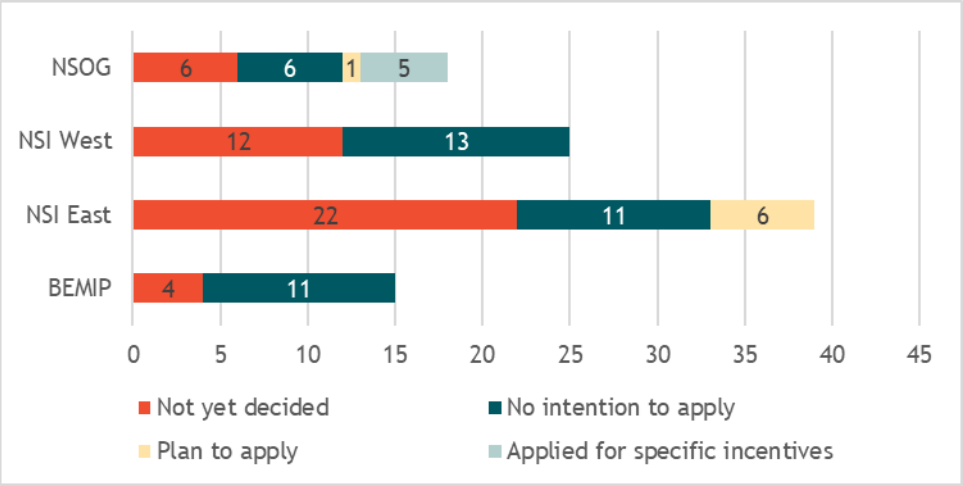
Evaluation based on literature review

ACER has published information on the use of incentives for electricity and gas PCIs in its annual consolidated monitoring reports.[334] **For electricity**, only five PCIs out of the 111 (6%) applied for and were granted specific incentives, and seven project promoters have indicated that they plan to apply. All past and planned applications for regulatory incentives concern the NSI East and NSOG corridor (see

[334] ACER (2016a), ACER (2016a) and ACER (2017a) 'consolidated reports on the progress of electricity and gas projects of common interest', respectively for the years 2015 and 2016.

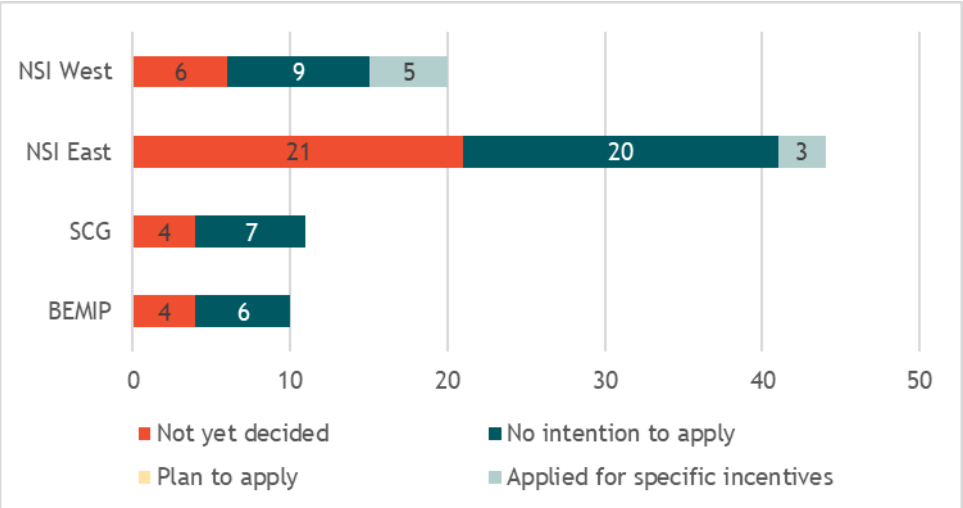
Figure 5-19). Four electricity PCIs have applied for an exemption related to regulated third-party access rules or certain tariff-related obligations.[335] Benefiting from an exemption under a Directive or Regulation as specified under Article 12(9), makes the PCI ineligible for specific incentives referred to in the TEN-E Regulation. Two PCI promoters plan to submit an exemption application, another 19 have not yet decided, and 74 PCI promoters have no plans to apply.

Figure 5-19 Application of electricity PCIs for specific incentives. Source: Figure 22 in ACER (2017a)



For gas, eight PCIs (out of the 77 gas PCIs) applied for specific incentives and promoters have currently no plans to apply for incentives for other PCIs (see Figure 5-20). Most applications for incentives for gas PCIs concern projects in two corridors (NSI West and NSI East). Four gas PCIs have applied for an exemption, one plans to submit an application for an exemption, 15 are undecided and the majority (61) plan not to apply for exemptions. When an exemption is granted as specified in Article 13(9), the PCI will not be eligible for specific incentives under TEN-E.

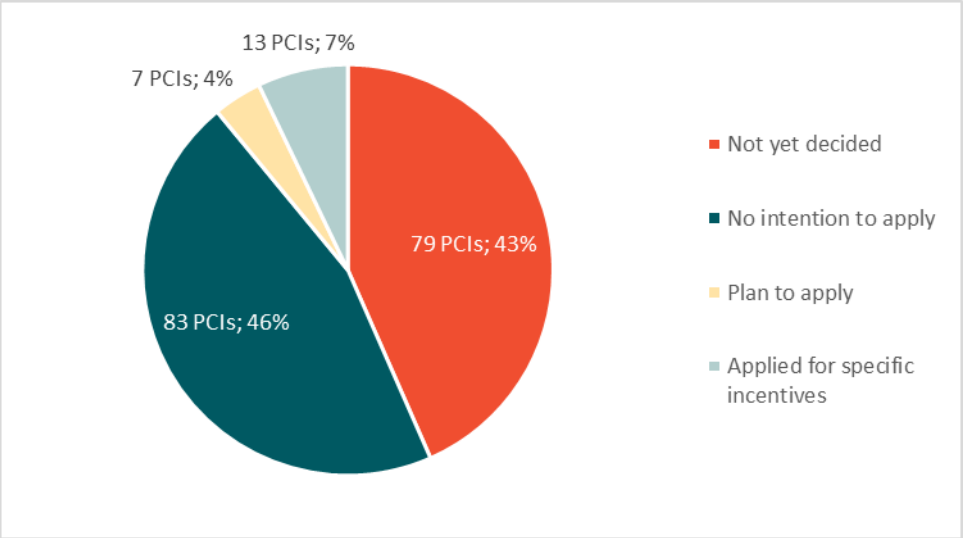
Figure 5-20 Application of gas PCIs for specific incentives. Source: Figure 94 in ACER (2017a)



[335] This concerns the PCIs having received an exemption as depicted in Article 13(9) of the Regulation.

A global overview of the specific incentive applications for both electricity and gas PCIs is presented in Figure 5-21. In total, only 13 PCIs (7%) have applied for specific incentives and another 7 PCIs (4%) have indicated the intention to apply.

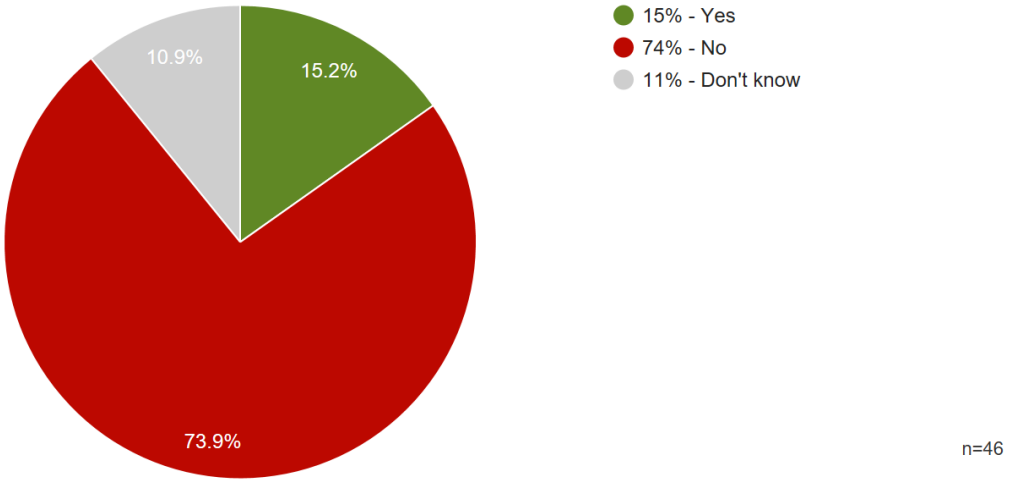
Figure 5-21 Specific incentive application for electricity and gas PCIs. Source: Own development based on ACER (2017a)



Stakeholder consultation

Via the **targeted survey** the concrete implementation of Article 13 was assessed with input from 46 respondents (project promoters, NRAs and CAs). Only a limited part of the respondents (15.2%) have concrete experience with applications for specific regulatory incentives. 73.9% of the stakeholders indicated not to have applied for specific incentives and 10.9% answered 'don't know' (see Figure 5-22). Out of the seven stakeholders who applied for incentives, it was granted to all but one. The NRA that did not grant the incentives explained that the applicant was not able to produce sufficient evidence after repeated extensions, and therefore withdrew its request, leading to a suspension of the administrative proceedings.

Figure 5-22 Results targeted survey to the question: "Have you applied or received applications for regulatory incentives as defined in Article 13 of the Regulation in order to facilitate the delivery of a project?"



Stakeholders at the **Regulatory focus group** confirmed that Article 13 is effectively not often used. It was mentioned during the focus group by an NRA that some TSOs considered the need and related costs for cross-border coordination as an argument to apply for incentives, but as TSOs can in principle recover these costs via tariffs, this does not seem to be a valid argument. One NRA mentioned that some risks may even be lower for PCIs because of their priority status and the political support they get from authorities.

The specific position of third-party promoters was also mentioned in this context; in order to have a level playing field for both third-party promoters and TSOs, the incentive regime should become more transparent.

Conclusion

In line with the specific purpose of Article 13, which only focuses on regulated electricity and gas projects with higher risks, there are only a small number of applications for specific incentives: 13 effective applications and 7 PCIs for which an application is planned. Therefore, only a small share of respondents to the survey (15%) indicated having concrete experience with Article 13.

5.17.2 Were project promoters aware of the option (regulatory authorities are obliged to grant incentives as per Article 13)?

Article 13 of the TEN-E Regulation offers promoters the option to apply for incentives to be granted by the NRA for regulated electricity and gas PCIs that present higher risks than comparable investments. A potential explanation for the low number of applications could be the lack of awareness from promoters. This is further explored in this section.

Evaluation based on literature review

According to VVA & Spark (2016), based on interviews with TSOs, there is a varying degree of awareness and experience with the specific incentive option of Article 13.[336] The lack of awareness (and experience) can be attributed to the relative novelty of the Regulation, but also to the absence of a specific methodology in some countries.

The same study (which is based on limited information) noted that in some cases, there is ambiguity regarding a direct request under Article 13 and a request submitted under a usual national framework.[337] For example, projects of strategic national interest, which include PCIs, may benefit from an incentive scheme under the Lithuanian regulatory framework. Thus, the TSOs did not submit a specific request to the NRA under Article 13. However, for the Gas Interconnection Poland-Lithuania (GIPL) and Capacity Enhancement of Klaipėda-Kiemėnai Pipeline (KKP) gas PCIs, the TSO submitted a cost benefit analysis to the NRA. Nonetheless, the incentive decision appears to have been taken according to the national regulatory framework, although the request of the TSO referred to Article 13 and the decision of the NRA took it into consideration, despite no specific methodology for Article 13 having been drafted.

[336] VVA & Spark (2016), Study on compliance-check of national regulatory practice with Article 13 of Regulation (EU) 347/2013.
[337] VVA & Spark (2016), Study on compliance-check of national regulatory practice with Article 13 of Regulation (EU) 347/2013.

In the case of the Netherlands, the NRA granted an incentive to a project promoter for two PCIs based on both Article 13 and the national methodology (pursuant to Article 13(6) of the TEN-E Regulation). However, in Lithuania, the NRA granted an incentive based on both Article 13 and the national regulatory framework (including its existing incentive scheme).

Stakeholder consultation

The **targeted survey** did not specifically explore whether stakeholders are aware of the Article 13 provisions. Nevertheless, Figure 5-22 as presented in 5.17.1 provides some information on this subject. As 41 out of the 46 stakeholders (project promoters, NRAs and CAs) indicated to know whether there has been an application for regulatory incentives, we can assume that this part (89.1%) of our sample is aware of this option under Article 13.[338] Considering project promoters specifically, we noticed that most of them (29 out of 32) indicated to know whether applications for regulatory incentives took place.

Stakeholders at the **Regulatory focus group** confirmed that, although TSOs and other project developers are aware of this specific provision in Article 13, it is not often used.

> **Conclusion**
> Despite the relative novelty of the specific incentives option in the TEN-E Regulation, stakeholders seem to be well aware of these regulatory provisions. This is confirmed by the focus group and targeted survey results, which indicate that about 90% of the project promoters who answered the survey are aware of Article 13.

5.17.3 What might have dissuaded promoters from applying for investment incentives?

According to Article 13, incentives can be provided for PCIs which are exposed to higher risks than normally incurred by a similar infrastructure project, and for which a net positive impact is confirmed by the CBA. However, there have been only very few applications for incentives and there is also a low intention to apply in the future (Section 5.17.1). As the lack of awareness from promoters does not seem to be a major reason (Section 5.17.2), this section aims to identify and evaluate other reasons that prevent promoters from applying.

Evaluation based on literature review

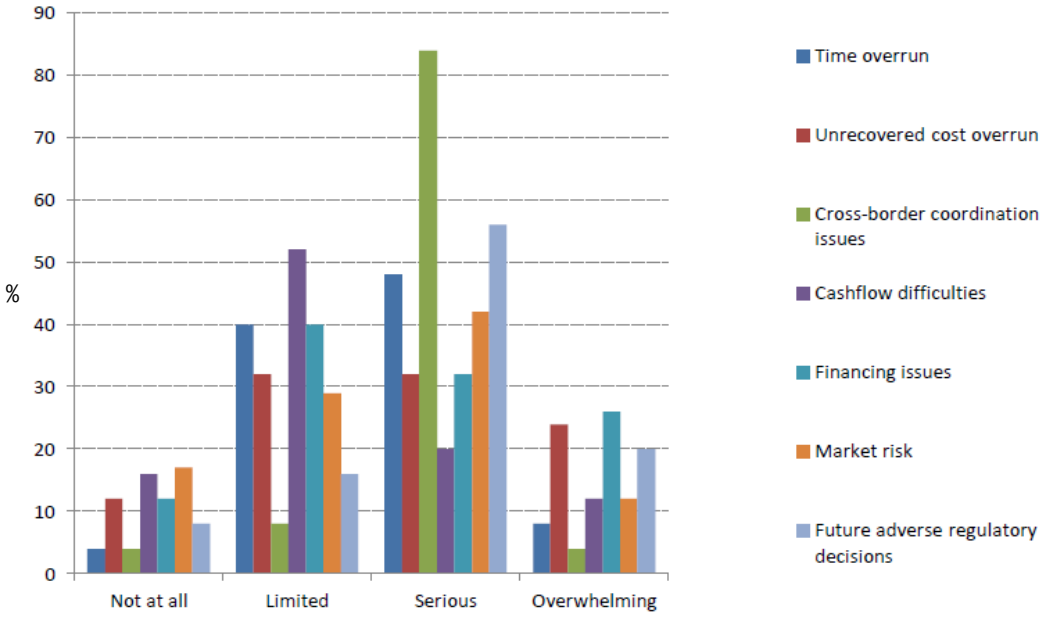
ACER (2016a) did not carry out an investigation on the underlying reasons for the very low application rates for specific incentives, but concluded that the low interest from project developers indicates that PCIs do not face higher risks than comparable infrastructure projects, and/or that the regulatory frameworks already tackle the risks with other sufficient measures.

A 2014 EC study[339] on the incentives Regulation, analysed the risks faced by PCIs and the framework of specific incentives designed to address these risks. The study identified seven risk factors for PCIs, which are: 1) policy and legal, 2) planning and permitting, 3) regulation, 4) finance and capital

[338] It may seem blunt to conclude that respondents who indicated 'don't know' are assumed not to be aware of the option. Similarly, repondents answering 'no' may have not been aware. Nevertheless, as the questioned stakeholders are all closely involved in the PCI procedures, we can legitimately assume that 'don't know' in this case means that the stakeholder is not aware of Article 13.
[339] AF & REF-E (2014), Study on regulatory incentives for investments in electricity and gas infrastructure projects – Final report. Prepared by AF-Mercados, EMI and REF-E for the European Commission, Brussels.

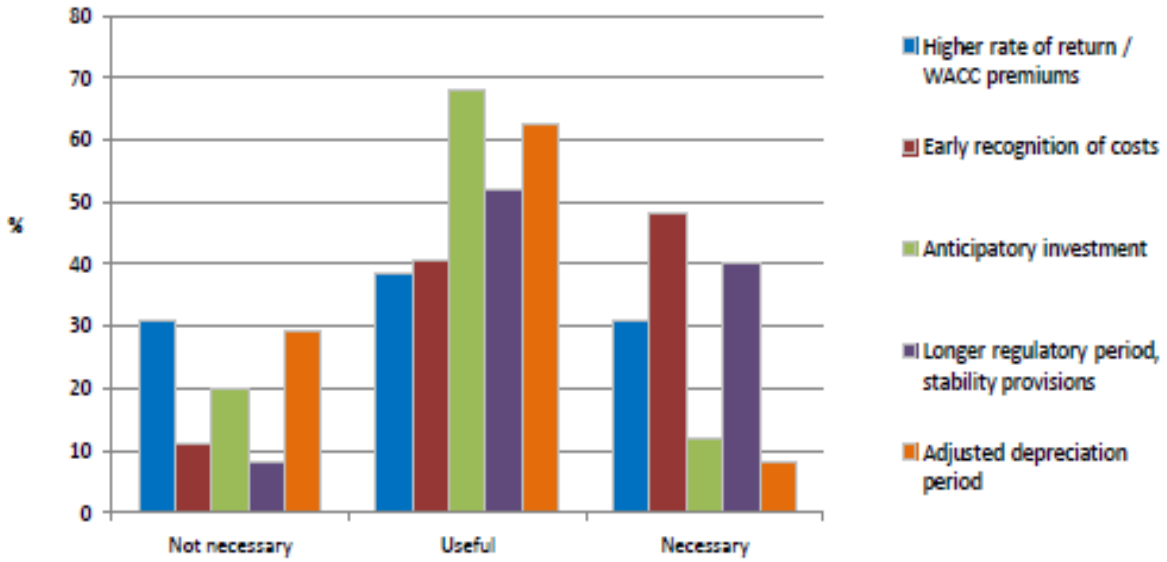
markets, 5) energy markets, 6) technology, and 7) geographical distribution of costs and benefits. The regulatory risks are of greatest concern to project promoters and should be properly addressed by NRAs. The stakeholder consultation which was part of this study showed that TSOs consider the regulatory risks to be more severe than NRAs do. Three regulatory issues were indicated as being the most important: cross-border coordination issues, future adverse regulatory decisions and financing issues (see Figure 5-23).

Figure 5-23 Stakeholders' perceptions of the severity of regulatory risks that affect PCIs' timely delivery (% of stakeholder responses) Source: Figure 2 in AF & REF-E (2014)



While stakeholders recognise that incentives are able to reduce certain risks, there is no clear agreement that regulatory incentives are necessary. The purpose of Article 13 is to provide incentives only if they are effectively required. This study concludes, similar to ACER (2016a), that risks may already be sufficiently mitigated by existing incentives, or that the risk level is not perceived (by the national regulators that are being called on to provide the incentives and possibly by the project promoters themselves) as being higher for PCIs than for other infrastructure, making specific incentives unnecessary. Where needed, the most appropriate incentive measures are stability provisions and measures to mitigate liquidity risk (see also Figure 5-24).

Figure 5-24 Views on how regulatory risks can be most effectively addressed through the application of regulatory incentives (NRAs and TSOs). Source: Figure 6 in AF & REF-E (2014)



A more recent EC study[340] analysed the implementation of Article 13 by means of a compliance-check of the national regulatory practices. This revealed that around half of the methodologies used in the MSs could be considered compliant with Article 13, but three were only partly compliant and ten were deemed non-compliant. The concerned NRAs and TSOs explained the non-compliance by the fact that 1) the national regulatory framework was already properly coping with the risks of infrastructure projects[341] and that 2) PCIs did not seem to incur higher risks than other infrastructure projects[342]. This was demonstrated by the timely implementation of PCIs in these countries, despite the absence of Article 13 provisions in the national framework. These outcomes confirm the assumptions presented in other reports.[343] Overall, stakeholders (as also found in the 2014 report of AF & REF-E[344]) consider the provisions of Article 13 useful, although only to be used in exceptional cases.

Stakeholder consultation

The **targeted survey** explored whether (and which) barriers were perceived regarding applications for regulatory incentives. Out of the 30 replies from stakeholders involved in applications for incentives (project promoters, NRAs and CAs), the majority (83.3%) indicated to perceive no specific barriers. Five stakeholders (project promoters only), representing 16.7% of the sample, noticed the following barriers:

- NRAs consider that PCI risks are already properly covered in the national tariffs, making it difficult for project promoters to get additional incentives. For example, an NRA mentioned it does not consider that PCIs have a higher financial risk, and therefore additional incentives are not deemed necessary.

[340] VVA & Spark (2016), Study on compliance-check of national regulatory practice with Article 13 of Regulation (EU) 347/2013.
[341] E.g. via "cap and floor regime" in United Kingdom, "singular projects" in Spain, "inclusion of unfinished construction costs in the RAB or inclusion of a premium within the WACC" in Lithuania. Source: VVA & Spark (2016)
[342] E.g. as mentioned by the German TSO, which does have a specific methodology in place for Article 13, but this is currently considered redundant (or a way to 'keep the door open' for the future). Source: VVA & Spark (2016)
[343] ACER (2016a), Consolidated report on the progress of electricity and gas projects of common interest for the year 2015 and AF & REF-E (2014), Study on regulatory incentives for investments in electricity and gas infrastructure projects – Final report.
[344] AF & REF-E (2014), Study on regulatory incentives for investments in electricity and gas infrastructure projects – Final report.

- Timely availability of accurate information for submission from procurement processes is a challenge. This includes approvals from involved MSs (that may not agree).
- The reporting can be very time consuming (due to the details required) and does not seem to be efficiently handled (there is duplication of information requested e.g. in ACER monitoring and Transparency Platform).
- MSs perceive that some applications may not be in their interest and thus may not support applications for projects that are partly on their territory and have a much broader European interest.

Stakeholders at the **Regulatory focus group** mentioned that in most MSs, the national framework covers all risks, and therefore promoters do not need to apply for incentives on the basis of incurred "higher" risks. Several NRAs confirmed that there are only a few applications for specific incentives because PCIs do indeed not incur additional risks compared to other projects. An NRA mentioned that in some cases, risks may even be lower for PCIs because of their priority status and the political support they get from the authorities. If for specific projects additional risks were not covered by the national framework (e.g. a small country developing a big infrastructure project triggered by TEN-E which will mainly benefit other MSs), this affordability issue should be covered by CEF.

According to exchanges with an expert, project promoters may decide not to apply for incentives under Article 13, on the basis of initial informal consultation with NRAs. Given the administrative burden of this and other TEN-E provisions, project promoters deem it worthwhile to explore beforehand the eligibility of their application via preliminary contacts (as was done for the Dutch case). Depending on the outcome of these initial overtures, the project developer will decide whether a formal application will be filed.

Conclusion

Evidence shows that specific incentives under Article 13 are only necessary in some very specific circumstances. According to the literature and stakeholders' feedback, PCI promoters might have been dissuaded from applying for incentives for the following reasons:

- PCI promoters assume that an application is not useful as NRAs are in general not convinced that PCIs present higher risks than comparable infrastructure projects
- PCI promoters may assume that an application is not needed as national regulatory frameworks are properly coping with the risks of infrastructure projects and project costs can hence sufficiently be recovered via the standard regime
- PCI promoters are reluctant to apply because of the negative feedback during initial (informal) contact with NRAs

However, most stakeholders (25 out of 30 project promoters, NRAs and CAs answering this question in the survey) did not perceive barriers to applications for regulatory incentives, which indicates that a review of the concerned provision in the Regulation is not deemed appropriate. Only five stakeholders mentioned the following barriers: NRA reluctance / not perceiving additional PCI risks, information availability issues, time-consuming reporting, and a lack of interest of MSs in projects that mainly benefit other countries.

5.18 EI.2 – Type of Incentives Used and their Effectiveness (Article 13)

5.18.1 Where used, what sort of incentives have been considered / developed? Have they been effective?

According to Article 13, NRAs may decide on the combination of regulatory measures, monetary reward/penalty schemes, etc. taking into account the relevant national regulatory systems.

Evaluation based on literature review

13 incentive requests had been filed and treated by the time of publishing of the ACER (2017a) consolidated report, five for electricity PCIs and eight for gas PCIs. For four **electricity** PCIs, the incentive request concerned the application for a cap and floor regulatory regime[345] in the UK (one of which also received incentives in France).[346] For the remaining electricity PCI (COBRA cable, which applied for incentives in the Netherlands), the request regarded the efficiency of the investment and the international benchmark, which is explained in more detail below. ACER (2017a) does not provide further information on the incentive requests for gas PCIs.

The VVA & Spark report[347] has analysed four specific incentive requests concerning five PCIs (of which one was denied):

- In the **Netherlands**, the national regulatory framework mitigates all risks except the risk related to the identification of inefficiently incurred costs. The Dutch NRA regularly performs international benchmarks to assess the efficiency of incurred costs (compared to other TSOs with different regulatory frameworks). On the basis of these benchmarks, the NRA may consider some costs incurred as inefficient and may thus refuse to include them in the tariff base. After an incentive request by the national TSO under Article 13 for two PCIs (**COBRA & Doetinchem-Wesel interconnector**), the Dutch NRA acknowledged that these PCIs effectively present higher project specific risks than similar infrastructure and agreed to grant incentives according to the provisions in the TEN-E Directive.[348] For both PCIs, the project specific additional costs are excluded from the assessment of efficient costs in the international benchmark during 10 years after their commissioning. For the COBRA cable, the additional costs which result from exogenous risks considered as project specific and exceptional, are remunerated if they are unique, specific and material. For the Doetinchem-Wesel interconnector, the project specific additional cost concerns the use of Wintrack pylons for DC HV lines, which are more expensive than traditional pylons; this additional cost is excluded from the efficiency assessment in the international benchmark during 10 years. Both incentive decisions, which are duly motivated according to the TEN-E provisions, can be considered as effective as they contribute to realising PCIs with a high net present value for the Netherlands (and a substantially higher NPV at EU level) and positive externalities.[349] It is, however, unclear whether these investments would otherwise (without incentives) not have been realised.

[345] The cap and floor regulatory regime is designed to consider and reflect the costs and risks of new subsea electricity interconnectors. This tool is not specific to PCIs.
[346] ACER (2017a), Consolidated Report on the progress of electricity and gas projects of Common Interest for the year 2016
[347] VVA & Spark (2016), Study on compliance-check of national regulatory practice with Article 13 of Regulation (EU) 347/2013.
[348] COBRA could be affected by e.g. archeological findings, soft and moving conditions of the sea bed, weather and environmental conditions and different permitting requirements/delays in Germany. Doetinchem-Wesel interconnector was required by the Dutch government to use so-called Wintrack pylons, which reduce the magnetic fields considerably. However, these pylons are much more expensive and are not used by any other TSO in Europe.
[349] https://www.acm.nl/nl/publicaties/publicatie/15095/Stimulansbesluit-Cobra-en-Doetinchem-Wesel/

- In **Lithuania,** the NRA agreed that the investment cost for work in progress of two PCIs (**GILP and Capacity Enhancement of KKP**) could be included in the Regulatory Asset Base (RAB). This incentive scheme is included in the Lithuanian regulatory framework for projects of strategic national interest. It allows inclusion of construction works in progress (unfinished construction costs) into the RAB; whereas usually this can only be included once the construction work is completed. It is unclear whether this specific incentive has effectively triggered the realisation of these PCIs.
- In **Slovakia**, the incentive request was rejected. The NRA concluded that provision of incentives was not necessary because the project was on track. Similar to the Lithuanian case, the request was submitted under the national procedure, but mentioned Article 13 in the application.[350] This standard procedure was used by the gas TSO for a general request for incentives - not linked to a specific risk as is the basis for Article 13 – aiming at the identification of significant impacts of the project on market integration, competition and security of gas supply. After assessment of the documentation and after additional discussions, the NRA showed support for the project, but concluded that provision of specific incentives was not possible for the project. The TSO representatives indicated that they will likely ask for a reassessment of the decision.

TSOs which were granted specific incentives (in NL and LT) were satisfied that the granting (or not) of these incentives had no impact the progress of their PCIs. The report also states that "there was no evidence of PCIs which were not progressing as planned due to insufficient financing/incentivisation" (VVA & Spark, 2016).

Another study[351] highlights that the UK's cap and floor regime does not strictly comply with Article 13 of the TEN-E Regulation. The UK's methodology has been published according to Article 13(6); however it compiles the criteria to evaluate infrastructure risks as per the current national regulatory framework, with the existing risk mitigation measures (i.e. the cap and floor regime). According to this regime, if there were 'higher risks' within the meaning of Article 13, they would be taken into account in the cap and floor regime (when setting the floor). Therefore, according to the UK NRA, there is no need for a specific methodology pursuant to Article 13 to cater for higher risks. The report further mentions that the cap and floor regime has been used for the interconnector PCI "Nemo" with Belgium, which was, according to the ACER (2017a), used for four electricity PCIs in total. In its consolidated monitoring reports, ACER notes that the cap and floor regulatory regime is designed to consider and reflect the costs and risks of new subsea electricity interconnectors, although the PCI status is not a precondition for approval under the regime (and as such the tool is not specific to PCIs).

According to a study of Mercados and REF-E[352], stakeholders consider that certain regulatory incentives have significant potential to help offset risks associated with PCI investments. However, there is no commonly-agreed view regarding the level of necessity of regulatory incentives (as also presented under EI.1). This diversity in the views of stakeholders regarding the optimal use of regulatory incentives fits well with suggestions to apply specific incentives – where they are effectively required – on a case-by-case investment basis. Despite diverging stakeholders' views on the need to apply regulatory incentives to address PCI risks, there is general agreement that the two most appropriate

[350] The national framework in place includes general rules to open an administrative procedure which is also valid for submitting a request regarding Article 13.
[351] VVA & Spark (2016), Study on compliance-check of national regulatory practice with Article 13 of Regulation (EU) 347/2013.
[352] Mercados and REF-E, Study on regulatory incentives for investments in electricity and gas infrastructure (2014)

regulatory incentives or measures are stability provisions and measures to mitigate liquidity risk (although liquidity risk is not necessarily a problem in all Member States).

Stakeholder consultation

In the **targeted survey,** a stakeholder mentioned that regulatory certainty (with regard to future revenues) is key to investor confidence, highlighting the certainty that a regime such as "cap & floor" provides, especially for offshore infrastructure projects. It was also mentioned that the introduction of advanced remuneration mechanisms (e.g. Cap & Floor), which mitigate the investor risks and hence encourage investments could be an option to reduce risks for merchant lines (for which revenues highly depend on bidding zone configuration and on infrastructure development).

During the **Regulatory Focus Group meeting,** ACER referred to its PCI monitoring report which shows that PCI promoters are effectively aware of Article 13 and that most regimes are cap and floor.

NRAs attending the focus group mentioned that, as incentives are rarely used, it is difficult to assess their effective contribution to the delivery of PCIs. In the UK, the cap and floor regime was established in 2013, and since then seven projects have been approved of which four are under construction. It is a specific framework for new electricity interconnector investment (both PCIs and non-PCIs), with similar aims and ambitions with regard to the possible Article 13 incentives, though broader in scope. It reflects some of the specific risks associated with developing subsea HVDC links versus comparable infrastructure. Due to their cap and floor regime, the UK does not foresee the need for any specific incentives under Article 13 (rather, it supports the view that national frameworks are usually broadly sufficient).

Another NRA mentioned that the Regulation seems to be effective in general, and that the level of risk for PCIs seems rather low, which has led to promoters willing to invest in these projects without applying for specific incentives. An ACER representative added that PCIs which receive incentives are often not delayed (they cope with difficulties but are mostly timely realised).

Conclusion

As specific incentives are rarely requested by PCI promoters and as there is limited information regarding the motivations and types of incentives provided under Article 13, it is difficult to assess their effective contribution to the delivery of PCIs. In some cases, it is also not clear whether the incentive requests effectively fall under Article 13 or rather under a national framework.

According to stakeholders, the UK's cap and floor regime for new electricity interconnector investments is an effective incentive scheme. Although it seems not fully compliant with Article 13 and it is also accessible to non PCIs, it can be considered as a good practice as it adequately addresses specific additional risks associated with developing subsea HVDC links versus comparable infrastructure.

Other examples of current practices include the incentive schemes for two PCIs in the Netherlands, for which specific additional costs are excluded from the assessment of efficient costs in the international benchmark, and the inclusion of investment costs for work in progress in the RAB for

two PCIs in Lithuania. Both incentive schemes can be considered as effective, although it is not fully clear whether the concerned PCIs would not have been realised otherwise.

5.19 EI.3 – Innovative Solutions to Infrastructure Needs

5.19.1 What evidence is there that the current legal and regulatory frameworks encourage innovative solutions to infrastructure needs?

Innovation is a key pillar in the EU as it is a vital element to European competitiveness and economic growth.[353] EU Regulation can stimulate (or hinder) innovative solutions. Innovation is not a specific criterion which is explicitly taken into account for the selection and prioritisation of PCIs, but innovation is a factor within the project specific analysis carried out when allocating CEF support.

Though innovation is often referred to as an important aspect of public policy, the complexity of innovation and the different factors which can enable innovation make it a difficult concept to measure. It is therefore important to have a clear notion on the concept. According to the literature review by Granieri and Renda in 'Innovation Law and Policy in the EU'[354], innovation entails "the creation of new (or the efficient reallocation of existing) resources which contribute to progress."

Evaluation based on literature review

The EU has a strong policy framework to support innovation in energy infrastructure. "Research, innovation and competitiveness" is one of the five pillars of the EU Energy Union. This means that the EU is focusing on innovation to drive the transition in the energy system, including research and innovation in the necessary infrastructure. In this regard, the EC has revised the Integrated Strategic Energy Technology (SET) Plan in 2015 to align it with the Energy Union research and innovation priorities.[355] Funding is provided by the Horizon 2020 Research and Innovation Programme which covers, among others, renewables, smart energy networks and energy storage.

A CEPS Report[356] focuses on the relationship between EU regulation and innovation, and discusses the innovation-enhancing potential of regulatory approaches as well as factors that tend to reduce incentives to innovate. The study concludes that regulation can be a powerful stimulus to innovation. More prescriptive regulation tends however to hamper innovative activity, whereas the more flexible EU regulation is, the better innovation can be stimulated. Lower compliance and red-tape burdens have a positive effect on innovation. The authors conclude by recommending to incorporate a specific test on innovation impacts in ex-ante impact assessments of EU legislation as well as in ex-post evaluations. They consider that there is ample potential for fostering innovation by reviewing the EU regulatory acquis.

This section specifically focuses on what TEN-E actually does to stimulate innovative projects. Innovation is not a selection criterion for PCIs, but innovation does come forward as a factor in CEF support for PCIs. This is described in Article 14 of the TEN-E Regulation, covering the 'eligibility of

[353] COM(2016)763 'Accelerating Clean Energy Innovation, within the Clean Energy For All Europeans as of COM(2016)860.
[354] Granieri and Renda (2012), Innovation Law and Policy in the European Union, Milan: Springer.
[355] DG Energy website
[356] https://www.ceps.eu/system/files/No%2096%20EU%20Legislation%20and%20Innovation.pdf

projects fur Union financial assistance'. According to our analysis of this article, innovative projects are encouraged in three different ways, which are subsequently dicussed below.

Firstly, innovation is indirectly encouraged as it can figure as a CEF criterion. According to Art 14(2) of the TEN-E Regulation, electricity and gas projects are eligible for grants for works if they 1) demonstrate significant positive externalities, 2) have received a CBCA decision, and 3) are commercially not viable. Smart grid and CO_2 transport projects (Article 14(4)) only need to demonstrate significant positive externalities and the lack of commercial viability.[357] Article 14(2)(a) explicitly states that innovation can be a positive externality (next to Security of Supply (SoS) and solidarity). More details about the required innovation aspects are however not mentioned, and are also not included in the existing CBA methodologies[358] nor in the proposed updated methodology[359]. While CBA results for electricity are published in the TYNDP, no information on innovation is provided; therefore, it is not possible to assess which projects have demonstrated 'innovation' as a significant externality. The upcoming CEF evaluation may provide more insight with regard to this aspect.

Secondly, innovation is encouraged for electricity storage projects. Article 14(2)(b) sets the criterion that PCIs are required to have a CBCA decision to be eligible for CEF funding. However, as electricity storage projects (under Annex II.2(c) category) cannot apply for CBCA decisions, they will instead have to prove that they brings technological innovation (among two other aspects) .[360] One of the nine storage projects has received grants for works: PCI 1.12 'Compressed air energy storage in United Kingdom-Larne', as reported in the project's CEF fiche.[361] This information fiche does not provide detailed information on the reason why this PCI is eligible in terms of 'bringing innovation'; the ongoing CEF evaluation will probably provide a more detailed assessment of the CEF grants. Regardless, the concerned technology – compressed air energy storage – is undoubtedly an innovative storage technology. Moreover, with its development, Northern Ireland explicitly expresses the intention to position itself at the "forefront of innovation".[362] Notice that all other eight electricity storage projects concern hydro-pumped technology, which is excluded from CEF funding probably due to its relatively high level of commercial readiness.[363]

Thirdly, Regulation 1316/2013 establishing the CEF, specifically stimulates innovative solutions by providing higher funding rates. Article 10(3) states that for actions which provide a high degree of SoS, strengthen solidarity or comprise highly innovative solutions, funding rates may be raised to maximum 75% (instead of 50%). Hence, CEF encourages innovative solutions in PCIs (as well as SoS and solidarity). Of the actions for works, which comprise the largest share (83%) of the CEF grants[364], five PCIs have received more than 50% EU funding. However, it is unclear whether these highfunding rates are linked

[357] Project promoters need to demonstrate this according to the business plan and other assessments carried out, notably by possible investors or creditors or, where applicable, a national regulatory authority (Article 14(4) of the Regulation)
[358] ENTSO-E (2015b), ENTSO-E Guideline for Cost Benefit Analysis of Grid Development Projects. FINAL- Approved by the European Commission and ENTSOG (2015), Energy System Wide Cost-Benefit Analysis Methodology
[359] ENTSO-E (2016b), Guideline for Cost Benefit Analysis of Grid Development Projects - Version for ACER official opinion, 29 July 2016
[360] Article 14(2)(b) states that "for projects of common interest falling under the category set out in Annex II.1(c) and that therefore do not receive a cross- border cost allocation decision, the project shall aim to provide services across borders, bring technological innovation and ensure the safety of cross-border grid operation".
[361] CAES Larne Implementation: CEF fiche 1.12-0023-UK-W-M-16 available on: https://ec.europa.eu/inea/sites/inea/files/1.12-0023-uk-w-m-16_action_fiche_electricity_final.pdf
[362] Information leafleat CAES Larne: http://www.project-caeslarne.co.uk/wp-content/uploads/2014/04/Information-Leaflet_reviewed-16Feb2016.pdf
[363] Rehman et al. (2015), Pumped hydro energy storage system: A technological review. Renewable and Sustainable Energy Reviews, Volume 44, April 2015, pp 586-598.
[364] INEA (2017), CEF Energy Key figures brochure. May 2017. Available from: https://ec.europa.eu/inea/sites/inea/files/cef_energy_keyfigures_2017_leaflet_final_0.pdf

to the criterion 'innovation' or to other criteria. From the projects' websites we conclude that only PCI 10.3 SINCRO.GRID (SL/HR) clearly highlights its innovative character. [365]

Table 5-12 PCIs with funding rates above 50% for works, as derived from the CEF fiches[366]

PCI		Estimated total action costs (EUR)	Maxiumum EU contribution (EUR)	Percentage of EU support
4.2.1	Interconnection between Kilingi-Nõmme (EE) and Riga CHP2 substation (LV)	172,771,848	122,301,701	65%
4.2.2	Internal line between Hark and Sindi (EE)			
8.1.1	Interconnector between Estonia and Finland [currently known as "Balticconnector"]	250,000,000	187,500,000	75%
8.5	PCI Poland-Lithuania interconnection [currently known as "GIPL"]	443,967,571	266,386,516	60%
10.3	SINCRO.GRID (Slovenia/Croatia)	79,390,221	40,489,013	51%

The NER300 programme for innovative low-carbon energy demonstration projects, specifically lists CCS and smart grid technologies among the innovation projects[367], falling under the definition of new technologies contributing to progress in the long run. Although the TEN-E Regulation explicitly encourages smart grid and CO_2 transport PCIs, the 2015 PCI Union list includes only three smart grid projects and no carbon dioxide transport projects. Especially the smart grid PCI 10.3 (Slovenia/Croatia) seems highly innovative, as it benefits of a funding rate above 50% (see table). The 2 other smart grids smart grid PCIs are: 10.1: North Atlantic Green Zone Project (Ireland, United Kingdom/Northern Ireland) and 10.2: Green-Me (France, Italy).

Stakeholder consultation

An NRA participant at the **Regulatory Focus Group** suggested that the legal framework should not "encourage" specific solutions, but should enable different technologies and not exclude some of them. Innovative technologies are not necessarily the best option from an technical/economic perspective, and incentives should hence not only be granted for innovative solutions.

Another NRA mentioned that, in order to enhance the flexibility of the energy system, there might be a need to reflect on the potential synergies between infrastructure (electricity, gas, storage, etc.). Such an 'innovative' cross-sectoral approach would be more appropriate than the current sectoral planning exercises.

Several interviewees have expressed (rather diverging) opinions regarding innovation in the framework of TEN-E. While some stakeholders highlighted that the current legal and regulatory frameworks do not provide enough encouragement for innovative solutions to infrastructure needs and that TEN-E does not explicitly account for innovation, others argued that specifically innovative or flexible solutions should not be prioritised via TEN-E, as all technical options should be considered and evaluated on an equal footing. An NRA representative mentioned that a number of interconnection projects seem to be technically innovative ('new' cable types, higher voltage levels, etc.) which is positive for the economy.

[365] http://www.sincrogrid.eu/
[366] As of August 29th 2017, available on: https://ec.europa.eu/inea/connecting-europe-facility/cef-energy/projects-by-sector
[367] https://ec.europa.eu/clima/policies/lowcarbon/ner300_en#tab-0-0

An energy sector representative highlighted that TEN-E should be technology neutral and innovation should be supported via other specific instruments. An NRA argued that TEN-E should consider the technical design of the infrastructures as a priority and assess technical solutions as a parameter to select the best investments. An energy sector representative suggested that flexibility and innovation could more explicitly be considered as a specific criterion in the PCI selection procedure: flexible infrastructure is more future proof and leads to less stranded assets, e.g. some gas infrastructure could in the medium term be used for other purposes, e.g. hydrogen (power to gas), synthetic methane, biogas, CO_2 transport. Gas terminals are more flexible (can be used to import gas from different sources) than pipelines (linked to one source).

Conclusion

The EU has a strong policy framework to support innovation in energy infrastructure. "Research, innovation and competitiveness" is one of the five pillars of the EU Energy Union. The research priorities are reflected in the Integrated Strategic Energy Technology (SET) Plan and funding is provided by the Horizon 2020 Research and Innovation Programme which covers, among others, renewables, smart energy networks and energy storage. Regulation can be a powerful stimulus to innovation, but it should not be very prescriptive. The more flexible EU regulation is, the better innovation can be stimulated. Lower compliance and red-tape burdens have a positive effect on innovation.

The TEN-E framework encourages innovative solutions, in particular through specific eligibility criteria within the CEF financial support mechanism. This encouragement for innovation is provided in three different ways:

1) Innovation can be a positive externality of PCIs and certain electricity (including smart grids), gas and CO_2 transport projects that demonstrate their innovative character according to Article 14(2)(a) of the TEN-E Regulation, are eligble for CEF funding.
2) Electricity storage projects that bring technological innovation according to Article 14.2(b) of the TEN-E Regulation, are eligible for CEF funding.
3) Projects which comprise 'highly innovative solutions' can receive CEF funding above 50%, with a maximum rate of 75% according to Article 10(3) of Regulation 1316/2013.

Innovation is a complex issue, which is difficult to measure. Neither the relevant Articles of the TEN-E and CEF Regulations nor the CBA methodologies provide guidelines on how a project's innovative aspects could/should be assessed. According to our assessment of the PCIs and in particular the allocated CEF grants for works, the following key findings can be formulated:

- Only one electricity storage project (PCI 1.12) has demonstrated to 'bring technological innovation'.
- Out of the five projects which received a CEF funding rate higher than 50%, one project's description (PCI 10.3, smart grid project) specifically mentions its innovation aspect.
- CO_2 transport and smart grids – typically considered as innovative technologies – are underrepresented in the 2015 PCI list, with no carbon transport PCI and only three smart grid projects.

While the TEN-E Regulation (along with CEF) aims to encourage and stimulate innovation, the results are not conclusive. Several PCIs effectively "bring technological innovation" but it is unclear to what

extent the TEN-E Regulation stimulates project developers to opt for innovative solutions rather than for standard equipment. An improved framework for measuring, monitoring and reporting PCI benefits would allow a better understanding of this in the future. The current legal and regulatory frameworks effectively encourage innovative solutions to infrastructure needs; on the basis of our analysis and the stakeholders consultation, there is no evidence that the TEN-E Regulation should be adapted in order to reinforce this focus on innovation.

5.19.2 What is the design (key elements) of successful incentive schemes promoting innovative solutions (across MSs)? Would more alignment between these schemes be needed? What is the role of TEN-E Regulation in this context?

Article 13 offers MSs a legal basis to provide specific incentives to PCIs that face higher risks than comparable infrastructure projects. These higher risks can be due to the implementation of innovative technologies or solutions.

Evaluation based on literature review

According to the Article 13(5) requirement, ACER published a "Recommendation on incentives for projects of common interest and on a common methodology for risk evaluation".[368] This Recommendation mentions that project risks can be grouped under five categories, one of which is cost overruns. ACER states, as an example, that innovative technologies may be the cause for the risk of cost overruns. The recommendation further details how the regulatory framework should address the identified risks, combining risk mitigation via the national regulatory framework and specific regulatory measures. An example, provided in the recommendation, related to innovative technologies which might have shorter lifetimes than expected, is to reduce the depreciation period of the asset class.

Despite diverging stakeholders' views on the need to apply regulatory incentives to address PCI risks, there is general agreement that the two most appropriate regulatory incentives or measures are stability provisions and measures to mitigate liquidity risk (although liquidity risk is not necessarily a problem in all Member States).[369] These measures, which are recommended for PCIs in general, seem also adequate for PCIs with a highly innovative character.

At a theoretical level, specific incentive schemes could be considered for innovative solutions that offer positive overall macro-economic benefits but imply higher risks for the project developers, e.g. NRAs could accept higher return on investment or equity for these assets, or in specific cases the assets could be exempt from third-party access via regulated tariffs.

Stakeholder consultation

NRA participants at the **Regulatory focus group** mentioned the cap and floor regime as an example of a successful incentive scheme. Under the UK's cap and floor regime, the full procurement project cost, including maintenance and decommissioning, is taken into account. If during the construction there are delays, their cost impact is in principle also taken into account.

[368] ACER (2014), ACER Recommendation No 03/2014 on incentives for Projects of Common Interest and on a common methodology for risk evaluation

[369] AF & REF-E (2014), Study on regulatory incentives for investments in electricity and gas infrastructure projects – Final report. Prepared by AF-Mercados, EMI and REF-E for the European Commission, Brussels.

Another participant mentioned a premium on WACC for priority projects (to encourage their timely realisation). However, other NRAs opposed to this approach (as it might lead to questioning the WACC level itself, which is indeed difficult to establish, and because of its impact on the tariffs). A proposed alternative was to determine incentives on the basis of the project risks by looking at their effective cost impact and compensate that specific cost. For example, a new technology (e.g. for subsea cables or overhead lines) can be encouraged by adjusting its depreciation period.

Conclusion

- Implementation of innovative technologies in PCIs induces higher risks for delays and cost overruns, and such projects are hence eligible for specific incentives according to article 13 of the TEN-E Regulation.
- Incentives to encourage innovative PCIs should focus on offering income stability to the concerned project developers and mitigating their liquidity risks.
- Based on the literature review and stakeholder consultation, as well as our own assessment, appropriate schemes to stimulate higher risk investment are: shorter depreciation period, higher return on equity (premium on WACC), exemption from regulated tariffs or cap and floor regime.

  If diverging national specific incentive schemes for project developers would lead to competition distortions amongst system users (e.g. power producers that are active in the same interconnected market or industrial consumers that are competing at European level) a harmonisation of the incentive schemes and system tariff principles would be appropriate. Such an aligmnent should not necessarily be implemented in the TEN-E framework, but could be considered in a broader context of a review of the transmission tarification principles.

5.19.3 To what extent does the TEN-E Regulation allow for promotion of increased digitalisation of the energy networks and what possibly unexploited potential is still there?

Smart electricity grid projects are eligible as PCIs and are one of the priority thematic areas defined in Annex I of the Regulation. TEN-E includes, as part of its energy infrastructure categories (in Annex II), equipment "aiming at two way digital communication, real-time or close to real-time, interactive and intelligent monitoring and management of electricity, generation, transmission, distribution and consumption within an electricity network in view of developing a network efficiently integrating the behaviour and actions of all users connected to it…in order to ensure an economically efficient, sustainable electricity system…".

Evaluation based on literature review

In its recent report 'Digitalisation and Energy'[370], the International Energy Agency states that the greatest transformational potential for digitalisation is its ability to break down boundaries between energy sectors, increasing flexibility and enabling integration across entire systems. The electricity sector is at the heart of this transformation, where digitalisation is blurring the distinction between generation and consumption, and enabling four interrelated opportunities: smart demand response, integration of variable renewables, smart charging technologies for electric vehicles and the development of distributed energy resources. According to this IEA study, investments in digital electricity infrastructure and software grew by 20% annually from 2014 on, reaching USD 64 billion in

[370] IEA (2017) Digitalisation and Energy

2016. The report also indicates that digital data and analytics can lead to the efficiency and optimisation of electricity assets and networks, amounting to nearly USD 80 billion savings per year up until 2040.

Digitalisation wil play a key role to succeed the transition to a low carbon, cost efficient, secure and consumer-centric energy system. Digitalisation will enable consumers to enhance their local generation/storage capacity and to optimise their consumption in near real-time. Digitalised, bi-directional networks will play a major role to ensure energy supply at least cost. Automation and digitalisation of devices will have to be integrated in all parts of the supply chain, including production, storage, transmission and distribution networks and end user appliances. Digitalisation will make it possible to transform "passive" consumers into active prosumers. Flexible supply assets (in particular storage) and flexible consumption devices that are connected to a "smart"grid will be able to communicate in a digital way ("internet of things") to adapt to the intermittent profile of renewable generation.

The refurbishment of the electricity grids to enable this evolution will necessitate huge investments. As mentioned above, smart grid deployment is a priority thematic area of TEN-E; this is in general considered as a domain which can provide important economic benefits. The digitalisation of the whole energy system (not only the network, but also other components of the system, e.g. end-user appliances and communication systems) offers indeed a high economic potential for demand response which is still largely unexploited at the present.

According to the IEA, smart grids can reduce peak demand and hence limit the need for investments in additional grid or generation capacity, improve management of power generation from both variable and dispatchable sources, and reduce potential increases in conventional infrastructure costs. Additional operating savings can stem from decreased maintenance costs, metering and billing.[371] Smart grids, among others[372]:

- Enable informed participation by customers – Consumers get more control and empowerment
- Accommodate all generation and storage options
- Enable new products, services and markets – Suppliers become full service providers
- Optimise asset utilisation and operating efficiency – DSOs become active system managers and neutral market facilitators
- Provide resiliency to disturbances, attacks and natural disasters

Investment in smart grids has significantly grown in the EU in the past years. The JRC has gathered a database of 950 smart grid projects representing EUR 5 billion of investment.[373] Given that only three smart grid projects are part of the 2015 Union list[374], there seems to be additional unexploited potential in this regard. A specific provision in the Regulation is however limiting this potential: according to Annex IV(1) only projects concerning grids of 10 kV or more and involving DSOs or TSOs from at least two MSs are eligble. In practice most smart grid projects also concern grids at lower voltage levels, and do not involve grid operators from several MS. Moreover, investments in smart grids typically focus on the modernisation and refurbishment of existing grids, for which a permit is not

[371] IEA (2011), Technology roadmap: Smart Grids.
[372] IEA (2011), Technology roadmap: Smart Grids; EDSO (2016), Future ready, smarter electricity grids. Driving the energy transition. Powering costumers; and Eurelectric (2016), The power sector goes digital - Next generation data management for energy consumers.
[373] JRC (2017b), Smart grid projects outlook 2017.
[374] 10.1 North Atlantic Green Zone Project (Ireland, United Kingdom/Northern Ireland); 10.2 Green-Me (FR, IT); and 10.3 SINCRO.GRID (Slovenia/Croatia)

needed and public acceptance is not an issue. The applicability of the TEN-E Regulation to smart grid projects is hence de jure and de facto limited.

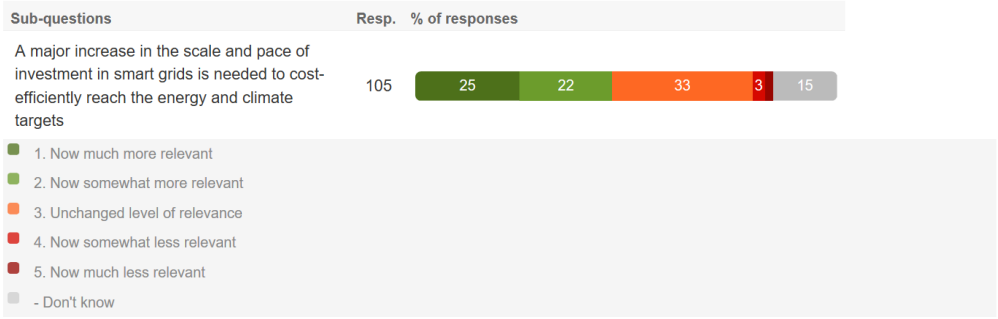
In addition to smart grids, digital technologies can be used to improve cost efficiency, safety and sustainability in oil and gas operations.[375] Downstream, in a similar way to smart electricity grids, digitalisation can enable strategic responses to market demand and regulation. Gas TSOs, DSOs and consumers can benefit from dynamic and up-to-date information, as well as shorter response times for information and data.[376] Smart networks are also key for DSOs who intend to use mixed gas sources in the future (such as natural gas, re-gasified LNG, biomethane and hydrogen) which have varying heating values (depending of type and source), posing questions about what is priced. [377]

Stakeholder consultation

47% of the respondents to the **targeted survey** believe that an increase in smart grid investments is more relevant today in order to reach the energy and climate targets (than it was when the Regulation was put in place), while only 3% believe this rationale is now less relevant.

Figure 5-25 Survey results on rationale for including smart grids in TEN-E

24. Please review the following statements concerning the original rationale for the TEN-E Regulation. To what extent do these statements remain relevant today?



One stakeholder commented that "Developing smart grids is crucial for ensuring the safe and secure operation of networks with increased intermittent renewable energies' capacity." Of the 20 stakeholders that provided comments on this, nine stakeholders agreed that additional investments are needed. It was also mentioned that the smart grids technology is essential to assist with balancing of supply and demand in a system with increasing quantities of variable RES. Stakeholders also highlighted that TEN-E and CEF have not had much positive impact in stimulating such investments so far, with only three PCIs. The presumed reasons for this limited impact are the fact that smart grids are more local investments (rather than cross-border) and the restrictive definition and selection criteria for smart grids.

During the **interviews**, a stakeholder suggested to consider a highly innovative solution that could be implemented and would consist of allowing both TSOs and DSOs to generate revenues through investments other than in "hard assets" or direct investments in their grids. It would however be beneficial to have some form of harmonisation amongst EU Member States to avoid investors engaging in forum-shopping. This stakeholder also believes that TSOs could play an important role in the

[375] DNV GL (2017), Oil and Gas Forecast to 2050. Energy Transition Outlook 2017.
[376] DNV GL (2017), Oil and Gas Forecast to 2050. Energy Transition Outlook 2017.
[377] DNV GL (2017), Oil and Gas Forecast to 2050. Energy Transition Outlook 2017.

digitalisation of energy networks by providing enhanced support to projects pertaining to network digitalisation and by encouraging investors via appropriate returns on investments in such new technologies.

Conclusion

Digitalisation will play a key role in the success of the transition to a low carbon, cost efficient, secure and consumer-centric energy system. Automation and digitalisation of devices will have to be integrated in all parts of the energy supply chain, including production, storage, transmission and distribution networks and enduser appliances. Digitalising the energy system has a number of benefits (including, among others, increased and informed participation by consumers/prosumers as well as optimised asset utilisation and increased efficiency). The TEN-E framework encourages this trend by including smart electricity grids as a priority thematic area.

Notwithstanding large overall investments in smart electricity grids across the EU, only three smart grid projects have been included in the 2015 PCI Union list. This low 'success' ratio is mainly due to the very strict eligibility criteria for smart grids in the Regulation, but seems also linked to the specificities of this type of projects compared to other investments in energy infrastructure. The applicability of the TEN-E Regulation to smart grid projects is hence de jure and de facto limited.

Although huge investments are needed to upgrade and digitalise the whole energy system, there is no evidence that the scope of TEN-E should be enlarged in order to also include local investments in smart distribution grids or small scale storage projects, as this type of investments is not part of the main focus of the TEN-E Regulation.

5.20 ECEF.1 – Criteria to access the Connecting Europe Facility (Article 14)

5.20.1 Do the CEF funding eligibility criteria laid down in the TEN-E Regulation (Article 14) effectively grant support to the most important projects?

The Connecting Europe Facility (CEF) is a funding mechanism designed to support the development of cross-border infrastructure introduced by the EC's growth package for integrated European infrastructure.[378] Under CEF, PCIs can receive grants for studies and works and/or access to financial instruments (which provide loans at attractive rates and conditions). EUR 5.35 billion of the overall CEF budget is allocated to energy projects for 2014-2020[379] (EUR 4.7 billion to be allocated through grants managed by the INEA)[380]. The CEF actions in energy are funded as a result of regular calls for proposals.

Regulation 1316/2013 establishing the Connecting Europe Facility, states that CEF will support energy PCIs that pursue one or more of the following objectives:

- Increasing competitiveness by promoting further **integration of the IEM** and the interoperability of electricity and gas networks across borders;

[378] COM(2011) 676 final, Communication from the Commission to the European Parliament, the Council, the European Court of Justice, the Court of Auditors, the European Investment bank the European Economic and Social Committee and to the Committee of the regions: A growth package for integrated European infrastructures.
[379] The 2014-2020 CEF budget is EUR 30.44 billion, of which EUR 5.35 billion is allocated to the energy sector. Up to 8.4% of the CEF budget can be used for financial instruments
[380] INEA (2017), CEF Energy Key figures brochure. May 2017. Available from: https://ec.europa.eu/inea/sites/inea/files/cef_energy_keyfigures_2017_leaflet_final_0.pdf

- Enhancing **security of supply**; and
- Contributing to **sustainable development and protection of the environment**, among others by the integration of energy from renewable sources into the transmission network, and by developing smart energy networks and carbon dioxide networks.

The TEN-E Regulation sets the eligibility criteria for Union financial assistance (Article 14). It states that electricity, gas and CO_2 transport PCIs are eligible for grants for studies and financial instruments; oil projects are excluded (Article 14(1)). We will hereafter focus on the specific criteria set for grants for works. Article 14(2) provides that electricity projects (excluding smart grid and hydro-pumped electricity storage projects)[381] and gas PCIs are eligible if they fulfil all three following criteria:

a) Significant **positive externalities** are demonstrated in the CBA;
b) A **CBCA decision** is received[382]; and
c) The project is **commercially not viable** according to the business plan.

In addition, PCIs with large delays which are taken over by another promoter according to Article 5(7)(d) of the Regulation can also be eligible for grants for works if they fulfil the three criteria mentioned above (Article 14(3)). Smart grid and CO_2 projects[383] can be eligible as well, if significant positive externalities and their lack of commercial viability can be demonstrated (Article 14(4)).

Evaluation based on literature review

According to the INEA CEF Key figures brochure as of May 2017[384], 93 grant agreements contributing to 73 PCIs were signed for a total of EUR 1.6 billion. Further details with regard to the CEF grants for studies and works are provided in Figure 5-26 while Table 5-13 gives an overview of the PCIs that received CEF grants for works[385] (based on the CEF fiches[386]).

[381] Article 14(2) of the Regulation describes that of the electricity projects only Annex II.1(a-d) are included, excluding therefore Annex II.1(e), which concerns smart grid projects.
[382] Electricity storage projects under Annex II.1(c) which do not receive a CBCA decisions, need to aim to provide services across borders, bring technological innovation and ensure the safety of cross-border grid operation.
[383] Specified in Annex II.1(e) and 4 of the Regulation
[384] INEA (2017), CEF Energy Key figures brochure. May 2017. Available from: https://ec.europa.eu/inea/sites/inea/files/cef_energy_keyfigures_2017_leaflet_final_0.pdf
[385] Section 5.11.1 already listed the six electricity CEF grants for works (contributing to seven PCIs) and nine gas grants for in Table 5-8 for the projects with CBCA decisions.
[386] As of August 29th 2017, available on: https://ec.europa.eu/inea/connecting-europe-facility/cef-energy/projects-by-sector

Figure 5-26 CEF funding for PCI projects as of May 2017[387]

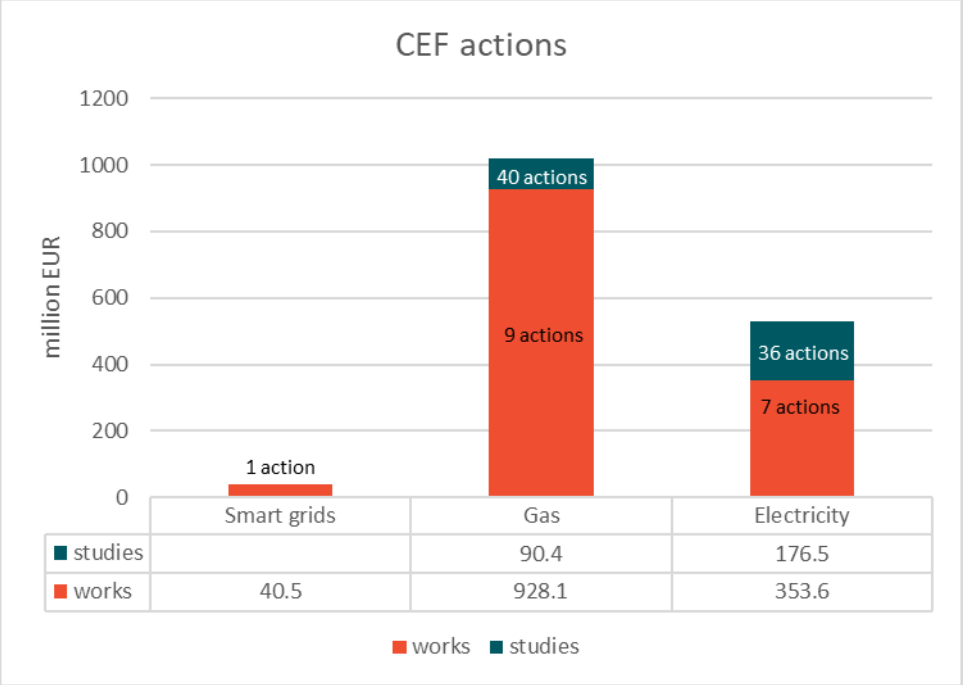


Table 5-13 List of CEF grants for works. Source: Prepared by Trinomics based on projects' CEF fiches[388], INEA's 'Lists of actions selected or funding' of CEF calls since 2014[389] and consultation of INEA[390]

PCI code	Name	Call	% EU support to the actiom	Maximum EU contribution	Total estimated cost of the action
1.12	Compressed air energy storage in United Kingdom – Larne	2016-2	21.51%	€ 90,000,000	€ 418,410,040
3.7.4	Internal line between Maritsa East 1 and Burgas (BG)	2015-1	50%	€ 28,996,650	€ 57,993,300
3.8.1	Internal line between Dobrudja and Burgas (BG)	2016-1	50%	€ 29,857,500	€ 59,715,000
4.2.1	Interconnection between Kilingi-Nõmme (EE) and Riga CHP2 substation (LV)	2014	65%	€ 112,301,701	€ 172,771,848
4.2.2	Internal line between Harku and Sindi (EE)				
4.2.3	Internal line between Riga CHP 2 and Riga HPP (LV)	2016-2	50%	€ 9,990,000	€ 19,980,000
4.4.1	Internal line between Ventspils, Tume and Imanta (LV)	2014	45%	€ 55,089,000	€ 122,420,000
4.5.1	LT part of interconnection between Alytus (LT) and LT/PL border	2015-1	50%	€ 27,375,582	€ 54,751,164
10.3	SINCRO.GRID (Slovenia/Croatia)	2016-2	51%	€ 40,489,013	€ 79,390,221
	Electricity PCIs (including smart grid)			**€ 394,099,446**	**€ 985,431,573**
5.2	PCI Twinning of Southwest Scotland onshore system between Cluden and Brighouse Bay. (United Kingdom)	2014	36.5%	€ 33,764,185	€ 92,758,750
5.10	Reverse flow interconnection on TENP pipeline in Germany	2015-2	50%	€ 8,665,000	€ 17,330,000
6.1.1	The Polish - Czech Interconnector II Project	2015-1[a]	-	-	-

[387] INEA (2017), CEF Energy Key figures brochure. May 2017. Available from: https://ec.europa.eu/inea/sites/inea/files/cef_energy_keyfigures_2017_leaflet_final_0.pdf
[388] As of August 29th 2017, available on: https://ec.europa.eu/inea/connecting-europe-facility/cef-energy/projects-by-sector
[389] Lists of actions selected for funding' by INEA for 2014, 2015-1, 2015-2, 2016-1 and 2016-2, available on: https://ec.europa.eu/inea/en/connecting-europe-facility/cef-energy/calls
[390] Communications with INEA representative on 16/17 November 2017.

PCI code	Name	Call	% EU support to the actiom	Maximum EU contribution	Total estimated cost of the action
6.2.1	Poland – Slovakia interconnector	2016-2	40%[b]	€ 107.741.144	€ 269,352,860
6.5.1	Phased development of a LNG terminal in Krk	2016-2	27.92%[c]	€ 101.400.000	€ 363,180,516
7.1.5	Gas pipeline from Bulgaria to Austria via Romania and Hungary	2015-2	40%	€ 179,320,400	€ 448,301,000
8.1.1	Interconnector between Estonia and Finland [currently known as "Balticconnector"]	2016-1	75%	€ 187,500,000	€ 250,000,000
8.2.2	Enhancement of Estonia-Latvia interconnection	2016-1	50%	€ 18,625,000	€ 37,250,000
8.2.3	Capacity enhancement of Klaipeda-Kiemenai pipeline in Lithuania	2014	45.5%	€ 24,739,293	€ 54,372,072
8.5	PCI Poland-Lithuania interconnection [currently known as "GIPL"]	2014	60%	€ 266,386,516	€ 443,967,571
	Gas PCIs			**€ 928,141,538**	**€ 1,976,512,769**
	All PCIs			**€ 1,322,240,984**	**€ 2,961,944,342**

[a] The foreseen grant of EUR 63.659.000 was cancelled at a relatively late stage, as the beneficiaries renounced the grant in August 2016
[b] The grant agreement is in the final stage of preperation and expected to be signed in December 2017. The cost figure still has to be confirmed by the grant beneficiaries.
[c] The grant agreement is in the final stage of preperation and expected to be signed in December 2017.

The latest ACER consolidated report[391] reveals that the CEF application rates are quite different depending on the corridors. Especially in the SGC and BEMIP gas corridors the interest for CEF is high, with almost three quarters of the PCIs applying for CEF funding (both studies and works). For electricity, many applications have taken place for the NSOG and NSI East corridors, with respectively 50% and 43% of the PCIs applying for CEF. ACER's monitoring exercise also revealed that only few gas and electricity promoters have the intention to apply for CEF in the next two years. Similarly, the interest for external public funding programmes is limited, for electricity 25% of the promoters indicated to have received some non-CEF funding, for gas this was only 5%.

Considering the selection of PCIs eligible for CEF funding, the Norton Rose Fulbright study[392] concluded that the financing of PCIs should be approached on a regional, if not individual, basis, making use of a risk based analysis and focus on PCIs "that are not financially viable from the market's perspective but that are socio-economically important and have positive externalities." This conclusion is in line with the SWD (2015) 247, which stated that CEF should be considered only as a last resort. Below we assess whether the TEN-E is effectively tackling the PCIs most in need and most useful (highest added value). The focus is on CEF grants for works, for which more strict eligibility criteria apply and which represent the major part of the funding.

Important projects

Ideally, to assess whether the 'most important' projects are effectively receiving support based on the set eligibility criteria, the PCIs which received CEF grants need to be thoroughly assessed on their achieved objectives. Most important PCI projects are interpreted as projects which perform especially well on achieving the CEF objectives as described in Article 4(3) of Regulation 1316/2013 which establishes the CEF (namely, increased competitiveness, enhanced SoS and contribution to sustainable development and protection of the environment).

[391] ACER (2017a), Consolidated Report on the progress of electricity and gas projects of Common Interest for the year 2016.
[392] Norton Rose Fulbright (2014), European energy infrastructure opportunities: Projects of Common interest.

There is no literature available which assesses the effectiveness of CEF in this way, and this falls out of the scope of this evaluation. The most ciritical issue is the quantification of all benefits in the CBAs (see also Section 5.22.3). Within the latest TYNDPs, quantified benefits are available for most electricity projects (though often calculated for a cluster of PCIs) but only for a few gas PCIs. Reporting of the project promoters to ACER in 2017[393] also include some information on monetised benefits, but it is very incomplete (no units, not all benefits included, very limited input for gas) and therefore can not be used for a quantified assessment in the context of this study. The ongoing CEF evaluation may contain relevant information on the effectiveness of CEF as it will include an ex-post measurement of the achievement of the three objectives by CEF grants as described in Article 4(3) of Regulation 1316/2013. This rticle contains detailed information on the indicators which need to be measured for each objective.

Stakeholder consultation

The **targeted survey** revealed that over half of the respondents (54 out of the 91) indicated that the most strategically important PCIs are effectively accessing CEF funding, while 37 respondents (40.7%) answered that not all the most strategically important PCIs are accessing CEF funding. However, stakeholders might have used their own interpretation for 'strategically important' rather than considering the objectives stated by the CEF Regulation, which can affect the the presented results. To illustrate this, we refer to the comments of some respondents who stated that "*all PCIs are strategically important*". Other comments were that "*funding is already covered by the national framework*", "*CEF should only be granted to address affordability issues*" and "*financing is not a key issue leading to delays in infrastructure implementation*". Stakeholders also mentioned that it is unattractive to receive CEF in many countries with national regulatory regimes which do not give incentives to project promoters and that CEF is a tool to accelerate strategic investments and a way to compensate and socialise the costs.

Other reasons given by respondents why not all the most strategically important PCIs access CEF funding are:

- The need for a consensual agreement between NRA and promoters on CBCA obstructs the access to CEF because there are often difficulties in reaching a formal CBCA decision
- Issues with the application procedure:
    - Long winded and complex qualification process
    - The window to access CEF does not always match the PCI permit procedure
    - The process is difficult to understand (guideline needed)
- Grants for works are more difficult to access than grants for studies

Some further observations from respondents to illustrate their concern that the CEF is not addressing the most strategically important PCIs are:

- Gas projects receive twice as much support as electricity projects, even though estimated electricity investment needs are much higher
- Smart grid projects are underrepresented
- Some gas projects were granted funding even though many feel that they do not add value to the logistic chain of the European network

[393] Underlying monitoring reporting data for ACER (2017a) 'Consolidated report on the progress of electricity and gas projects of common interest for the year 2016'. Provided by DG ENER, received by e-mail.

- It is unlikely that most strategically important PCIs are located in Baltic and Eastern European countries, where a large share of the CEF grants for works are awarded

Another relevant result from the stakeholder survey, that was already discussed in Section 5.2.2, concerns the question of whether the Regulation contributed to the continuation of projects. The results revealed that the main reason for a project to proceed (when it may not have otherwise) was indeed access to CEF funding (for works and/or studies).

Conclusion

73 PCIs have been granted a total amount of EUR 1.6 billion CEF funding under 93 agreements: 17 actions concern works (EUR 1.3 billion) and 78 action concern studies (EUR 267 million). More than 60% of the overall budget is granted to gas projects. Application rates for CEF funding are especially high in the SCG and BEMIP gas corridors. PCIs are less likely to rely on support from other (non-CEF) funding programmes, especially in the gas sector. This seems to imply that CEF is effectively targeting those PCIs which need funding. Moreover, only a few promoters plan to apply for CEF in the near future, though the reason for this prevailing attitude remains unclear.

The most **important** projects refer to those that strongly contribute to the objectives of competitiveness, security of supply and sustainable development. The latest TYNDPs include quantified benefits for most electricity projects (though often calculated for a cluster of PCIs) but only for a few gas PCIs. As there is no adequate input available that allows an assessment of the effective contribution of PCIs to these three objectives, it is not possible to further assess the effectiveness of CEF funding in this regard. However, the ongoing CEF evaluation will in principle include the ex-post measurement of the achievement of the three objectives by CEF grants as described in Article 4(3) of Regulation 1316/2013.

Survey respondents indicated that CEF funding (for both works and studies) was the main aspect of the TEN-E Regulation which allows projects to proceed – when they would not have done otherwise. This comment underpins the conclusion that CEF effectively supports needy projects. However, stakeholders expressed diverging opinions regarding the question whether the most strategically important PCIs are accessing CEF. Some stakeholders argued that the access of strategic PCIs to CEF is hindered by different aspects, such as the need for a consensual CBCA agreement, issues with the application procedure and difficulties in accessing grants for works. On the basis of the stakeholders' feedback and our analysis, there is no evidence that the CEF funding eligibility criteria laid down in the TEN-E Regulation should be changed, as the current criteria effectively lead to supporting the "most important projects" that need financial aid.

5.20.2 Are the criteria too wide/too restrictive?

Article 14 of the TEN-E Regulation sets the eligibility criteria for Union financial assistance. It states that electricity (including smart grids), gas and CO_2 transport PCIs are eligible for grants for studies and financial instruments. It further establishes that electricity PCIs (excluding smart grids and hydro-pumped electricity storage projects) and gas PCIs are eligible for grants for works when they fulfil the following criteria:

- **Article 14(2)(a) -** CBA shows significant positive externalities (SoS, solidarity or innovation)

- **Article 14(2)(b) -** CBCA decision has been provided (or for electricity storage the PCI aims to provide services across borders, bring technological innovation and ensure safety of cross-border grid operation).
- **Article 14(2)(c) -** Commercially not viable (after taking into account incentives – Article 13)

PCIs with large delays which are under the Article 5(7)(d) procedure of the Regulation can also be eligible for grants for works if they fulfil all three criteria (Article 14(3)). Smart grids and CO_2 transport PCIs are also eligible for CEF grants for works if they can demonstrate positive externalities and lack of commercial viability (Article 14(4)).

Evaluation based on literature review

ENTSO-E is of the opinion that CEF applications are limited by too strict and unclear eligibility criteria,[394] and highlights different issues within the three sub articles (a-c) of Article 14(2), which can be considered as too restrictive:

Article 14(2)(a): This article requires that the CBA proves the existence of significant positive externalities, such as SoS, solidarity or innovation.

- ENTSO-E questions whether SoS, solidarity and innovation are the only possible positive externalities. The list could be enlarged by including 'acceptance by the local population' or 'preservation of the environment'.
- The Article does not properly describe the term 'innovative'. Would this definition also include mature but risky technologies (like offshore DC) and if so, to what extent?

Article 14(2)(b): This article sets the condition of a CBCA decision as eligibility criterion for grants for works.

- This condition may effectively deter promotors from applying for grants for works as CBCAs need a certain level of maturity in terms of permit granting, technical design and cost assessment. This usually means the projects have already received approval by regulatory authorities proving their economic viability as well. If a PCI is mature enough, it may not allow for new cost-allocation decision by promoters and may put at risk decisions made by the regulatory authority.
- The CBCA process can delay projects and introduce regulatory risks. The prequisite of a CBCA decision therefore forces the promotor to begin the PCI development without the information of possible CEF assistance.
- Moreover, it would be desirable that the CBCA is set by an agreement between the concerned countries; such an agreement in itself would consist of a CBCA decision for the purpose of the eligibility criteria for CEF grants for works.

Article 14(2)(c): This article explains the criteria of 'commercially non-viable' projects:

- It is not clear what is considered 'non-viable', in the Article, especially considering the referenced "assessment carried out by regulatory agencies".
- Demonstrating that an electricity project is not commercially viable is in most cases unworkable, due to the fact that it is difficult to determine the precise use of a single line in a meshed grid.

[394] Provided to us by a stakeholder: "ENTSO-E's response to the EC's public consultation on the Connecting Europe Facility" (May 2017), Handout for Energy Infrastructure forum 1-2 June 2017

Despite these critical comments, ENTSO-E believes that "grants for works under CEF could be concrete tools for expediting PCIs", but the current eligibility criteria as laid out in Article 14(2) are "at best unclear and at worst overly restrictive". ENTSO-E therefore calls to change the concerned provisions of this article.

Stakeholder consultation

The **targeted survey** did not specifically ask respondents whether the criteria are too wide or too restrictive. Nevertheless, at different questions throughout the survey respondents pointed to the "unfortunate" link between CBCA and CEF. An NRA, for example, expressed it more directly: "A CBCA decision should not be a pre-requisite for a CEF grant for works", and proposed the complete removal of the CBCA criteria for CEF funding (for works). The main arguments focus on the difficult, lengthy and restricting procedure itself and the additional risks it implies. One respondent, however, indicated that "*CEF should only be granted to address affordability issues*", which implies that the current criteria are too wide.

Interviewees did not have fully converging opinions on the evaluation of the CEF funding eligibility criteria. Some stakeholders suggest that CEF should only intervene for projects with a financing gap at national/regional level, while other interviewees are in favour of less restrictive criteria, which allow to also fund highly innovative projects, even if their investment costs could be recovered by national tariffs.

Conclusion

Some stakeholders are of the opinion that the current eligibility criteria for CEF funding are too restrictive. ENTSO-E for instance has explicitly expressed its concerns about this issue.[395] Its comments focus on the three main criteria in Article 14(2), which state that PCI applications for grants for works need to 1) demonstrate significant positive externalities, 2) have a CBCA decision, and 3) be commercially not viable. ENTSO-E considers these criteria too restrictive, and calls for a review. It also suggests to clarify the definition of 'innovative' and 'commercially not viable'.

Additional analysis is needed to assess whether CBCA should remain a pre-condition for CEF[396]; this link is criticised by most stakeholders. Only few stakeholders have indicated to be in favour of more restrictive eligibility criteria, arguing that CEF should only focus on PCIs with certain affordability issues.

5.21 ES.1 Network Planning and Governance within the PCI Framework

5.21.1 How adequate and effective is the Regional Group model for the PCI process?

Article 3 and Annex III of the Regulation establish twelve regional groups (one per corridor or priority area) and the framework for their functioning. The groups rank the PCI candidates based on their aggregated contribution to the PCI selection criteria (Article 4(4)). Based on this ranking (which is for

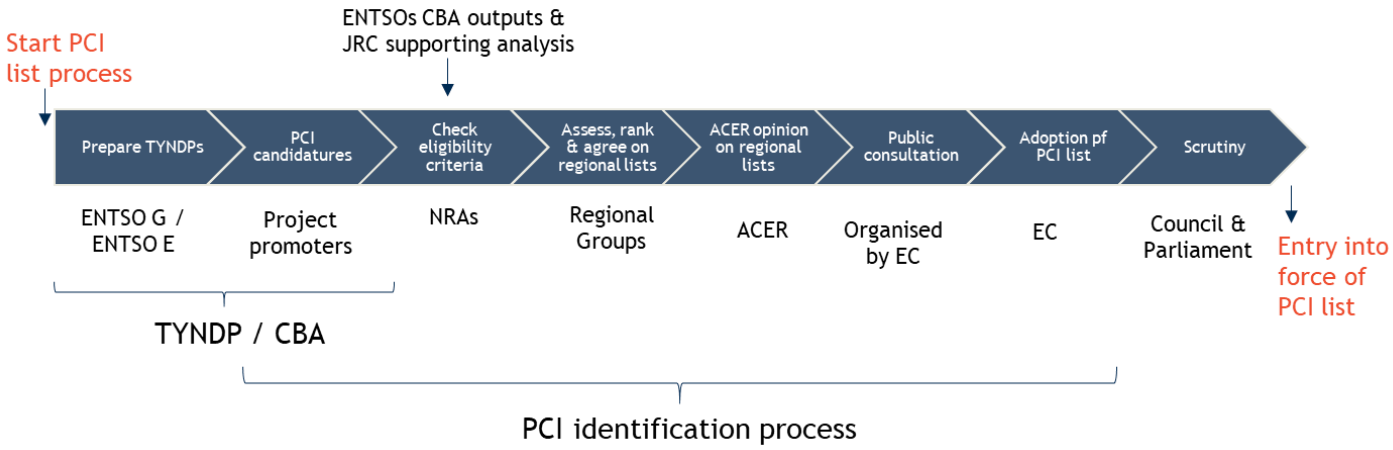
[395] Provided to us by a stakeholder: "ENTSO-E's response to the EC's public consultation on the Connecting Europe Facility" (May 2017), Handout for Energy Infrastructure forum 1-2 June 2017

[396] If such a study defines that CBCA should not be a pre-condition for CEF, it should also be assessed which of the studies and assessments performed under the CBCA process should be carried out as part of CEF application.

internal use), the regional groups adopt regional lists of proposed PCIs, taking into account the EC's aim to have a "manageable total number of PCIs". The regional groups also monitor the PCIs and make recommendations to facilitate their implementation (Article 5(3)).

The overall PCI selection process is depicted below.

Figure 5-27 PCI selection process[397]



Evaluation based on literature review

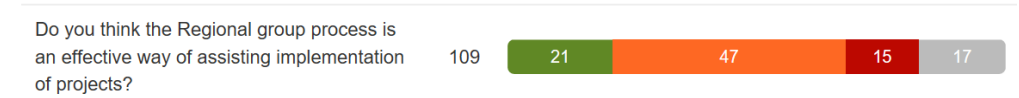
There is limited publicly available information regarding the adequacy and effectiveness of the regional group model. There are only a few comments regarding their functioning; NGOs suggest, for instance, that regional groups should take into account the environmental assessment information and should ensure "that projects are not given PCI status if this, and other information sources, suggest that impacts on the environment would be unacceptably severe or that climate commitments would be compromised."[398]

Stakeholder consultation

A large majority of stakeholders answered in the **targeted survey** that the regional group process is an appropriate way of identifying PCIs, to some extent (50%) or to a significant extent (38%). Only 4% indicated that this instrument would not be appropriate to identify PCIs. Most stakeholders also confirmed that the regional groups are effective at assisting implementation of PCIs, but these scores were lower: respectively 21% and 47% expressed the opinion that they are effective to a significant extent or to some extent, while 15% mentioned they are 'to no extent' effective at assisting PCI implementation.

Figure 5-28 Results targeted survey on the regional groups

[397] Own development, adapted from Norton Rose Fulbright (2014) and European Comission presentation 'Implementing the Projects of Common Interest' 2016.
[398] EEB & Birdlife International (2014), Connecting energy, protecting nature.



Legend: green = 'to a significant extent', orange = 'to some extent', red = 'to no extent', grey = 'don't know'

25 stakeholders (22%) provided additional feedback on the **regional group process' appropriateness for PCI selection** highlighting both positive aspects and points for improvement. Positive aspects are the regional identification of needs and the cooperative approach, while points for improvement concern the administrative burden, the lack of transparency and the PCI selection criteria.

Some specific suggestions for improvement included:

- Less meetings and better organisation would improve the process.
- Coordination between different teams within the TYNDP process and regional groups is crucial. The EU regional groups are not in line with the ENTSO-E regional groups, which increases the complexity for the coordination of regional grid planning between the different TYNDP and PCI processes. Discussions should be engaged to align the regions on the different planning levels.
- Regional groups should engage with the Network Development teams in each Member State.
- There is a lack of bottom-up process (discussion at MS level). Promoters directly submit their projects to regional groups bypassing national processes, where pre-selection of projects could be carried out. National processes might disburden regional groups and enable them to only discuss questions of strategic importance and relevant PCI Candidate Projects.
- Regional groups could take a more strategic role in the direction of regional energy systems identifying needs and tackling challenges beyond energy infrastructure (e.g. harmonisation of regulatory systems).
- Improve transparency by providing that information for all projects is available and ensuring that all candidate projects go through the regional group meetings.
- Regional groups should engage with the public more effectively to facilitate a meaningful early collaboration on the candidate PCIs.
- Clarifying the regional group process for stakeholders, explaining for example, what information is required, when, who decides, etc. If this information exists it is often inadequate, unorganised, inconsistent and/or lacks transparency. It is important to provide a transparent and simplified overview of the whole process so that all stakeholders have a clear view about the process of creating the PCI candidate list.
- There is inconsistency in how the different regions apply assessments, but the stakeholder recognised that the current approach may be the best way to handle this.
- The set-up of regional groups is focused on diversification and security of supply, without sufficiently taking into account sustainability or having a demand based approach.
- Foresee in the regional group the possibility to underline additional benefits assessed by promoters, to complement the TYNDP evaluations.

Stakeholders expressed mixed opinions regarding the optimal involvement in the regional group process. Of the 25 stakeholder who provided comments, four advocatied for more participation (e.g. from DG ENV, ministries of environment, authorities implementing energy efficienty policies, technology providers, etc.) and three suggestedexcluding less relevant members in order to make the process more efficient. A potential conflict of interest was also mentioned, stating that the regional group process is dominated by the ENTSOs and their members, thus risking to discriminate against independent project developers.

20 stakeholders (17%) provided comments regarding the **role of regional groups in assisting project implementation.** Overall, they stated that a stronger regional group involvement would support implementation (though project promoters' cooperation might have a bigger impact). It was also mentioned that the regional group setting is effective for exchanging experiences and good practices, and that it could serve to monitor PCI implementation (i.e. by gathering detailed information from delayed projects). Assistance could be provided, for example, via one-to-one assistance to specific projects facing institutional/regulatory/policy barriers, and group deep dives into common issues faced by multiple projects e.g. permitting/one stop shop/manuals of procedures.

However, it was also mentioned that certain coordination aspects could be improved (such as better engagement with stakeholders at MS level and a transparent overview of the process).

Stakeholders also had certain misgivings regarding the assistance of regional groups for project implementation:

- Assistance would be difficult due to different frameworks and challenges in Member States.
- Supporting (and monitoring) project implementation requires time, which regional groups often do not have. Additional work in the implementation phase should be examined from the perspective of administrative burden.
- Monitoring and assistance for PCI implementation should be done by an independent body, like ACER. This would allow avoiding potential conflicts of interest.[399]

At the **Network Planning Focus Group meeting,** TSOs confirmed they are familiar with the structure and role of the regional groups, and gave overall positive comments on their functioning. A TSO suggested to align the methodology of the different regional groups to avoid diverging project rankings.

Representatives from JRC and DG ENER highlighted the positive feedback on the current approach (third PCI list) where regional groups assessed the most critical problems in the region, in view of developing a list of infrastructure needs per region. The PCIs are then selected based on the extent to which they address these identified needs.

Regarding the regional groups' functioning, a TSO suggested they should also help the Competent Authorities coordinate/ cooperate and to eliminate inconsistencies (e.g. via deep dive sessions on topics that are an issue for the region). DG ENER reacted that there are already narrower representations within regional groups to discuss a specific project, to find solutions for delays or other issues.

An **interviewed** NRA considered that, as the PCIs selection is to a significant extent a political decision, the RGs are useful to raise awareness but not to take decisions. RGs serve to keep involved parties updated of the process, but should not influence it. Another NRA representative considered the regional group model for the PCI selection as quite adequate and effective. Moreover, some regional group meetings are held together, facilitating concertation and harmonisation between regions. A 3rd NRA found it too early at this stage to decide upon the effectiveness of RGs. There have only been three RG processes for the PCI lists, and each time there seemed to have been some improvement.

[399] Some members of the regional groups are at the same time developers of PCI projects.

An NGO suggested that the composition of the groups should be more diverse and include representatives from DG ENV and national Ministries of Environment. The bottom-up process (discussion on Member State level) is not functioning properly, as TSOs and project promoters directly submit their projects to regional groups. This leads to the fact that national processes, where pre-selection of projects could be carried out, are bypassed. National processes might disburden regional groups and enable them to only discuss questions of strategic importance and relevant PCI Candidate Projects. Regional groups could take up a more strategic role in the direction of regional energy systems by identifying needs to tackle challenges beyond energy infrastructure (e.g. harmonisation of regulatory systems).

Conclusion

A large majority of stakeholders considered the regional group approach to be an appropriate way of identifying PCIs, and most of them were of the opinion that this structure is effective at assisting implementation of PCIs. Aspects such as the regional identification of needs and the cooperative approach were positively highlighted. Issues brought forward for improvement included the administrative burden related to the regional groups (including organisation, number and length of meetings), the lack of transparency (regarding the overall regional group and PCI selection process) and certain coordination aspects (such as engagement with stakeholders at MS level and within TYNDP processes, alignment of the regions). Stakeholders expressed mixed opinions regarding the optimal involvement in the regional group process.

5.21.2 Is there any evidence for added value from a High Level Group (HLG) format?

At EU level, four High Level Groups are active at regional level to discuss energy issues that have been identified as being of high priority, namely: Central and South Eastern Europe Gas Connectivity; North Seas Energy Cooperation; South-West Europe and the Baltic Energy Market Interconnection Plan (BEMIP).[400] The HLGs are organised by the EC and bring together representatives from the concerned EU Member States in the region, TSOs, and NRAs. Their role includes monitoring the progress of PCIs and providing strategic steering and policy guidance on technical topics.

Evaluation based on literature review

The HLGs are intended to enhance regional cooperation by "preparing a common regional political vision, drawing up regional priorities, providing strategic guidance and political support for the implementation of PCIs requiring strong consensus".[401] These groups aim to establish and/or reinforce cooperation between Member States, at regional and EU level. Their remit includes preparing political agreements to support the coordinated implementation of cross-border projects at regional level.[402] However, no information is available in reports or studies regarding their added value and/or their weaknesses (e.g. possible overlap with the regional groups).

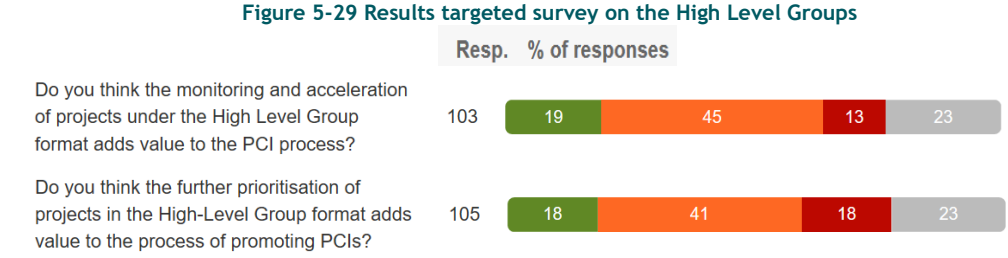
[400] DG Enery website (https://ec.europa.eu/energy/en/topics/infrastructure/high-level-groups)
[401] SWD(2015) 247, Commission Staff Working Document accompanying the document Commission Delegated Regulation amending Regulation (EU) 347/2013 of the European Parliament and of the Council as regards the Union list of Projects of Common Interest C(2015) 8052.
[402] SWD(2015) 247, Commission Staff Working Document accompanying the document Commission Delegated Regulation amending Regulation (EU) 347/2013 of the European Parliament and of the Council as regards the Union list of Projects of Common Interest C(2015) 8052.

Stakeholder consultation

A majority of stakeholders (64%) answered in the **targeted survey** that the HLGs' monitoring role effectively adds value to the PCI process to some extent (45%) or to a significant extent (19%). Only 13% considered that the HLGs do not add value. Similar positive feedback was received regarding the further prioritisation of PCIs in the HLGs: 59% considered this adds value to some extent (41%) or to a significant extent (18%), while 18% of the respondents were of the opinion that this structure is 'to no extent' adding value to the PCI process. It is important to highlight that for both questions regarding the High Level Groups, a considerable share of the respondents (23%) answered 'Don't know', potentially reflecting a knowledge gap and/or lack of involvement in this process.

Regarding the split across stakeholder types, there are slight differences in opinion. For example, energy companies/associations and MS authorities gave a more positive feedback than project promoters, while NRAs seem to have the most negative view. For example, all NRAs answered that the High Level Group format, and its monitoring and prioritisation add value to some extent only or to no extent.

Figure 5-29 Results targeted survey on the High Level Groups



Legend: green = 'to a significant extent', orange = 'to some extent', red = 'to no extent', grey = 'don't know'

10 stakeholders (9%) provided comments regarding the **monitoring and acceleration of PCIs under the HLG format.** Overall, their views were mixed and illustrated with arguments highlighting the work of HLGs supporting faster implementation of the most urgent projects and others suggesting HLGs to focus on monitoring actual needs and improvements (rather than on monitoring and accelerating PCIs). The responses also made clear that some stakeholders are not familiar with the HLG process.[403] Additionally, concerns were raised regarding the administrative burden and the lack of information and reporting on the HLG activities in this regard.

16 stakeholders (14%) provided comments regarding the **added value of further prioritisation in the HLGs.** Feedback regarding the added value of the HLGs was mixed, including both positive and negative views. On the one hand, stakeholders highlighted the efficient role of HLGs supporting and accelerating the implementation of urgent PCIs for the Iberian Peninsula. On the other hand, several comments mentioned that there should not be further prioritisation within the PCI list or if there was, such an approach would require very careful assessment[404]. These comments highlighted that all PCIs should be be treated equally as it is difficult to compare their benefits.

At the **Network Planning Focus Group meeting,** TSOs confirmed they are familiar with the structure and role of the High Level Groups, and gave overall positive comments on their functioning and the

[403] A stakeholder, for example, noted that the distinction between regional groups and HLGs was not clear; while another one was not aware of the HLGs at all.
[404] For example by thoroughly examining whether prioritisation would have a positive impact on speeding up the priority projects and would not result only in slowing down those that would be ranked lower, yet still considered eligible. It was also mentioned that there is no visibility as to the criteria applied by the HLGs to rank projects.

contribution of the EC in the HLGs. A TSO added that the aims of the regional groups and HLGs are different (with HLGs dealing with particular regional problems, ensuring projects are not lagging behind schedule).

TSOs recognised that HLGs are adequate and effective for the priortitisation of projects and to facilitate their implementation (even without the backing from a Regulation). They also mentioned HLGs are transparent, providing all relevant information (however, some stakeholders seem to encounter difficulties to have access to it).

A TSO questioned the use of MoUs as the main outcome of the HLG discussions. DG ENER explained that the MSs are effectively using these international agreements to confirm concrete joint initiatives and actions, and added that HLGs have worked well for projects' prioritisation (especially in the wider corridors, where some subregions might have different problems) and implementation (e.g. SESEC is following up on projects closely). Decisions taken by the HLGs are discussed in the regional groups defined by the TEN-E Regulation if relevant.

An **interviewed** NRA mentioned that an HLG may be used to explain in detail the concerns about a specific infrastructure/corridor, but that, in the end, the decision is political. Another NRA mentioned that the HLGs are useful ad hoc groups in order to help specific projects be implemented, but their existence and perimeter should remain flexible in order to keep this adaptability.

An NGO concluded there is a lack of evidence regarding the added value of the High Level Group format, and suggested clarifying the aim of the High Level Group Format, its composition and how it improves the process in comparison to the group settings in former PCI designation processes.

Conclusion

In general, stakeholders gave positive feedback regarding the added value of both HLGs for both aspects: monitoring and acceleration of PCIs, and prioritisation of PCIs. However, there seems to be a knowledge and information gap, as some stakeholders seem un familiar with the HLG structure and its outcome.

Regarding monitoring and acceleration of PCIs, some stakeholders highlighted the positive contribution of HLGs by supporting faster implementation of the most urgent projects while others suggested HLGs should focus on monitoring actual needs and improvements (rather than on monitoring and accelerating PCIs).

Regarding further prioritisation of PCIs, stakeholders highlighted the efficient role of HLGs in supporting and accelerating the implementation of urgent PCIs, for example in the Iberian Peninsula. Several stakeholders suggested, however, that further prioritisation within the PCI list is not necessary and would still require very careful assessment. All PCIs should indeed be treated equally, as it is difficult to compare their benefits.

Based on the literature reviewed and the stakeholder input, as well as our own assessment, we conclude that while the roles of the HLGs and RGs are different and both structures seem to be working effectively, there is inpractice some overlap which might lead to a suboptimal functioning:

Member State representatives are present in both groups, and both RGs and HLGs are concerned with the monitoring of PCIs and supporting their implementation.

5.21.3 Is there a need for formal recognition of the High Level Group format in the Regulation?

The High Level Groups are not established or recognised by the TEN-E Regulation. They are established by Memorandums of Understanding (MoUs) signed by all involved MSs.[405]

Evaluation based on literature review

The Commission has established four regional High Level Groups which aim to accelerate infrastructure development in specific European regions, facing particular challenges. These HLGs contribute in particular to the prioritisation of key projects of common interest in the concerned regions. The Commission's political and financial support has been a key enabler.

The scope of certain HLGs has meanwhile been extended to cover wider aspects of energy policy, notably energy markets, renewables generation and energy efficiency. The HLGs could also play a role in regional cooperation in the framework of the preparation of the National Energy and Climate Plans (NECPs) foreseen in the proposal for a Regulation on the Governance of the Energy Union.[406]
There is no relevant information available in studies or reports on the pros and cons of a formal recognition of the HLG format in the Regulation.

Stakeholder consultation

The responses to the **survey** did not reveal useful information with regard to this question, which was also due to the fact that a large share of the respondents are unfamiliar with the HLG structure.

Participants at the **Network Planning Focus Group** confirmed that the HLG format is in practice strongly recognised and that there is no need to formalise it in the Regulation.

Conclusion

In the literature and the stakeholder feedback, we could not find any indications that it would be appropriate to formalise the HLG format via a Regulation. However, the current lack of formal recognition may contribute to the fact that stakeholders seem to have a knowledge gap on the subject. Formal recognition might improve this, and contribute to higher legitimacy and transparency.

5.21.4 What evidence is there that the Priority Corridors or Areas are defined optimally?

Annex I of the Regulation identifies priority corridors and thematic areas of trans-European energy infrastructure. These are described in the following table.

[405] CESEC MoU (2015): https://ec.europa.eu/energy/sites/ener/files/documents/CESEC%20MoU_signatured.pdf; BEMIP MoU: https://ec.europa.eu/energy/sites/ener/files/documents/2009_bemip_mou_signed.pdf (2009) and https://ec.europa.eu/energy/sites/ener/files/documents/ROMANAD_2016.02.08_11.32.52_5C4N2560_1.pdf (2015); Interconnections for South-West Europe MoU (2015): https://ec.europa.eu/energy/sites/ener/files/documents/FINAL%20MoU%20after%20interservice.pdf; North Seas Energy Cooperation, political declaration (2016): https://ec.europa.eu/energy/sites/ener/files/documents/Political%20Declaration%20on%20Energy%20Cooperation%20between%20the%20North%20Seas%20Countries%20FINAL.pdf

[406] COM (2017) 718 final, Communication from the Commission on strengthening Europe's energy networks

Table 5-14: Priority corridors and thematic areas. Source: Prepared by Trinomics based on Regulation 347/2013 on guidelines for trans-European energy infrastructure

Type	Name	Description	MSs
Electricity corrdidors	Northern Seas offshore grid (NSOG)	Integrated offshore electricity grid development and interconnectors in the North Sea, Irish Sea, English Channel, Baltic Sea and neighbouring waters to transport electricity from offshore RES to centres of consumption and storage and to increase cross-border electricity exchange.	BE, DK, FR, DE, IE, LU, NL, SE, UK
	North-South electricity interconnections in Western Europe (NSI West Electricity)	Interconnections with the Mediterranean area including the Iberian Peninsula, notably to integrate electricity from RES and reinforce internal grid infrastructures to foster market integration in the region.	AT, BE, FR, DE, IE, IT, LU, NL, MT, PT, ES, UK
	North-South electricity interconnections in Central Eastern and South Eastern Europe (NSI East Electricity)	Interconnections and internal lines in North-South and East-West directions to complete the internal market and integrate RES generation.	AT, BG, HR, CZ, CY, DE, HE, HU, IT, PL, RO, SK, SI
	Baltic Energy Market Interconnection Plan in electricity (BEMIP Electricity)	Interconnections in the Baltic region and reinforcements of internal grid infrastructure, to reduce their isolation, foster market integration and facilitate integration of RES.	DK, EE, FI, DE, LV, LT, PL, SE
Gas corridors	North-South gas interconnections in Western Europe ('NSI West Gas')	Gas infrastructure for North-South gas flows in Western Europe to further diversify routes of supply and for increasing short-term gas deliverability	BE, DK, FR, DE, IE, IT, LU, MT, NL, PT, ES, UK
	North-South gas interconnections in Central Eastern and South Eastern Europe ('NSI East Gas')	Gas infrastructure for regional connections between and in the Baltic Sea region, the Adriatic and Aegean Seas, the Eastern Mediterranean Sea and the Black Sea, and for enhancing diversification and security of gas supply	AT, BG, HR, CY, CZ, DE, HE, HU, IT, PL, RO, SK, SI
	Southern Gas Corridor ('SGC')	Infrastructure for the transmission of gas from the Caspian Basin, Central Asia, the Middle East and the Eastern Mediterranean Basin to the Union to enhance diversification of gas supply	AT, BG, HR, CZ, CY, FR, DE, HU, HE, IT, PL, RO, SK, SI
	Baltic Energy Market Interconnection Plan in gas ('BEMIP Gas')	Gas infrastructure to end isolation of Baltic States and Finland and their dependency on a single supplier, to reinforce internal grid infrastructures, and to increase diversification and security of supplies in the Baltic Sea region.	DK, EE, FI, DE, LV, LT, PL, SK
Oil corridor	Oil supply connections in Central Eastern Europe ('OSC')	Interoperability of the oil pipeline network in Central Eastern Europe to increase security of supply and reduce environmental risks.	AT, HR, CZ, DE, HU, Pl, SK
Priority thematic areas	Smart grids deployment	Increase deployment of smart grids to efficiently integrate the behavior and actions of grid connected users, in particular the generation of large amounts of electricity from renewable or distributed sources and demand response	All
	Electricity highways[407]	Construction of large grids that allow electricity to be transported over long distances across Europe	All
	Cross-border CO_2 networks	Development transport infrastructure for captured carbon dioxide	All

[407] PCIs qualifying under the priority thematic area "Electricity Highways" are PCIs which belong to different Electricity Corridors. Theore, these do not have a specific code and are included in the analysis only under their respective Corridors.

Evaluation based on literature review

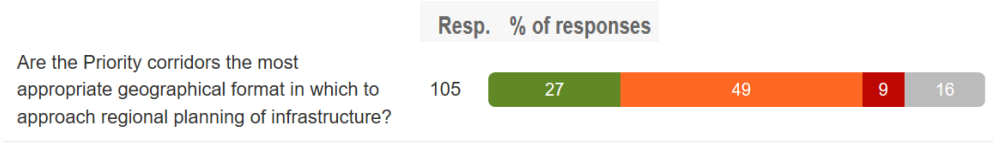
There is no relevant information from the literature review to answer this question.

Stakeholder consultation

The **public consultation** provided limited feedback on the definition of priority areas and corridors; however, it was mentioned that the smart grids priority area has several shortcomings. These comments are further detailed in section 5.24.

A large majority of stakeholders (76%) responded in our targeted survey that the Priority Corridors as defined in the TEN-E Regulation are appropriate for regional planning of infrastructure, to some extent (49%) or to a significant extent (27%). Only 9% responded they would not be appropriate.

Figure 5-30 Results targeted survey on the Priority Corridors



Legend: green = 'to a significant extent', orange = 'to some extent', red = 'to no extent', grey = 'don't know'

20 stakeholders (17%) provided additional comments. While several stakeholders acknowledged the importance of priority corridors, several criticial issues were mentioned as well as some ideas for improvement. It was for instance mentioned that this approach helps to identify the most important projects per region and to identify the isolated regions in the EU. It also allows neighbouring countries to better cooperate and to identify joint projects as part of the solution to a larger objective. Specific issues and suggestions include:

- The split of Southern Gas Corridor and NSI East Gas seems to be somewhat artificial.
- The corridors are not aligned with the ENTSO-E regional groups, which increases the level of complexity for the coordination of regional grid planning between the different TYNDP and PCI processes. Alignment would be appropriate, although a stakeholder stated that from a grid characteristics perspective the ENTSO-E regions are most suited, but given that PCIs are at their third process, involved parties are used to the current format.
- Corridors are too broad and do not allow deeper focus on particular regional problems.
- In order to ensure that the Priority Corridors reflect network requirements it is crucial to have a close engagement between regional groups and MS Network Development.
- In light of the existing Neighbouring Policy Strategy of EU, it is appropriate to include in the perimeters of Priority corridors also neighbouring non-EU Member States, the North African countries or energy community Countries. In this way the regional planning of infrastructure will consider also projects involving non-EU Member States which are of key relevance to develop the infrastructure corridors and to integrate isolated systems.
- Need for an integrated perspective on gas and electricity systems and to redefine corridors in terms of regional integration of energy systems and sustainability (including energy efficiency objectives).

Some stakeholders also mentioned that a pan-European approach (less confined than corridors) would be a better approach; it would avoid overlaps and better capture the EU's interests. Another mentioned drawback of the current approach is that the definition of the priority corridors is set and does not

allow for adjustments or consider the dynamics of the energy system (including the overlaps and effects across corridors).

The **targeted survey** also focused on some specific questions regarding oil, CO_2 transport and smart grids.

Oil

89% of the respondents indicated they do not know whether the TEN-E framework has achieved its oil related objectives and 71% indicated they do not know whether TEN-E should continue to support oil projects, while 24% of the respondents clearly indicated that oil projects should not be supported any more. This negative opinion was in particular expressed by NGOs, which consider that oil technology should not be prioritised at all, taking into account the Paris Agreement.

CO_2 transport

Most respondents (51%) did not know why so few projects have applied for PCI status in this priority area, but some respondents indicated possible reasons: 26% answered that the technology is not commercially viable, 16% referred to the fact that the technology is not yet mature but projects may emerge in the future, and 14% indicated that the technology is not viable.

Figure 5-31 Results targeted survey on the CO_2 transport Priority Area - Why do you think so few carbon dioxide transport projects have appliedy for PCI status?

Response	Total	% of responses	%
Don't know	44		51%
The technology is not commercially viable	23		26%
The technology is not yet mature but projects may emerge in the future	14		16%
Other, please specify	13		15%
The technology is not viable	12		14%
PCI status would not help carbon dioxide transport projects	4		5%
The criteria for PCI status is too restrictive	4		5%

Smart grids

45% of the respondents did not know why so few smart grid projects had applied for PCI status, while the other respondents referred to the following possible reasons: this domain is not relevant for TEN-E (21%), the selection criteria are too strict (19%), the technology is not yet mature (15%), and the rewards of the PCI process are not sufficient (11%).

Figure 5-32 Results targeted survey on the Smart Grids Priority Area - Why do you think so few smart grids projects have appliedy for PCI status?

Response	Total	% of responses	%
Don't know	44		45%
The sector is not relevant to TEN-E objectives of supporting infrastructure with European significance	20		21%
The TEN-E Regulation lays down criteria for PCI selection that are too strict	18		19%
The technology is not yet mature	15		15%
Other, please specify	13		13%
The rewards of the PCI process are not sufficient to persuade projects to apply	11		11%
Total respondents: 97 Skipped question: 27		0% 20% 40% 60% 80%	

Several stakeholders further suggested to revise the criteria for smart grids projects, in particular regarding the cross-border aspect and the 10kV threshold. Answers highlighted that smart grids are local and also involve distribution networks at lower voltage levels (not only transmission).

A think tank representative mentioned at the **Network Planning Focus Group meeting**, that, while the priority corridors cover the whole EU, it is difficult to assess the selection (in Annex I to the Regulation) without knowing their purpose. It is not clear whether there is a mandate to delete corridors from the priority list once they are completed. The stakeholder suggested to regularly update Annex I and set clear aims and criteria for what the corridors are meant to achieve and why they matter to the EU energy system. DG ENER clarified that since this PCI selection process, discussions are ongoing at regional group level on the needs per corridor, which translate into tangible results: some corridor elements that were an issue at the publication date of the Regulation are no longer applicable. This means that the currently identified needs are no longer not fully in line with Annex I.

The same think tank representative also mentioned that the diverging regional configurations (e.g. PCI corridors, ENTSO regions, etc.), each with a different scope, can generate confusion.

A TSO mentioned that the electricity highway concept in the Regulation is not clear and does not offer added value (double label with no additional benefit). DG ENER explained that the aim was to give higher visibility to these projects but that, due to the lack of additional benefits, it did not really take off.

It was finally mentioned that the non-geographic corridors and areas (related to smart grids and CO_2 transport) are not moving forward, and that only limited information is available on the concrete progress in the oil corridor.

An **interviewed** NRA considered that the priority corridors and areas are well defined and allow for a general vision at regional level, not only at a bilateral or national one. Another NRA thought it iss too

early at this stage to assess whether Priority Corridors are well-defined, although the approach seems to be well functioning.

Conclusion

Most stakeholders gave positive feedback with regard to the appropriateness of the electricity and gas Priority Corridors for regional planning of infrastructure, but some respondents criticised the lack of alignment with other structures (e.g. regional TSO groups). Priority corridors help identify the most important projects per region and the isolated regions in the EU. This approach also allows neighbouring countries to better cooperate (identifying projects as part of the solution to a larger objective). Some stakeholders mentioned, however, that a pan-European approach (rather than a regional one) might better allow to avoid overlaps and to capture the EU's interests. Another drawback of the current approach is that the identification of priority corridors is too static and does not consider the dynamics of the energy system (including overlaps and effects across corridors).

Regarding the oil corridor and the CO_2 transport and smart grid priority areas, stakeholders expressed the following opinions:

- 24% of the respondents, in particular NGOs, expressed a clear opposition against further support of **oil projects** within the PCI framework, as this approach is not in line with the Paris Agreement.
- Regarding **CO_2 transport**, 26% answered that the technology is not commercially viable, 16% that the technology is not yet mature but projects may emerge in the future, and 14% indicated that the technology is not viable.
- Regarding smart grids, 21% indicated that this domain is not relevant to TEN-E objectives, 19% answered that the PCI selection criteria are too strict, 15% that the technology is not yet mature, and 11% that the rewards of the PCI process are not sufficient. Some respondents suggested revising the selection criteria in order to enlarge the scope.
- Regarding **electricity highways**, the Regulation seems unclear and its added value seems limited (double label with no additional benefit).

We can therefore conclude that the Priority Corridors or Areas might have been defined optimally at the moment of the publication of the Regulation, but that updates on the basis of currently identified infrastructure needs and policy priorities would be appropriate.

5.22 ES.2 - Network Modelling and CBA within the TYNDP and PCI process

5.22.1 How adequate is the current set up for the electricity and gas network planning?

The current network planning exercise is embedded in the framework of the NDPs and TYNDPs. TYNDPs have been established since 2009 and are prepared by ENTSO-E and ENTSOG based on National Development Plans.[408] Regarding network planning, Article 3(6) of the TEN-E Regulation requires PCIs to be included in the National Development Plans (defined in Article 22 of Directives 2009/72/EC and 2009/73/EC). Annex III of the TEN-E Regulation further requires that electricity transmission and storage projects, as well as gas PCIs are included in the TYNDPs.

[408] Regulations 714/2009 and 715/2009 require ENTSO-E and ENTSOG respectively to adopt and publish a Community-wide network development plan (TYNDP) every two years.

Evaluation based on literature review

Inclusion of PCIs in TYNDPs and NDPs

While all gas PCIs are included in the ENTSOG TYNDP, ACER's latest monitoring report[409] states that for electricity one transmission and one storage PCI were not included in the TYNDP 2016. Furthermore, PCIs are not always included in the National Network Development Plans (NDPs) of (all) the hosting Member States.

Regarding electricity PCIs, three do not appear in any of the relevant NDPs; seven appear only in some relevant NDPs (but not all) and for three, not all investment items were included in the relevant NDPs. Although these PCIs are in an early stage of development, the relevant NDPs were – in most instances – issued after the adoption of the 2015 PCI list.[410] Regarding gas PCIs, 16 are not mentioned in the NDP of any hosting country and five are missing in the NDP of at least one hosting country.[411]

Despite improvements, some recommendations from ACER (2016a) remain relevant and appropriate to ensure higher consistency between PCI lists, TYNDPs and NDPs:

- TYNDP projects should be associated with only one PCI (instead of several, as was the case in the 2017 ENTSOG TYNDP) to avoid ambiguity regarding the distribution of the costs and benefits.
- Rearrangements of PCIs (which was common in the 2015 gas PCI list compared to 2013) should be limited in order to facilitate monitoring and ensure consistency.
- NRAs and competent authorities should ensure that all PCIs are included in the relevant NDPs with the due level of priority.
- NDPs should indicate which PCIs are (potentially) competing.

Other ACER recommendations to improve network planning

To improve the efficiency of network development, the 'Position of the Agency on Potential Improvements to the Energy Infrastructure Package'[412] highlights the importance of the availability of accurate, detailed and up-to-date cost data and other project characteristics to ACER and NRAs. ACER therefore proposes a legislative amendment to the Regulation which places "an obligation on infrastructure owners, operators and promoters, including all TSOs, storage system operators (SSO), and liquefied natural gas (LNG) terminal operators, to provide the data that NRAs and the Acency require". This would enable the regulators to review the unit investment costs (UIC).[413] Additionally, in order to ensure flexibility, ACER proposes that the Regulation should foresee that UIC updates are done 'regularly' – instead of stating a defined interval. ACER's recent opinion on the ENTSOG draft TYNDP 2017[414] also highlights that the main shortcoming is the quality of the CBAs, therefore the proposed TYNDP "may not sufficiently contribute to the efficient functioning of the market". On the other hand, ACER concludes that the draft is in line with the objectives of non-discrimination, effective competition and secure market functioning, but may not sufficiently contribute to the efficient functioning of the market

[409] ACER (2017a), Consolidated Report on the progress of electricity and gas projects of Common Interest for the year 2016.
[410] ACER (2017a), Consolidated Report on the progress of electricity and gas projects of Common Interest for the year 2016.
[411] ACER (2017a), Consolidated Report on the progress of electricity and gas projects of Common Interest for the year 2016.
[412] ACER (2017f), Position of the Agency on Potential Improvements to the Energy Infrastructure Package. 31 May 2017
[413] ACER prpeared a report on "UNIT INVESTMENT COST INDICATORS AND CORRESPONDING REFERENCE VALUES FOR ELECTRICITY AND GAS INFRASTRUCTURE" in 2015, which has not been revised to date.
[414] ACER (2017g), Opinion of the Agency for the cooperation of energy regulators No 06/2017 on the ENTSOG draft Ten-Year Network Development Plan 2017

Stakeholder consultation

Stakeholders participating in the **targeted survey** highlighted that network planning is properly addressed in Directives 2009/72 and 2009/73 for both the national and EU level, with the TYNDPs being a good starting point for planning trans-European infrastructure. The new approach used for the drafting of the 3rd PCI list focusing on identification of problems and needs was welcomed. Several stakeholders also acknowledged the efforts made and progress achieved by ENTSO-E in particular regarding project assessment. The ENTSO-E TYNDP allows a fair comparison between projects, taking into account their complexity. TYNDPs are an efficient framework for gathering and assessing energy infrastructure projects.

Most of the respondents of the targeted survey (52%) agreed that the TYNDP is 'to a significant extent' a good starting point for planning trans-European infrastructure.

Figure 5-33 Results targeted survey on the the TYNDP

Sub-questions	Resp.	% of responses	avg	med	SD
Do you think the TYNDP is a good starting point for planning trans-European infrastructure?	112	52 / 38 / 5 / 4	1.51	1	0.6

27 respondents (23%) provided additional feedback, highlighting that the TYNDP is indeed a useful tool for planning (and assessing) EU energy infrastructure, as it provides a comprehensive overview at EU level. However, while the electricity TYNDP is considered being on the right track, the gas TYNDP still requires considerable improvements.

General concerns brought up in the targeted survey regarding the **TYNDPs** include:

- MS authorities do not play a direct role in the elaboration of the TYNDP, so some needed infrastructure may be missing.
- Lack of transparency and level playing field, in particular for third-party project promoters.
- Some respondents suggested to limit the TYNDP's scope to security of supply and severe market failure issues.
- Improvement could be made in the identification of borders where NTC increase is needed and of critical internal bottlenecks.
- Incoherence with the EU's energy and climate targets and the Paris Agreement.[415]
- Need for longer term horizon and more holistic approach.

- Several stakeholders also listed weaknesses and points for possible improvement of the network planning process: the bottom-up approach inherent in the current process should be revisited such that an independent and centralised entity with no interests in the ownership of the assets would be identifying the needs for cross-border infrastructure. A more centralised approach would also be needed to optimise the ranking/prioritisation of projects by identifying the projects that are most urgently required. That entity would then award projects via centralised competitive auctions whereby a newly established concessional

[415] Only one of the four TYNDP 2017 scenarios seems compatible with the proposed 30% energy efficiency target for 2030, but fails to fully reflect the levels of gas demand as modelled by the EC under its PRIMES scenarios. The Paris Agreement requires parties to develop 'long-term low GHG emission development strategies'. Long-lived network infrastructure investments need to be consistent with these long-term strategies. The EU's proposed Governance Regulation suggests that MSs will need to develop these, will be completed by 2019 – something to be taken on board by the 2020 TYNDP.

regime would provide a stable framework to investors as well as increase competitiveness in a more than mature transmission market.

- The leading role of the ENTSOs was perceived as inherently flawed and leading to conflicts of interest since infrastructure owners determine the demand scenarios and infrastructure needs in the TYNDPs, which might put TPPs at a disadvantage. It was also suggested that cross-border network planning should be carried out under the responsibility of ACER or of an independent authority.
- Stakeholders suggested ensuringhigher consistency between NDPs and TYNDPs and stressed the need for improved transparency regarding data on network, load flow and social welfare.
- Third-party promoters (TPPs) argued that they have limited access to data that is available to TSOs and that they should be more involved in the selection process.

Certain **methodological improvements** to the current network planning approach were also proposed by repondents:

- Calculate costs of additional power interconnection capacities via a harmonised methodology (instead of expert opinions).
- Optimise transmission and generation planning simultaneously.
- Consider the effective RES generation costs in the network planning (e.g. to assess grid investment versus curtailment).
- Harmonise national network development approaches to ensure a consistent scenario (instead of using TSO assumptions).
- Increase the time horizon of the TYNDPs to 30-40 years.
- Split countries with one electricity price zone into several price zones to effectively consider internal congestions and constraints.
- Improve TOOT methodology.
- Increase flexibility by allowing the EC to adjust the priorities to which PCIs should contribute (without jeopardising projects that are already PCIs).
- Increase focus on vulnerable areas in case of an energy crisis.
- Further consider commercial interest and private funding of energy infrastructure.

Other mentioned aspects include the PCI selection criteria (discussed in section 5.24.1) and the proposal to shorten the PCI list (discussed in section 5.24.2).

At the **Network Planning Focus Group**, an ENTSO representative recalled that the TYNDP process is mainly a planning exercise, in which all involved countries (34) are working together and agree on a common approach to define scenarios, identify gaps and provide data.[416] The infrastructure gaps, which are identified taking into account the TEN-E criteria, often evolve from one TYNDP edition to the next. There are different layers in the process, with TYNDP projects having pan-European relevance, as they address gaps/needs identified at EU level, and with PCIs being a subset of TYNDP projects, which require political support.

If electricity TSOs identify specific needs for which there are no concrete project proposals, they created a 'generic' project.[417] This has not yet happened for gas, perhaps because there are less gaps

[416] For electricity, NRAs are not involved at the needs identification level, they give their opinion once the draft plans are published
[417] In the future, ENTSO-E expects to deal with this by contacting the impacted TSOs when there is an infrastructure need without concrete project proposal, so that TSOs can study options to fill this gap. TYNDP is rooted on the regional groups and there is always a feedback loop allowing for this.

(since the first TYNDP, 55 projects have been implemented and there are only few needs which are not yet addressed).

ENTSO representatives stressed that coordination is important but complex; it includes the identification of projects and their assessment to ensure a level playing field. The role of the TYNDPs is to identify infrastructure gaps from an EU perspective, but not to identify the optimal subset of projects to address the needs. TYNDPs are not wish lists, and not all identified projects are meant to be implemented, since (in particular for gas) competing projects are often included.

A TSO added that the TYNDP does not and should not present an ideal subset of projects, since this decision should be made at a political level. The stakeholder does not consider the TYNDP as a planning instrument (rather a set of scenarios with possible evolutions of the system), which is in line with the Regulation.

An NRA reacted that not all PCIs should indeed be implemented. It is appropriate that also "early stage projects" can become PCIs, in order to be further studied and then either be discarded or implemented. Further, competing projects should be included in the PCI lists, and some of them will effectively be implemented and others not.

A stakeholder from a think tank highlighted that there is a communication challenge, as the public considers the TYNDP as a plan that needs to be fully implemented rather than as an extensive list of proposed projects. The stakeholder added that the initial objectives of the Regulation have been reached to a certain extent, but that there is room for improvement:

- **More EU coherence:** There has been significant improvement
- **Identifying strategic EU projects:** The Regulation was meant to trigger about 150 PCIs (recital 23), but the effective number is much higher (though it remains under the maximum of 220 mentioned in the Regulation), which might be due to more grid extension needs than anticipated or to a lack of prioritisation.
- **Accelerate implementation:** There are a number of steps (from TYNDP to PCI to CEF) leading to a multi-year process, which might be quicker without this complex set up.

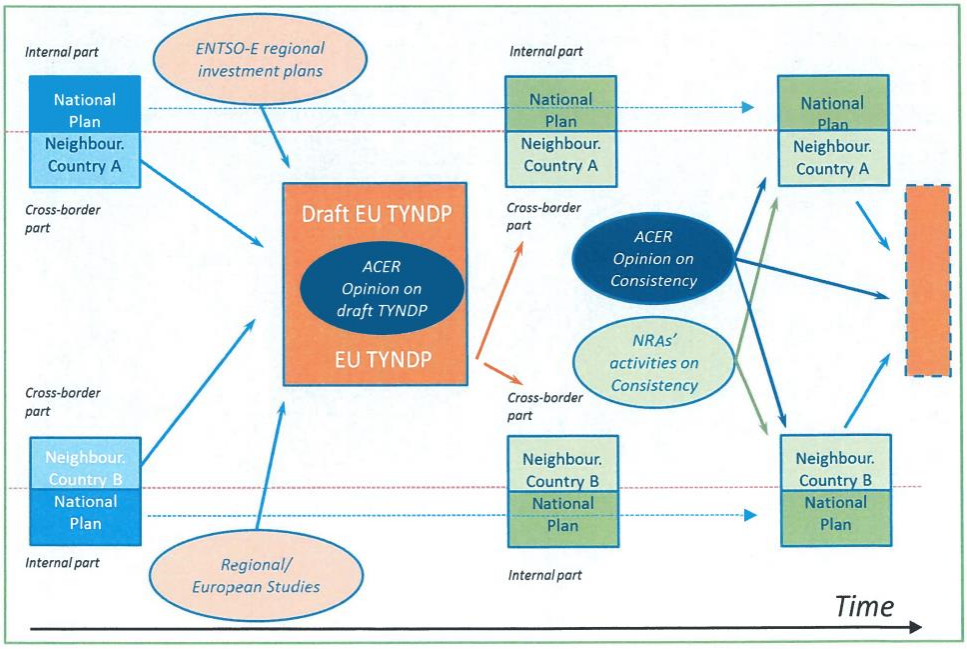
According to a TSO a major criticisms of the TYNDP is the lack of a helicopter view. The representative questioned whether it would be possible to prepare a project list that would represent an optimal solution to the EU needs as a whole, and confirmed that the process has improved thanks to the regional approach.

An NRA commented that the current bottom-up process might lead to NDPs and TYNDPs which are based on social welfare maximisation at MS level, but not necessarily at EU level. The stakeholder suggested that there should be a more Europe-centric, rather than MS-based, approach to planning network interconnections, based on needs, but the two approaches are complementary (see proposal ACER in figure): bottom up (blue colour) and top-down (orange colour).

The NRA confirmed that the TYNDPs are elaborated on the basis of national needs and priorities, therefore not necessarily including projects which have limited benefits for their hosting country(ies) but which are (highly) beneficial at EU level. However, this is probably a small part (e.g. 10-20%) of EU

projects. If properly implemented, the EU-centric layer would identify this additional 10-20% of projects.

Figure 5-34 The process of interaction between the NDPs and the EU TYNDP. Source: ACER Opinion No 08/2014



An NRA recalled that the link between the electricity TYNDP and NDPs was recently discussed in ACER Opinion No 08/2017, which detected a relatively large gap between TYNDP and NDPs. Stakeholders agreed that the link between NDPs and the TYNDP is not always adequate (they are inconsistent and not all PCIs are included in NDPs). This needs to be corrected and ACER made proposals to strengthen the link.

The same stakeholder also highlighted that there are big differences between the NDP processes and their legal status depending on the MSs. It was discussed whether a minimum level of harmonisation for NDPs would be useful to improve the consistency with the TYNDP. Aligning NDPs by using common standards (e.g. same units, scenarios and methodologies) would allow for easier aggregation at EU level (same assumptions) and easier comparison across MSs, while at the same time MSs would have enough freedom and flexibility. While several stakeholders were in favour of this proposal, DG ENER stated that this aspect cannot be regulated at EU level due to the subsidiarity rule. Therefore, only minimum building blocks (instead of specific guidelines) could be provided to better align NDPs.

NDPs are not binding in the majority of countries, in particular due to their long time horizon. NDPs should be robust and serious, but cannot entail a firm commitment from authorities and developers with a 10+ year horizon. This is reflected in reality, e.g. only the first three years of France's NDP are binding, the rest is indicative. An ENTSO representative added that TYNDPs often look further into the future than NDPs, which explains why they may have more projects than NDPs.

A stakeholder insisted that it should be ensured that NDPs (and TYNDPs) include projects from all promoters (not only TSOs). However, this is currently already the case provided certain basic criteria are met.

A stakeholder stated that the German NDP is fully aligned to the TYNDP (setting the 2030 horizon). In his view, the TYNDP should build on approved projects of the NDPs, making the TYNDP and the network model more consistent and reliable. Otherwise, projects that are unlikely to be build could affect the calculation results in the TYNDP since calculations are based on the "TOOT" method (Take one out at a time). A TSO reacted that it would be acceptable to build the TYNDP on the basis of NDPs, as long as this approach would not restrict the selection of cross border projects.

Some participants at the **Regulatory Focus Group** focused on the interlinkage between NDPs, TYNDPs and PCI lists. Two NRA representatives suggested that NDPs need to be approved by NRAs (which is already the case in some MSs), or they should at least be submitted to NRAs for thorough scrutiny. NDPs should form the basis for the TYNDPs and PCI lists, which can of course also comprise specific regional/European projects that are not part of NDPs.

During the **interviews**, an energy sector representative stated that network planning should focus on real needs from a market and supply security perspective, based on realistic demand scenarios (including impact of demand response). Not all NDPs seem at present to be based on realistic scenarios, including the impact of demand response and the development of local energy communities which might become increasingly independent from the public grid. Network planning should make it possible to minimise the risk of stranded investments.

An NRA representative also expressed doubts about the validity of the used scenarions. There are no checks and balances (or formal approval) of the scenarios prepared by ENTSO, only a public consultation. These scenarios are, however, an important basis for network planning and CBAs/CBCAs. Checks and balances should be put in place and a binding opinion of ACER/NRAs on the scenarios would be useful, also in order to have a more consistent and consensual approach. Similarly, the TYNDPs published by ENTSO are a black box and should become more transparent and subject to checks and balances. Better underpinned and consensual scenarios will improve the quality of the CBAs/CBCAs, including the quality of applications for CEF funding. The scenarios and TYNDPs should be maintained as non-binding.

The criticism on the current TYNDP and CBA approach is shared by a TSO representative, who argued that there should be one source at EU level for CBAs, and that TYNDPs should become more transparent: more information on each PCI should be provided; benefits are presented per cluster but should also be available per PCI; TYNDP data needs to be compatible with CBCA data; and the investment cost should be compared with standard values per item.

An energy association representative also suggested that system planning at European level could be more efficient and should be better at reflecting the reality. For instance, it would make sense to allow the EC, through secondary acts, to add or adjust the priorities to which projects should contribute so that they are not constrained by an inflexible legal framework that cannot adjust to real needs. Adjustments should, however, not jeopardise projects that have already been recognised as PCIs and are well on their way. With regard to the idea of a more detailed CBA, which may lengthen the procedure and may lack objectivity, this stakeholder is not convinced of the merits of going into further detail for the CBA, but considers it essential and helpful to ensure that promoters better understand the CBA process, which currently significantly lacks transparency.

Conclusion

The majority of respondents confirm that **TYNDPs are a good starting point for planning trans-European energy infrastructure, as they** provide comprehensive overviews at EU level. TYNDPs are an efficient framework for ensuring a level-playing field for gathering and assessing energy infrastructure projects. However, improved alignment is needed between NDPs, TYNDPs and PCIs.[418] NDPs should be thoroughly scrutinised and approved by NRAs to ensure an adequate basis for the TYNDPs and PCI list.

Stakeholders acknowledge improvements in the new approach used for the establishment of the 3rd PCI list, by an improved focus on the identification of problems and needs. Progress has also been achieved by ENTSO-E regarding scenario determination and project assessment, but further work is needed in the preparation of the gas TYNDP by ENTSOG.

Additional suggestions for improvement in network planning, based on the literature review, stakeholder input and our own assessment, include:

- Ensure **improved communication, transparency and equality,** particularly for third-party promoters.
- Ensure stronger involvement of national authorities in NDPs.
- Consider the option of designating ACER or an **independent authority with no direct link to asset owners** to take up a monitoring role in TYNDP and PCI processes.
- Ensure a **coordinated and pan-European view** for infrastructure planning.

5.22.2 How adequate is the network modelling exercise (within network planning)?

Article 11 of the TEN-E Regulation requires the ENTSOs to jointly submit a consistent and interlinked electricity and gas market and network model to be used in the context of CBA (as determined by Annex V of the Regulation).

Evaluation based on literature review

On 21 December 2016, the ENTSOs jointly submitted a 'consistent and interlinked electricity and gas market network model'.[419] This model aims to ensure more consistent and interlinked TYNDP outcomes of both ENTSOs, so that the European gas and electricity infrastructure planning and assessment of infrastructure needs takes place on a consistent and transparent basis. This model is proposed as part of the CBA methodologies, with the key element being the joint development of scenarios by both ENTSOs. The result of implementing this common scenario module would include:

1) Same scenarios for the identification of infrastructure needs,
2) Same future for the TYNDP assessment,
3) Same data for the gas demand for electricity generation,
4) Same views on the heating sector, and
5) One scenario report for both organisations.

[418] While all gas PCIs were included on the TYNDP, two electricity PCIs were not. Further, PCIs are not always included in the NDPs of (all) the hosting Member States.
[419] ENTSOG & ENTSO-E (2016), ENTSOs consistent and interlinked electricity and gas model in accordance with Article 11(8) of Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013. 21 December 2016

ACER[420] has provided its views and recommendations regarding this model. ACER concludes that the model is inadequate and lacks several fundamental elements such as the input dataset, endogenous variables and output dataset, along with the relevant algorithms and their description. Furthermore, it mentions that the level of interlinkage proposed is insufficient, in particular regarding a) electricity generation from gas, b) split of gas and electricity consumption where they are substitutable, and c) power-to-gas. ACER recommends to include the following interlinkages: interaction of price formation processes, interaction of electricity and gas infrastructure developments and cross-sectoral influence of gas and electricity projects.

Stakeholder consultation

The respondents to the **targeted survey** acknowledged the need to take into account gas and electricity simultaneously in network planning in order to reach the most cost-effective infrastructure developments. While the interlinked scenario for gas and electricity (ongoing for TYNDP 2018) is a step in this direction, a stakeholder mentioned that the current modelling exercise does not yet fully consider energy infrastructure in an integrated way and thus does not allow to identify the best option (between demand side flexibility, grid enhancement or additional infrastructure) to address a particular bottleneck. Another stakeholder mentioned that the TYNDP scenarios play an important role in providing different long-term perspectives for the development of the energy sector towards the EU climate and energy targets. For the next TYNDP edition, these scenarios will be jointly developed by ENTSOG and ENTSO-E, based on a wider stakeholder engagement, ensuring a common energy landscape for assessing gas and electricity infrastructure projects.

At the **Network Planning Focus Group**, an NRA pointed to the importance of considering the mutual impacts of energy vectors (in particular gas to electricity, but also electricity to gas), which should be reflected in the ENTSOs integrated model. It was also mentioned that, while coordination between electricity and gas in the TYNDP preparation is not yet optimal, this only has an effect in few local areas and few infrastructures.

The same NRA referred to the ACER Opinion on the interlinked model 07/2017[421] which clearly states that the interconnected model provided by the ENTSOs in 2016 is not sufficient to meet the requirements of the Regulation. In the NRA's opinion, the model is not yet fit for purpose, but there is an improvement in the alignment of electricity and gas scenarios. The NRA acknowledged that it is probably too early to further adapt the modelling, and suggested to focus on local actions (including with regional groups' subsets involving electricity and gas) to discuss specific infrastructures (electricity and gas) jointly. The need for joint modelling for gas and electricity is confirmed by another participant at the meeting.

An **interviewed** NRA suggested that network modelling should be done by TSOs with a single network configuration for the whole European market (taking into account hydraulic variables) and simulating several contingencies. Nowadays, PCIs are mainly suggested by individual TSOs on the basis of the network modelling of each TSO. For gas, network modelling seems basically based on economic

[420] ACER (2017e), Opinion No 07/2017 on the ENTSOS' draft consistent and interlinked electricity and gas market and network model and ACER (2016f), The Agency's views on a consistent and interlinked electricity and gas market and network model -An opportunity to improve the Ten Year Network Development Plans beyond 2017

[421] http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Opinions/Opinions/ACER%20Opinion%2007-2017.pdf

parameters and does not consider hydraulic simulations. For electricity, the model considers more technical aspects, but it should be more detailed and take multivariable parameters.

The potential to improve the process is referred to by another NRA representative, who considers the network modelling exercise as further perfectible (notwithstanding considerable progress in the past). The exercise in itself remains an assessment of the costs and benefits based on assumptions and scenarios with high uncertainties. The need for a common network model for all countries is a challenging objective, considering that all TSOs/NRAs are used to work with their own methods and tools. Relying on more detailed assessments would be beneficial, but these tools, which are aimed to help the decision making process, cannot grasp all involved elements (for instance political aspects).

Analysis

There is no joint ENTSO modelling in place, and the only step implemented so far for the future TYNDPs has been to align the scenarios for electricity and gas. The first joint set of scenarios was recently released for public consultation (until 11 November 2017).[422] Where the interaction between gas and electricity is concerned, the ENTSOs included cross-sectoral technologies and presented common storylines (and datasets) on e.g. gas demand in power generation, substitution of gas by electricity in heating, and power-to-gas developments. Although storylines are coordinated, the ENTSOs have developed and retained separate scenario development methodologies for both sectors, as further explained in section 5.2 of the TYNDP 2018 scenario report. The document states that "Thanks to the new level of collaboration between ENTSOG and ENTSO-E, the output of electricity models now directly serves as an input for the gas scenarios power sector consumption profiles", also suggesting that this is indeed the only true (and static) link between otherwise two separate modelling exercises.

The first step has been taken by the ENTSOs, however, further development of an interlinked electricity and gas market and network model, as requested by the TEN-E Regulation, is still required. The ENTSOs clearly expressed their ambition in 2016 to develop "The Model", but the recent activities on the TYNDP 2018 and further steps to be taken do not account for joint modelling.

Conclusion

The Regulation requires the establishment of an interlinked electricity and gas market network model; a proposal has been submitted jointly by ENTSOG and ENTSO-E in December 2016. The aim is to improve energy infrastructure planning by considering interlinkages between gas and electricity on a consistent and transparent basis.

While progress has been made in this regard (particularly in the alignment of electricity and gas scenarios), the proposed **interlinked electricity and gas model remains inadequate and requires further work to properly meet the requirements of the Regulation** (consider energy infrastructure in an integrated way, consider mutual impacts, consider a single network configuration for the whole European market accounting for hydraulic variables). As both ENTSOs are autonomous to a certain extent, and ACER does not have the legal competence to impose its views, it might be difficult to reach an outcome which fully complies with the aims of the Regulation and the concerned authorities. A stronger steering/monitoring role for ACER or the European Commission could be envisaged.

[422] ENTSOG & ENTSO-E (2017) TYNDP 2018 Scenario Report Main report – Draft edition

While the common network modelling exercise for all countries is a challenging objective, this may only have an effect in few local areas and few infrastructures. For quick improvements, it is suggested to focus on local actions (including with regional groups' subsets involving electricity and gas) to discuss specific infrastructures (electricity and gas) jointly.

5.22.3 *Would relying on more detailed cost-benefit assessments for the selection of PCIs (beyond the results from TYNDPs) be beneficial to the process?*

The TEN-E Regulation requires ENTSO-E and ENTSOG to prepare a cost and benefit analysis methodology (CBA) to assess the transmission and storage infrastructure projects included in the Ten-Year Network Development Plans (TYNDP).[423] The CBA methodology is regularly updated by the ENTSOs, based on former TYNDP and PCI process experience, on consultation with stakeholders and on opinions from ACER and the Commission, and is subject to final approval by the Commission.

Evaluation based on literature review

The ENTSOs consulted with stakeholders, ACER and the European Commission to draft and refine the CBA, with the methodology being adopted by the Commission in early 2015. These include CBA 1.0[424] for electricity and a Energy System Wide Cost Benefits Analysis (ESW-CBA)[425] for gas. The CBAs provide cost and benefit indicators, all of which stem from European policies on market integration, security of supply and sustainability. For electricity, in order to ensure a full assessment of all projects' benefits, some indicators are monetised, while others are quantified in their original physical units, such as tons or kWh. The CBA methodologies are designed to be fully consistent across gas projects or electricity projects through the use of a single dataset, the same modelling tool, identical indicators and the same approach to monetisation.

In order to improve these methodologies, stakeholders recommended, for example, including information on potential environmental impacts as part of the CBA methodology.[426] Other issues raised, for electricity in particular, included that the CBA output is a set of indicators (including monetised, quantified and ordinal indicators) instead of comparable values, that CBAs are performed at cluster level (instead of at indivual PCI level), that the "Take-out one at a time"[427] approach is not appropriate (not at PCI level), and that security of supply and social & environmental impact indicators are discarded due to lack of data.[428] Regarding the gas CBA methodology, ACER noted that "the ENTSOG CBA methodology should be updated and improved to allow for a comprehensive monetisation, to the degree possible, of all benefits that a PCI at individual project level is expected to deliver".[429] There was very limited information made available for gas PCIs, which prevented ACER from carrying out a proper analysis of expected PCI benefits.

Since then, there has been progress and improvement in the methodologies for both electricity and gas. The new ENTSO-E draft methodology (CBA 2.0) was put forward for consultation in 2016 and is expected

[423] The JRC deals separately with the assessment of smart grids.
[424] ENTSO-E (2015b), Guideline for Cost Benefit Analysis of Grid Development Projects. Final - approved by the European Commisison
[425] ENTSOG (2015), Energy System Wide Cost-Benefit Analysis Methodology
[426] EEB & Birdlife International (2014), Connecting energy, protecting nature.
[427] The approach assesses how much value is destroyed by not building one cluster, while all other TYNDP projects are built.
[428] Presentation by Gianluca Flego (JRC) at the 2nd General Assembly of the INSPIRE-Grid Project (26 November 2015). Available from: http://www.inspire-grid.eu/wp-content/uploads/2015/12/06_CBA_applied_to_PCI.pdf
[429] ACER (2016a), Consolidated report on the progress of electricity and gas projects of common interest for the year 2015.

to be approved in 2017.[430] This new method has been discussed in different fora (including workshop, consultation, webinar, informal discussions) to include stakeholders' views. ENTSOG also organised a consultation in 2017 on the Energy System Wide (ESW) CBA update and a Project Specific CBA (PS-CBA 2017)[431] was published. Additionally, JRC published an updated methodology in 2017 on how to assess PCIs in the field of smart grids.[432] The new proposed methodologies would lead to improved outcomes, but continues to have weaknesses, in particular with regard to the monetisation of specific benefits and the identification and quantification of all relevant environmental impacts (see also comments of stakeholders).

Notwithstanding the progress, there is still criticism and room for improvement. Recommendations provided by ACER[433] on the electricity CBA 2.0 point in particular to two critical issues:

- The monetisation of cost-benefit indicators still requires more attention as the CBA Methodology 2.0 includes neither any reference to the suggested indicators nor explanatory examples.
- More clarity and transparency are required on the Socio-Economic Welfare (SEW) calculations, especially as this is the most relevant project benefit item.

ACER's paper 'Position of the Agency on Potential Improvements to the Energy Infrastructure Package'[434] proposes the following improvements concerning the scenarios and CBA methodologies:

1) ACER should have the power to **approve** the ENTSOs' Scenario Development Report and CBA Methodology and to directly amend it (after consulting the ENTSOs) and publish it. This should be done within an appropriate timeframe to avoid delays.[435]
2) ACER should have the power to issue **binding** guidelines on major CBA-related deliverables (i.e. Scenario Development Report, CBA Methodology and TYNDP)[436].
3) Delete Annexes IV(2) and IV(3) of Regulation (EU) No 347/2013 regarding the evaluation of the selection criteria for PCIs as applicable to CBAs (or at least provide more flexibility). The evaluation methodology should be established by the regional groups.

Stakeholder consultation

Respondents to the **public consultation** highlighted that:

- A methodology to measure security of supply benefits is needed.
- The methodology to assess sustainability criteria should be clearly defined and communicated.
- CBA must take into account the impact of new projects on grid tariffs.
- The need to monetise all possible impacts in the CBA and to include the social welfare calculation in order to avoid a bias inherent to a multi-criteria CBA.
- CBA for Pumped Storage Hydro projects needs to be improved (in terms of monetisation of positive externalities, longer lifetime) and grid charges need to be aligned with those for generation.

[430] ENTSO-E (2016b), Guideline for Cost Benefit Analysis of Grid Development Projects - Version for ACER official opinion, 29 July 2016
[431] ENTSOG (2017), PS-CBA 2017: Guidance for users.
[432] JRC (2017a), Assessment Framework for Projects of Common Interest in the Field of Smart Grids
[433] ACER(2017c), ACER Opinion No 05/2017 of 6 March 2017 on the draft ENTSO-E guideline for cost benefit analysis of grid development projects
[434] ACER (2017f), Position of the Agency on Potential Improvements to the Energy Infrastructure Package. 31 May 2017
[435] ACER points out that the approval process of the CBA methodology is lengthy. Developing and approving the current CBA methodologies had taken over 20 months (spring 2013 to February 2015).
[436] Which may also address aspects related to the fair treatment of all project promoters and the transparency of the process.

Another stakeholder argued that the lack of transparency on the project costs may reduce the credibility of the CBAs. However, while both the CAPEX and OPEX are part of the PCI assessment performed, these values are not always published which may have led to this comment.

Respondents to the **targeted survey** expressed positive feedback, acknowledging that the CBA methodology applied in TYNDP and PCI processes ensures a level-playing field assessment of projects. Other respondents mentioned that the methodologies should be improved/simplified significantly. Key issues highlighted are:

- CBA methodology follows a project by project basis, which is fair for competing projects. Nevertheless, it leads to more projects being included in the TYNDP than necessary, and there is no optimisation of the investments in the long term. Single projects which do not have the best CBA result on their own, might be very beneficial in combination with others.
- CBA methodology does not adequately capture benefits of storage projects. The ad-hoc methodology adopted in the regional groups is not necessarily consistent between projects and, according to some project promoters, has no legal basis.
- CBA criteria for social & environment impacts should be strengthened. CBA approach often fails to capture the full 'costs' of environmental impacts. Need to further consider how environmental impacts can be better reflected and taken into consideration in the CBAs.
- It was suggested to use tailor-made scenarios and dataset (not TYNDP scenarios), to cover a longer time period, and to include different scenarios.
- Additional work is needed for the monetisation of security of supply benefits.

At the **Network Planning Focus Group**, stakeholders recognised that the CBA methodology can still be improved (especially for gas), but work is ongoing in this regard (with both ENTSOs working on updated CBA methodologies). An NRA representative mentioned that no additional models/analyses (in addition to CBA results stemming from the TYNDP) should be used for the selection of the PCIs. The TYNDPs, however, should be improved. The stakeholder also added that the project assessments for TYNDP (CBA) and PCI selection should be more closely linked in order to avoid double assessments or inconsistencies.

An NRA representative mentioned that a major challenge is to quantify all project's benefits (other than consumer and producer surpluses), and suggested there should be clearer focus on monetised benefits and on the final economic calculation of net benefit (or benefit/cost ratio). The stakeholder also highlighted that the quality of the CBAs and scenarios is not considered good enough to be used for the PCI selection and CBCA process for gas projects.

An ACER representative highlighted that the uncertainty regarding monetised benefits has a limited impact on the CBA results given the long term horizon of projects (minimum 10-15 years). While this uncertainty cannot be removed, it can be addressed via e.g. sensitivity analyses on key factors that impact the outcome (such as prices, etc.). ENTSO representatives confirmed that sensitivity analyses could be envisaged and stressed that they expect the next version to be more in line with the ACER recommendations and opinions. They are currently discussing with ACER and the EC on possible improvements of their methodologies.

Stakeholders acknowledged in general that there are several improvements in the proposed CBA 2.0 methodology.

Electricity

An ENTSO representative mentioned that for electricity, there is a methodology that maps all relevant impacts of the project (not everything monetised, but there is a view on how it behaves in the scenarios). ENTSO-E is currently working on CBCA 2.0 and on the basis of received feedback from the EC it will start working on CBA 3.0 which is expected to offer more stability. The aim is to provide a full view of costs and benefits of the project to support decision makers.

An NRA mentioned that ENTSO-E itself is not yet dealing with the costs, but rather receives this information from the project developers. There might be a need to review this information as a basis for evaluation and comparison. ENTSO-E confirmed this could be worked out by using standard costs.

Gas

An ENTSO representative stated that for gas, the CBA methodology proposal will be submitted to the EC and ACER after the public consultation.[437] The process includes work from expert teams on market and network studies, and dedicated teams per region doing the CBAs within the six ENTSOG regional groups. The gas TSOs are following the same approach as the electricity TSOs, aiming to present the relevant project information (costs and benefits) in a short, simple and transparent way.

The same representative recalled that some elements (such as the project's impact on SoS) are difficult to monetise. Stakeholders are also in favour of more market modelling; however, models are becoming complex, and ENTSOG wants to make sure it can run the modelling in a reliable and comprehensive way. At the moment certain aspects such as market participants' behavior, are difficult to model; and while the TSOs can assess the impact of network transmission tariffs, they still need reliable storage and energy supply data and prices to avoid presenting a distorted view.

A TSO added it is important to check whether additional market information would in fact be useful and whether it would make the assessment more resilient. In his view, system needs are more important than market aspects.

Scenarios

An ENTSO representative mentioned at the **Network Planning Focus Group** that scenarios are key, since they frame the future planning. A TSO highlighted that it is not possible to agree on the "perfect" system or scenarios. Stakeholders acknowledged the large uncertainty regarding the selection of scenarios[438] and understand they cannot be optimal, since by definition they are hypothetical. A TSO added that the aim is to consider a diversity of possible evolutions (scenarios) in the assessments in order to "test" the infrastructure.

ENTSO representatives explained that there is now a common gas and electricity scenario, based on five storylines. Previously electricity and gas planning exercices were run in parallel, but now there is a coordinated approach. Based on input from Member States and NRAs, three storylines were selected[439] for the scenarios (all of which are in line with the 2030 targets). The joint scenario report will be

[437] For 2018 the process is still under consideration, but the aim is to make it more streamlined and centralised.
[438] E.g. Gas demand has been difficult to predict (e.g. economic crisis, impact of ETS, etc. and a number of policy changes that could not be anticipated). For 2017 for the first time the short-term demand evolution was underestimated.
[439] We notice a big discrepancy in the scenario preferences of MSs and NGOs.

published in September for consultation. One of the scenarios is selected for CBAs. Stakeholders present agreed that convergence for electricity and gas is positive.

An NRA stated that a balanced spectrum of future developments should be considered. The stakeholder clarified that previously (TYNDP 2014), the scenarios were extreme options, but since then (TYNDP 2016) a best estimate scenario is presented and the other scenarios are less extreme.

At the **Regulatory Focus Group,** ACER recalled that the different scenarios used by the ENTSOs are based on rather opposite developments (e.g. very high/low RES) and the probability of an individual scenario to become reality is zero. ACER also highlighted that TSOs had too much autonomy given that there is no approval from the EC or ACER of this process. ACER had already commented on these issues in a non-binding opinion.

An NRA suggested that the policy objectives from TEN-E could guide the scenario development. Providing more clarity would be helpful, e.g. reference scenarios which depict the future that should be achieved by implementing the PCIs. The proposed approach is to look at the different futures and assess the projects based on what NRAs estimate as being likely. DG ENER added that in the 2018 TYNDPs, ENTSOs will align one vision with EUCO2030 (PRIMES), which makes a link to the energy and climate objectives and has been widely consulted with MSs.

In the **interviews,** an NGO mentioned that it is necessary that CBAs, as part of the TYNDPs, fully include the environmental and social impacts of projects.

Conclusion

The literature review and stakeholders consultation did not suggest that more detailed cost-benefit assessments for the selection of PCIs (beyond the results from TYNDPs) would be beneficial to the process. The use of the same CBA results for both the TYNDP and PCI processes seems rational and ensures a level-playing field assessment of all projects. However, taken into account the high economic impact of PCIs, more detailed CBAs could be appropriate, at least for large and competing projects, in order to better underpin decisions. Such a complementary evaluation could consist of a more comprehensive multi-criteria evaluation as well as a sensitivity analysis to evaluate the outcome on the basis of changing critical variables, e.g. load factor, discount rate, time horizon, lifetime of the assets, etc.

Nonetheless, priority should be given to further improving the CBA processes. While both CBA methodologies (for electricity and gas) have undergone a revision process and several weaknesses have been addressed, there is still room for improvement concerning, among others, the monetisation of all benefits, the proper inclusion of environmental aspects, as well as increased clarity and transparency on the calculations and results. More effort should be placed on ensuring that adequate methodologies are developed, communicated and applied properly and consistently (for both gas and electricity).

It is also important to ensure that the inputs for the CBAs (including the scenarios) are properly chosen. Common scenarios for electricity and gas are being developed by the ENTSOs to ensure a coordinated approach which is also in line with the energy and climate objectives.

5.23 ES.3 - Link between Transmission and Distribution in the PCI Framework

5.23.1 How adequately is the interface and inter-linkage between transmission and distribution grids reflected in the PCI framework?

The Regulation focuses on trans-European electricity and gas infrastructure, which mainly consists of HV transmission lines and HP pipelines. The Regulation also refers to distribution networks for gas and electricity: its definition of "project promoter" encompasses both TSOs and DSOs, and the link between electricity transmission and distribution networks (their efficiency and interoperability) is explicitly mentioned in Article 4 which determines the specific criteria for smart grid PCIs.

Evaluation based on literature review

Overall, TSOs and DSOs have similar responsibilities in transmission and distribution respectively, including: maintenance and construction; planning for outages; infrastructure development or operational alternatives to meet connection requests; and ensuring system security and quality.[440]

TSOs have specific responsibilities in the TYNDP framework, including adequacy forecasting and the assessment of future transmission network planning needs.[441] During their respective network planning, there is mutual information sharing between DSOs and TSOs, but the methodology and type of information shared vary between countries. DSOs usually feed into the TSOs' planning process; though

[440] CEER (2016b), CEER position paper on the future DSO and TSO relationship (Ref:C16-DS-26-04)
[441] CEER (2016b), CEER position paper on the future DSO and TSO relationship (Ref:C16-DS-26-04)

there are no obligations for the TSOs to take DSOs comments or suggestions into account in their planning. There is, however, no evidence at the present that the current planning process of trans-European infrastructure, and in particular of PCIs, would be suboptimal due to a lack of proper coordination with DSOs.

The changes brought by the energy transition (including decarbonisation, decentralisation and digitalisation) have important impacts on network planning and operations at both transmission and distribution levels, implying new roles for DSOs and TSOs. DSOs will host more (intermittent) generation, thus requiring properly integrated network planning with TSOs in order to be able to opt for macro-economically and technically appropriate design and development of grids, and in order to allow optimal integration of RES into the grids. TSOs, on the other hand, will host less centralised power generation but long distance transport across EU will gain importance. The use of innovative technologies will be key to increasing the performance and capacity of grids. Greater cooperation between DSOs and TSOs is required to ensure the most efficient solutions are implemented; while a coordinated approach to system development can optimise network development costs.[442]

In the context of the new challenges related to the energy transition several initiatives are being taken to improve the cooperation and coordination between TSOs and DSOs in network planning. In 2015, EDSO, ENTSO-E and Eurelectric published their "General Guidelines for Reinforcing the Cooperation Between TSOs and DSOs"[443] regarding data management, active/reactive power, and coordinated network planning. This document comprises a 'Use Case' on network planning, which provides an overview of processes related to network planning and the related data exchange between TSOs and DSOs. It is based on the draft guideline on transmission system operation (GL SO), which contains significant references to data exchange between DSOs and TSOs related to a.o. network planning. In 2016, CEER published a paper highlighting the future principles for transmission and distribution network planning, including the need to take into account their interactions when developing network plans and to cooperate to produce generation or injection forecasts, demand scenarios and models.[444]

Stakeholder consultation

There was limited feedback from the **Network Planning Focus Group** regarding the interlinkage between transmission and distribution (which is more relevant for electricity than for gas). For electricity, most new RES based generation capacity is connected to medium or low voltage grids, so the function of distribution grids is evolving and also affecting the network planning at transmission level. This development should be taken into account to reach an optimal overall network planning and to avoid structural congestion at one or another voltage level.

An ENTSO representative responded that this development is effectively taken into account: one of the TYNDP scenarios is 'distributed energy'; it will be assessed in the next TYNDP for electricity.

An NRA mentioned that the link between transmission and distribution grids is mostly absent in the PCI framework but stressed that this is not a major problem. The relevant impact from distribution grids is the availability of flexible resources connected to the distribution grids (e.g. demand response). This impact can be taken into account via general assumptions about energy demand, which is the current

[442] CEER (2016b), CEER position paper on the future DSO and TSO relationship (Ref:C16-DS-26-04)
[443] CEDEC et al (2015), General guidelines for reinforcing the cooperation between TSOs and DSOs
[444] CEER (2016b), CEER position paper on the future DSO and TSO relationship (Ref:C16-DS-26-04)

approach. While this NRA representative agreed that coordinated network planning is key to optimise the overall energy system, the stakeholder stressed it is not an issue for PCIs and he does not see the need to better integrate distribution data into the PCI selection process.

Gas stakeholders mentioned that there are limited cases in which the interlinkage between transport and distribution network planning is an issue for gas, though it might be an interesting topic to explore further. For example, in France, at some local points the distribution network cannot handle more biomethane in feed during the summer and the options are to curtail injection or to build reverse capacity to evacuate the methane. This might happen more frequently in the future as France has the ambition to replace 10% of its natural gas consumption by biomethane by 2020. Other stakeholders agreed that avoiding RES curtailment would contribute to sustainability and would benefit EU economy.

Energy sector representatives confirmed during **interviews** that coordination of network planning issues between TSOs and DSOs is important, and necessary, for instance, to avoid that cross-border capacity cannot be optimally used due to domestic bottlenecks, but consider that the current situation is not critical and that in the context of the TYNDP elaboration no new legal initiatives are necessary.

Conclusion

At the moment, there is limited direct involvement of DSOs in the TYNDP framework (led by the ENTSOs); TSOs and DSOs exchange information during their respective network planning processes at national level, but their methodology and data exchange models are not (yet) harmonised. Several initiatives are currently being taken to streamline the information exchange and network planning coordination between TSOs and DSOs, which is important to optimally cope with the ongoing changes due to the energy transition. Closer cooperation and coordination between TSOs and DSOs for network planning will be required to ensure the most efficient solutions are implemented. The need for a reinforced cooperation is also linked to the "new" role of distribution grids, which is evolving and affecting the planning at transmission level due to the increasing integration of RES based generation capacity at the distribution level.

Regarding the PCI framework, the link to distribution is currently limited, and, if DSOs are properly involved at national level in the elaboration of the NDPs, it is not deemed necessary to also involve them in the PCI selection process. While the Regulation includes DSOs as potential project promoters, they are only directly involved in smart grid PCIs. Regarding network planning, one of the relevant impacts from distribution grids is the availability of flexible resources (e.g. demand response and local storage) which is taken into account via general assumptions about the evolution of energy demand and residual load.

5.24 ES.4 – PCI Selection Process

5.24.1 How effective is the process of PCI identification in selecting projects that are most relevant to the fulfilment of policy objectives?

Article 3 of the TEN-E Regulation defines the process for adopting the Union list of PCIs while Article 4 provides the criteria for PCIs (see Figure 5-20 in section 5.21.1). The policy objectives that PCIs aim to address, based on the criteria set in Article 4, are:

- To enhance market integration and increase competition in energy markets;

- To enhance security of supply;
- To contribute to the EU's energy and climate goals, in particular by facilitating RES integration.

The PCI selection process is based on the NDPs (which are mainly based on national interests) and TYNDPs (which take an EU centric approach) prepared by the ENTSOs. Furthermore, the process involves consultation with multiple stakeholders (within the regional groups and via a public consultation) to ensure broad consensus of the adopted list by the EC. At the regional level, the regional groups rank the PCI candidates based on their aggregated contribution to the PCI selection criteria, and draw the regional PCI lists which are then adopted by the EC in the Union list.

Evaluation based on literature review

Several points of criticism regarding the PCI selection process are found in public documents, namely on the stability of the PCI label and the (high) number of PCIs (and its implications).

As PCIs have to undergo the selection process every two years, they **risk losing their 'priority' status during implementation as well as losing further financial support**.[445] This risk can hamper projects' proposal and implementation and the impacts should hence be assessed further. ENTSO-E recommends that PCIs should keep the PCI label as long as they stay on track. This is especially important for projects in the permitting or even construction phase, so that no additional risks come up. The view of ENTSO-E that "infrastructure implementation should benefit from longer-term stability of the PCI label" is further elaborated in the similarly named handout provided at the Energy Infrastructure Forum in June 2017.[446] Ensuring stability of the label would also improve reporting on PCIs. Currenty, reporting for projects which lose the PCI label is not required; therefore, there is no comprehensive overview of the PCIs and their progress.[447]

The PCI list contains more projects than initially envisaged, also due to the fact that it **comprises competing projects**. The list also **comprises projects of varying maturity**. Less mature projects may lack proper data availability to calculate certain indicators required in the CBA[448], they are subject to rescheduling as they can be conditional upon market or network developments, or upon the progress of other projects.[449] ACER suggests **assessing the degree of maturity of PCIs at the selection stage**, so that the uncertainties inherent to less mature projects are identified, while not necessarily preventing such projects from being included in the PCI list. [450] However, other stakeholders would rather keep a short list and exclude less mature and controversial projects.[451] ACER also suggests that, if a project promotor continuously fails to provide the necessary information for monitoring or if the PCI reports no activity for two consecutive years, the PCI should not be maintained/placed on the list and retain its PCI status, thus limiting the length of the list.[452]

[445] ENTSO-E website accessed 21 April 2017: http://tyndp.entsoe.eu/insight-reports/common-projects/#enabling-investments-with-cross-border-impacts
[446] Provided to us by a stakeholder: "Infrastructure implementation would benefit from longer-term stability of the PCI label" (May 2017), Handout for Energy Infrastructure forum 1-2 June 2017.
[447] This issue was for example encountered in our analysis of the CBCA decisions (see footnote 'e' on progress level of PCIs in Table 5-8). As former PCIs are not monitored anymore, it is in this case not possible to say draw a conclusion on the possible effect of CBCA decisions on the progress of these former PCIs.
[448] Presentation by Gianluca Flego (JRC) at the 2nd General Assembly of the INSPIRE-Grid Project (26 November 2015). Available from: http://www.inspire-grid.eu/wp-content/uploads/2015/12/06_CBA_applied_to_PCI.pdf
[449] ACER (2016a), Consolidated report on the progress of electricity and gas projects of common interest for the year 2015
[450] ACER (2016a), Consolidated report on the progress of electricity and gas projects of common interest for the year 2015
[451] Letter to the Commissioner for Energy from EEB regarding "Selection process for energy infrastructure Projects of Common Interest" dated 12 June 2013. Available from: http://www.eeb.org/EEB/?LinkServID=3AE45BAE-5056-B741-DBF188A00C893230&showMeta=0
[452] ACER (2016a), Consolidated report on the progress of electricity and gas projects of common interest for the year 2015

NGOs mention that **additional transparency and a more structured approach are needed in the selection of oil PCIs** in particular, which does not take place in a regulated scheme such as electricity and gas PCIs within the TYNDP framework.[453] Other stakeholders argue for additional and/or more transparent information, especially regarding the environmental, social and climate impacts of PCIs.[454] The fact that **there are only very few smart grids projects in the PCI list** is also mentioned as a critical factor.[455] It was suggested to **include innovation** as a specific criterion in the selection process and to increase stakeholder participation (i.e. to involve technology providers in the regional groups in order to better evaluate the added value of innovative projects such as smart grids).[456]

Other aspects which are relevant to the PCI selection process and need further improvement are the CBA and related scenarios. For example, CBA results have been found insufficient for CBCA decisions and highly uncertain. These aspects are further discussed in section 5.22.2.

Stakeholder consultation

During the **public consultation**, several suggestions were provided regarding PCI selection:

- Prioritise smart grid projects and introduce less stringent eligibility criteria for smart grids, especifically regarding the cross-border and 10kV criteria.
- Prioritise interconnection of islands and include objectives and criteria for trans-European island networks.
- Take into account the role of energy efficiency and demand-side management when selecting PCIs.
- Clarify cross-border relevance criterion. One relevant dimension could be the socio-economic welfare for both hosting and non-hosting countries.[457]
- Facilitate infrastructure which enables the use of domestic sources, to mitigate energy dependency and improve supply diversification.
- Perform the assessment only by using measurable parameters
- Only implement projects with measurable positive impacts
- Selected projects should not duplicate existing infrastructure which is not fully utilised.
- Storage should be treated on the same level as other electricity infrastructure.
- The contribution of PCIs to the EU's decarbonisation targets should be a selection criterion.
- Need for increased transparency in the process.

Feedback received via the **targeted survey** suggested, among other suggestions, that a more dynamic and shorter process for identification of PCIs would be appropriate. It was also suggested to review the eligibility criteria for smart grids in order to allow projects at MV level, and to adopt a more flexible interpretation of the cross-border criterion.

[453] Justice and Environment & CEE bankwatch network (2014), Recommendations for the Improvement the PCI Designation Process and the Adjacent Public Consultation.
[454] Justice and Environment & CEE bankwatch network (2014), Recommendations for the Improvement the PCI Designation Process and the Adjacent Public Consultation.
[455] Orgalime (2016), Position paper: Follow up comments to the meeting of TEN-E regional and thematic groups for electricity, gas, oil and smart grids
[456] Orgalime (2016), Position paper: Follow up comments to the meeting of TEN-E regional and thematic groups for electricity, gas, oil and smart grids
[457] For example, for a cross border transmission asset, it could be relevant to consider the ratio: (producer surplus+ consumer surplus+ additional congestion rents for other borders)/overall benefits of the project; for an internal line or a generation or storage infrastructure: (producer surplus in other bidding zones+ consumer surplus in other bidding zones + additional congestion rents on all borders)/overall benefits. If such an indicator is used, the threshold to characterise cross border relevant projects should be detailed and duly justified.

At the **Network Planning Focus Group**, representatives from JRC and DG ENER highlighted the positive feedback on the current approach (third PCI list). There has been a discussion within the regional groups regarding the most critical problems in the region, in view of developing a list of infrastructure needs per region. The PCIs are then selected based on the extent to which they address these identified needs. Some projects may be ready to be implemented while other need further studies to assess if they are viable, but they all need to go through the same process. Dealing with the different levels of maturity is a challenge during the process.

The ENTSOs highlighted that the current approach is result oriented, focusing on projects which solve the regional infrastructure needs, but they acknowledged that the process is still under review. They stressed that there is already a close link between the CBA, TYNDP and PCI selection: the project specific CBAs are currently using TYNDP data and when the new proposal will be adopted, CBAs will be run as part of the TYNDP process.

PCI selection and link to NDPs

An NRA suggested that a more thorough analysis should take place before the selection process to ensure that only feasible and really needed PCIs are included in the list, mostly via a stronger role of national plans and national scrutiny (including consultation). Such an approach (using national processes) might disburden regional groups and enable them to only discuss questions of strategic importance and relevant PCI Candidate Projects.

An ENTSO representative responded that filtering is not so important, and that information on project maturity is available. However, information on financeability (from a regulatory perspective) is only available afterwards (although some stakeholders would already know the project's impact on tariffs). DG ENER mentioned that including financeability criteria at an early stage would be counterproductive, since the PCI list should allow risky innovative solutions (which may receive funding for studies). A TSO added that, for regulated gas projects, financeability falls on the regulator's side; the business case of most new investments is difficult to assess due to the uncertainty with regard to short term bookings. This is in particular a problem for cross-border infrastructure projects, for which the business case also depends on the likelyhood of a supply crisis.

PCI selection criteria

The representative of an environmental NGO suggested to include energy efficiency as a selection criterion for PCI projects, but other participants at the focus group argued this would not be in line with the TEN-E framework, which focuses on pan-European networks.

An NRA mentioned that the cross-border criterion should also be properly applied for smart grid projects (even if some TSOs/PPs recommend not to apply it for this type of projects). The stakeholder highlighted that cross-border relevance is in the Treaty (TFEU) and in the aim of TEN-E (development of trans-European networks) and PCI (common interest).

According to several **interviewees,** the current PCI identification process is not optimal and could/should be further improved, in order to lead to the selection and realisation of the most needed projects from a macro-economic EU perspective.

An NRA expert considered that the PCI identification and evaluation are often based on outdated scenarios and assumptions with regard to the energy mix and on inconsistent definitions (e.g. an LNG terminal is in the security of supply evaluation considered as one source), which can lead to the selection of PCIs which have a relatively low added value (and might become stranded assets in the medium term).

Another NRA expert suggested that the PCI selection should include country specific data. Some stakeholders argue that including these types of data might lead to (more) public opposition to PCIs, but the NRA expert believes that more transparency at an early stage leads to better decision-making. Also, there should be full coherence when submitting CBAs in the selection process and in the CBCA procedure. Changes in data between the two processes should be avoided, and if they are necessary, they should be made transparent.

A project developer criticised the dominant position of ENTSO in the PCI assessing process, and referred to potential conflicts of interest, which might result in an unlevel playing field for projects of TSOs versus projects of other developers. The stakeholder argued that there is also an asymmetry in the access to information between TSOs and other project promoters. Non-ENTSO project promoters do not have access to detailed data, but only to the results of the simulations. ACER asked for opinions on its annual assessments, but independent developers cannot provide input due to lack of information on the data and methodology.

An NGO suggested that PCI candidates should be evaluated taking into account their full lifespan under scenarios compatible with European climate and energy objectives. During the compilation of the first and second Union list, the assessment of the PCI candidates suffered from incomplete and insufficient data for projects suggested for the regional draft list, a problem of specific importance for controversial projects that entail severe environmental and social impacts. This very much hurts the credibility of the PCI list and leads to major delays in the implementation of listed projects. All required information should hence be timely provided by project promoters.

Conclusion

On the basis of our literature review, stakeholder feedback and our analysis, we conclude that the PCI selection process has substantially improved since the first PCI list, but further progress is necessary to ensure the selection and realisation of the most needed projects offering the highest value from an EU perspective, taking into account the key policy goals (competitiveness/market integration, security of supply and sustainability). Stakeholders have given positive feedback regarding the result-oriented approach taken for the 3rd list (which focused on identifying the most critical problems in the region and selecting PCIs to address them). The improved link between CBA, TYNDP and PCIs is also acknowledged (CBAs are now developed as part of the TYNDP process).

Specific points of criticism regarding the PCI selection process focus on the administrative burden for promoters to maintain the PCI label by reapplying for PCI status and the high overall number of PCIs on the list. Another issue of concern is the need for additional and/or more transparent information, especially regarding the environmental, social and climate impacts of PCIs (which is linked to the required improvement of CBAs). Stakeholders also suggested several aspects to prioritise and change in the PCI selection, in particular a more thorough ex-ante analysis and scrutiny of potential PCI projects at national level before the PCI selection process at regional/EU level. The bottom-up

approach taken and the leading role(over)involvement of the ENTSOs are also considered as critical aspects. These issues are further discussed in section 5.22.1.

5.24.2 Pros and cons of focusing on the limited number of strategic projects (e.g. as agreed by individual HLGs)?

A specific list of strategic projects has been drafted by individual HLGs in the context of the CESEC MoU and the Madrid Declaration (South-West Europe). These lists do not have any legal status under the PCI framework, which has its own ranking process. This question centres on the idea of having a stricter process of PCI prioritisation and hence a limited number of strategic PCIs (e.g. as agreed by individual HLGs). A stricter PCI selection process would also have an impact on the ability of projects to access funds.

Evaluation based on literature review

The CESEC HLG selected a limited number of key projects which bring the overall largest benefits to the region, contributing to security of supply and facilitating price alignment between markets (which should also lead to competitive wholesale prices and affordable prices for final consumers). Based on an assessment performed by the Regional Centre for Energy Policy Research (REKK), and approved by the CESEC High Level Group, the CESEC priority projects[458] are:

- Trans-Adriatic Pipeline (TAP): PCI 7.1.3
- Interconnector Greece-Bulgaria (IGB): PCI 6.8.1
- Interconnector Bulgaria-Serbia: PCI 6.10
- Phased Bulgarian system reinforcement
- Phased Romanian system reinforcement
- LNG terminal in Croatia (with phasing potential): PCI cluster 6.5.1
- LNG evacuation system towards Hungary: PCI cluster 6.5.2

The CESEC conditional priority projects are:

- Connection of off-shore Romanian gas to the Romanian grid and further enhancement of the Romanian system
- Interconnection Croatia-Serbia
- New Greek LNG terminal: PCI 6.9.1

The South West Europe HLG, in the Madrid Declaration[459], also highlighted a number of key projects:

- Phase-shifter transformer, planned for 2017, in Arkale (ES): PCI 2.8
- Electricity interconnection Portugal - Spain, between Vila Fria - Vila do Conde - Recarei (PT) e Beariz - Fontefría (ES): PCI 2.16.2 (no longer PCI) and PCI 2.17
- Biscay Bay electricity project connecting the Biscay/Gascoigne Bay in Spain to the Aquitaine area in France: PCI 2.7
- France Spain interconnections via the Pyrinees (Electricity projects concerning Cantegrit and Navarra or Pais Vasco, and concerning Marsillón and Aragon): PCI 2.27

[458] As defined in the CESEC MoU (Annex II – Action Plan) - https://ec.europa.eu/energy/sites/ener/files/documents/CESEC%20MoU%20Annex_II%20Action%20Plan.pdf. Note that for several projects the link to the PCI list is unclear and therefore not specified

[459] Madrid Declaration. Energy Interconnections Links Summit (Spain-France-Portugal-European Commission-EIB). Madrid, 4 March 2015. Available on: https://ec.europa.eu/energy/sites/ener/files/documents/Madrid%20declaration.pdf

- Gas interconnection project MIDCAT to complete the Eastern gas axis between Portugal, Spain and France, allowing bidirectional flows between the Iberian Peninsula and France: PCI 5.5
- "Val de Saône" project to guarantee the Spanish and Portuguese access to the European Gas Market: PCI 5.7.1

This Madrid Declaration states that all three countries (Spain, France and Portugal) will continue to closely coordinate with the aim of developing and following-up the interconnection projects, assessing their financing needs and monitoring their progress. Furthermore, it tasks the HLG to provide technical assistance to MSs to monitor the routes of the Pyrenees projects, facilitating construction, presentation, selection and financing of PCIs to reach the 2020 interconnection target.

Stakeholder consultation

A stakeholder mentioned in the **targeted survey** that it is hard to justify and explain the urgency and relevance of each project to concerned communities given the large number of projects awarded a PCI label. In this regard, having a limited number of strategic projects at HLG level might bring benefits in terms of prioritisation, communication and public acceptance. A stakeholder also highlighted that the large number of projects identified as PCIs does not allow for a more focused monitoring and streamlining contribution to the projects by the HLGs. It would be useful if the number of projects was reduced and the regional groups or HLGs had more time and resources to focus on the most important projects and the obstacles that prevent their timely implementation.

Another stakeholder mentioned that additional filtering of PCI candidates should be carried out at an early stage, during network planning, to remove non-robust projects from electricity and gas TYNDs.

An NGO **interviewee** argued that the current selection process might not be sufficiently strict to ensure that the Union list of PCIs is limited to projects which contribute the most to the implementation of the strategic energy infrastructure priority corridors and areas.

Conclusion

Prioritisation of strategic trans-European energy projects by HLGs is not defined under the TEN-E Regulation and only two (of the four) HLGs have established their lists of strategic projects. There is very limited information regarding the pros and cons of this approach, but a more selective process which focuses on strategic regional or EU wide priorities seems a priori an efficient approach. Several stakeholders also mentioned that a shorter list of strategic projects might bring benefits in terms of public acceptance, monitoring and support towards timely implementation. It is important to have a consistent approach in order to define which PCIs are considered 'strategic' by HLGs. At the same time, there should be a clear link between the selected strategic projects at HLG level and the identified PCI candidate projects.

5.24.3 What changes in the PCI selection process could result in stronger commitment of all the actors to the timely approval and realisation of PCI projects?

This question does not refer to specific provisions in the Regulation but focuses in general on suggestions to adapt the PCI selection process in order to contribute to a timely realisation of PCIs.

Evaluation based on literature review

We believe that in order to enhance the commitment of all concerned actors to a timely approval and realisation of PCIs, several initiatives could be considered, e.g. the PCI list could get a more binding status, the selection process could become more inclusive with a stronger link to NDPs and stronger involvement of national regulators and CAs, the PCI list could become more selective and only include mature projects, for each PCI an MOU could be established to have a firm commitment of all concerned parties (project developers, CAs and NRAs), the monitoring role of the regional groups could be enhanced and for each PCI individual members could be designated for specific follow-up.

Reinforcing the binding character of the PCI list would be helpful to increase the impetus to get the priority projects timely approved and built. The counter argument is that the PCI list is a starting point of valuable projects of which some are not yet mature and others are competing with each other. If the PCI list would become final and binding, more ex ante scrutiny would be needed in the selection process. This might lead to eliminating promising projects that are not yet mature or are competing with other candidate projects. There is no evidence that this approach would lead to a better outcome, also taking into account that a binding status of the PCI list will in principle not specifically facilitate the permitting procedure or public acceptance.

A more inclusive, effective and transparent selection process at all levels (national, regional and EU level) would be helpful to increase acceptance of the PCI list.[460] Issues in the PCI selection, include[461]:

- Lack of sufficient transparency (limited information available on the candidate projects, including EIA findings),
- Insufficient public participation (late engagement and insufficient opportunity and time to comment, superficial engagement, no evidence that consultations influenced the list), and
- Lack of appropriate consideration of environmental and climate objectives.

It seems important to properly address these issues rather than to focus on specific suggestions to enhance the level of commitment of the actors. Most actors seem indeed effectively committed to timely approve and realise PCIs, and delays are mainly due to permitting and public acceptance problems.

NGOs have provided a number of suggestions that they feel would improve the process.[462] These included, for example, describing each project (including EIA results) in detail and providing a clear motivation for the PCI status as well as providing enough time for consultation.

In February 2016, ACER communicated a proposal to the Commission, which partly addressed the issues described above. ACER proposed "to establish a Cooperation Platform to support the work of the regional groups and to facilitate the third PCI selection process"[463]. Such a platform would bring together the EC, the ENTSOs, ACER and NRAs to perform preparatory work and to make constructive

[460] Justice and Environment & CEE Bankwatch Network (2014), Recommendations for the Improvement the PCI Designation Process and the Adjacent Public Consultation.
[461] EEB & Birdlife International (2014) & Justice and Environment & CEE Bankwatch Network (2014) & Letter to the Commissioner for Energy from EEB regarding "Selection process for energy infrastructure Projects of Common Interest" dated 12 June 2013. Available from: http://www.eeb.org/EEB/?LinkServID=3AE45BAE-5056-B741-DBF188A00C893230&showMeta=0
[462] See Justice and Environment & CEE Bankwatch Network (2014) & Letter to the Commissiner for Energy from EEB regarding "Selection process for energy infrastructure Projects of Common Interest" dated 12 June 2013. Available from: http://www.eeb.org/EEB/?LinkServID=3AE45BAE-5056-B741-DBF188A00C893230&showMeta=0
[463] ACER (2016d), Agency's letter on proposal to establish a Cooperation Platform to support the work of the Regional Groups and to facilitate the third PCI selection process, 2 February 2016.

proposals to the regional groups on key aspects of the PCI selection, in an informal cooperation group. These potential changes are intended to address concerns relating to transparency with respect to the overall calendar of the selection process, the timely notification of activities and the circulation of necessary information, increasing the quality of the selection process and stakeholders' involvement, but also the constructive cooperation with regional groups and the assessments performed by NRAs and by ACER.

Stakeholder consultation

At the **Network Planning Focus Group**, several potential improvement proposals were mentioned, some of which are relevant to the above mentioned question.

Increased stability of the PCI label

An ENTSO representative mentioned that keeping the label (without reapplying) would help the implementation of projects which are at a mature stage or which have already received CEF funding. The stakeholder referred to an ongoing project which had to reapply for permitting when it got the PCI status, which led to delays.

An NRA disagreed that the PCI status would need to be more stable/predictable (promoters should not be able to get a PCI label, at an early stage for the purpose of studies, and keep it until commissioning). The stakeholder is not convinced that a more lean approach (e.g. skipping a full reassessment in every PCI selection round if the project's scope and timing have not changed and where projects under construction can keep their PCI label) is needed to bring stability to the PCI label. In his view, such an approach would entail the risk of abuse.

Reporting about projects which have no longer a PCI status

DG ENER suggested that, if a project reaches a certain stage where there is no need for further support, it does not need to remain as PCI and the reporting can be stopped. A TSO responded that it might be useful for projects which were PCIs but would not reapply to maintain their PCI status (e.g. because they are at the construction stage) to still report, in order to have a full overview.

Frequency of the PCI list

A TSO suggested to make the process more dynamic by increasing the frequency of the list drafting in order to accommodate innovative projects. If a promoter misses the window of opportunity to submit a project for inclusion in the TYNDP, he needs to wait two years plus an additional one for CEF funding. Especially for preliminary studies, the current frequency is too low.

Updating of the PCI list

A representative from a think tank suggested introducing a fundamental selection criterion to eliminate projects from the list if they no longer offer positive net benefits.

Increased transparency and involvement during network planning, TYNDP and PCI selection

Stakeholders at the **Network Planning Focus Group are not convinced that** transparency is an issue during network planning, TYNDP and PCI selection. DG ENER reacted that transparency and level playing field are indeed success factors of the process. An NRA agreed that the TYNDP and the selection process are transparent and inclusive towards all relevant stakeholders. For DG ENER it is not clear what elements could be added to make the process more transparent. Stakeholders agreed that the

process is very technical and that a large amount of data is already available. By providing more data, the process might become more (too) complex and subject to more criticism.

An ENTSO representative recalled that all inputs and outputs of the model are public, and that the methodology is extensively described in an annex to the TYNDP. The ENTSOs are aware of consultants applying this methodology smoothly.

An NRA suggested to make a distinction between transparency (availability of information) and understanding/ involvement of stakeholders in the TYNDP process. In his view, there is already enough information available but the level of understanding is very different across stakeholders.[464] An ENTSO representative responded that the ENTSOs extensively inform promoters via working groups and press releases, and also mentioned that more information will be added explicitly in the guidelines.[465]

It was also mentioned that the upgrade of the CIRCABC system for the regional groups is an improvement in terms of transparency. This platform has a restricted area for members and an open area for the general public.

Involvement of third-party promoters (and other stakeholders)

An ENTSO representative mentioned that the ongoing PCI process is open for consultation to a larger public and stakeholders are effectively participating (other than members of the regional groups, which include ACER, NRAs, TSOs, EC, MSs). The stakeholder also mentioned that third-party promoters do effectively have access to the relevant underlying data and model to perform certain calculations themselves, with data available partly on the web and partly on request to ENTSOs.

For gas, in the current procedure, promoters fill in their project data in the portal; then ENTSOG publishes the TYNDP. After EC approval, promoters get their CBA results, then add more detailed investment cost data (if not already included earlier) and provide comments on the results.

ENTSOG offers to run the promoters' CBA assessments (which is more efficient and consistent than individual assessments by project promoters) and puts third-party promoters in the same level playing field as TSOs. With the new methodology, ENTSOG expects to do this as part of the TYNDP, including a feedback loop with promoters to check the CBAs, allowing to have the outcomes in a more transparent way within the TYNDP.

[464] The stakeholder mentioned that at least three promoters had only just discovered that the TYNDP results are used to select PCIs.
[465] Regarding the guidelines, a TSO stated that it is criticised that the guidelines are not approved by the EC and suggested that new versions should be formally approved.

Conclusion

There are several ways in which the PCI selection process could be improved in order to enhance the commitment of all concerned actors for a timely approval and realisation of PCIs. Options that could be considered include:

- Providing the PCI list with a more binding status, but the legal feasibility to implement this option is not obvious and should be further assessed.
- Make the selection process more inclusive with a stronger link to NDPs and with stronger involvement of national regulators and Cas.
- Make the PCI list more selective, including only mature projects and establishing an MOU for each PCI to have a firm commitment from all concerned parties (project developers, CAs and NRAs).
- Enhance the monitoring role of the regional groups, assigning individual members for specific follow-up of each PCI.

6 Efficiency

This section of the report presents the findings on the questions we have grouped under efficiency. According to the Better Regulation guidelines[466] "Efficiency considers the relationship between the resources used by an intervention and the changes generated by the intervention (which may be positive or negative)." Therefore, efficiency questions focus on the costs and benefits of the TEN-E Regulation, aiming to identify the factors are driving these costs/benefits and how these factors relate to TEN-E. Ideally, this section should allow us to draw conclusions on whether the costs are proportionate to the benefits.

6.1 E.1 – Efficiency of Network Planning and PCI Selection

6.1.1 To what extent have the Regulation and the mechanisms for improved network planning included therein been efficient means of selecting PCIs?

The Regulation (and in particular its Annex) lines out the rules, process and indicators to be applied for the selection of PCIs (including the work of the regional groups). A key element for the selection of PCIs – also to be used for network planning in the context of the 10-year network development plans and for the allocation of cross-border cost (CBCAs) - has been the introduction of a common framework for an energy system wide cost-benefit analysis (CBA). Question E.1 evaluates whether the processes and mechanisms foreseen in TEN-E to select PCIs have been cost efficient (in particular in relation to the associated administrative burden).

Evaluation based on literature review

In relation to the cost efficiency of the process of selecting PCIs (specifically the administrative burden) and the contribution of changes in network planning induced by the Regulation, no empirical evidence has been identified in the literature. More information on the effectiveness of the selection process is provided in sections 5.21 to 5.24.

Stakeholder consultation

Based on feedback received from an NRA in the **targeted survey**, additional costs have occured in the process of PCI selection for assessing candidate projects and coordinating with other NRAs, although this depends on the number of candidate projects and it is impossible to quantify these effects. Another NRA stressed the importance of the CBA process for regulatory purposes and while it induced additional costs (for participation in ACER activities at EU level) of about one person-month, it also generated greater savings for the preparation of the national CBA methodology (at this stage electricity only) of about three person-months.

Further feedback on this questions has been provided by stakeholders via **bilateral interviews**. A TSO expert focused in his feedback on the energy system efficiency rather than on the efficiency of the administrative processes and network planning. The stakeholder stated that the European instruments effectively stimulate investments in additional transport and interconnection capacity, but that the selected projects are not necessarily the most efficient solution to solve a specific "problem" in terms of security of supply, competition or market integration. Alternative options should be considered, and the most efficient solution should be opted for. To enhance the overall energy system efficiency, more

[466] http://ec.europa.eu/smart-regulation/guidelines/tool_42_en.htm

interlinkage between electricity and gas is necessary, not only for network planning, but also for other components of the energy chain, e.g. in power/heat generation and transport. The current political approach in the PCI selection (balances between regional investment budgets and between different categories of investments) does not allow macro-economic system efficiency to be maximised. The efficiency of the administrative processes is improving, but the regional splitting up involves additional costs and possible overlaps, and can lead to suboptimal choices from a macro-economic EU perspective.

An NRA expert stated that the Regulation and its mechanisms are effective means to select PCIs and facilitate their implementation, but suggested that the CBA architecture should be adapted to enhance efficiency. A specific suggestion was that CBAs should not only quantify the market value of a PCI, but also its externalities (impact on security of supply and environment).

Conclusions

- Stakeholders focused, in their feedback, more on the energy system efficiency than on the efficiency of the network planning and related administrative processes.They stressed the need to adjust the PCI selection methodology in order to consider all relevant dimensions and also alternative options in view of choosing the most efficient solution.
- Respondends also stated that the PCI selection process as specified within the Regulation is associated with additional administrative costs. Savings can be made by national authorities by applying the European CBA methodology also for their evaluations at national level.

There is no clear evidence that the TEN-E Regulation, and in particular the introduction of an energy system wide cost-benefit analysis, has effectively improved the efficiency of the network planning and – as a consequence – the selection of PCIs. Stakeholders generally gave a positive evaluation about this impact, although they also indicated room for improvement. This may be linked to the regional approach (which involves higher administrative costs and can lead to suboptimal solutions from a European perspective) and to the necessary improvement of the CBA methodology by the ENTSOs.

6.2 E.2 – Efficiency of TEN-E in PCI Implementation

6.2.1 To what extent have the Regulation and the specific measures included therein (incl. priority status, regulatory, permitting, financing) been efficient means of assisting PCIs in their implementation?

The Regulation has implemented a set of procedures for the granting of permits, the financing and regulation of PCIs and specific incentives for PCIs with high risks (Articles 10, 12, 13, 14) that should contribute to facilitating a more efficient implementation of PCIs.

Evaluation based on literature review

ACER states that for approximately half of the cases requesting CBCAs, the NRAs had to carry out further work to verify CBA results, as the submissions lacked sufficient detail.[467] The CBA methodology and its process could hence be improved in order to enhance its efficiency. No additional information is available in the literature regarding the efficiency of the Regulation in relation to specific measures

[467] ACER (2017a), Overview of cross-border cost allocation decisions – Status update as of January 2017.

(PCI label, permitting, incentives, etc.) on assisting PCIs in their implementation. Reviews conducted by ACER on the progress of the implementation of PCIs indicate significant delays for many PCIs, in particular in relation to permit granting, although average durations have been decreasing since the implementation of the Regulation in 2013.

Stakeholder consultation

The **targeted survey** participants provided limited feedback regarding the costs/benefits of specific TEN-E measures to facilitate and accelerate PCI implementation. The questionnaire asked in particular for the *additional* administrative spending directly linked to the TEN-E Regulation, i.e. costs that did not arise under the previous framework and that are not linked to other activities.

NRAs were in general not able to provide consistent quantitative input regarding the administrative efficiency of the CBCA and incentives requests related processes. There was a wide range of days estimated for the implementation of these processes, up to 40 days in total and up to 20 days/year. Only four NRAs quantified the number of days related to processing incentive requests, ranging from 0 (no request for incentives) to 20 days in total or 7 to 20 days/year. The NRAs were not able to provide further estimates of the administrative costs of the processes related to CBCA and requests for incentives.

Three *competent authorities* provided estimated levels of administrative costs resulting from the specific TEN-E related permitting requirements and the participation in regional groups. For the one-stop shop the estimates of administrative effort ranged from 15 to 250 days per year, while the third respondent quantified the corresponding cost to EUR 90 per day for the Competent Authority. Another respondent stated however that the administrative requirements of the one-stop shop are identical to the pre-existing system foreseen for strategic investments in all economic sectors. The additional costs regarding group meetings were quantified by one participant at EUR 1200 per meeting; others quantified 3-10 days per year.

TSOs and project promoters estimated the specific effort to comply with the monitoring and reporting obligations imposed by the TEN-E Regulation at an average of around 30 days per year (most answers provided by 14 stakeholders ranged from 10 to 40 days). This would result in average costs of around EUR 400 per day for the project promoters. Combining both numbers, this results in a cost of around EUR 12,000 per year for the project promoters. One respondent gave a more detailed estimate; it is based on a portfolio of five PCIs, and includes activities such as preparation of annual monitoring reports to ACER, coordination with partner(s) and project teams, PCI implementation plan and files' updates, submission of candidate projects to ENTSO-E TYNDP/ EC PCI list processes and internal & external stakeholder management, implying costs of around EUR 21 000 (30 days/year, 700 EUR/day). A respondent added that three FTEs are needed for managing five PCIs.

Only five TSOs or project promoters provided quantified information on the costs related to permitting procedures. The result was an average of 45 days per project promoter with daily costs averaging EUR 217, with a range from EUR 64 per day to EUR 500 per day (per project promoter). Taking the average into account the specific permitting related costs would amount to almost EUR 10,000 per year per project promoter.

Costs related to public participation obligations were quantified by four respondents, who estimated the workload to be 10 to 40 days per year (per project promoter).

Cost estimates of the CBCA process were provided by six TSOs or project promoters, resulting in an average workload for promoters of 32 days/year, wich would translate in an average yearly cost of around EUR 9,000 (per promoter). One respondent added that the preparation of the investment request and relevant documents for CBCA processes are a very comprehensive issue and therefore some project promoters need support from external consultancy companies. These costs vary depending on the scope and extent of the requested consultancy service.

Cost estimates related to process to apply for the incentives granted by NRAs could not be provided. The cost impact is different depending on the need for changing the national legislation/regulation in the MS in order to comply with the TEN-E Regulation. The respondents were not able to quantify the specific administrative costs.

Costs related to participating in regional groups were estimated by twelve TSOs or project promoters resulting in an average estimation of 14.5 days, while the daily costs as indicated by the respondents would on average amount to around 440 EUR/day, resulting in overall costs of around EUR 6400 per year and per TSO. The individual costs per TSO are quite diverging, as salaries and travel expenses (including accommodation) are highly different depending on the Member State. The cost estimates provided by respondents are also not fully consistent, as some estmates include the efforts for preparation, attendance, feedback and homework, while cost estimates in other responses seem to be based only on travelling costs and the time spent at external meetings.

In addition to the above costs, some respondents referred to administrative and other costs under TEN-E, such as participation in training courses on the TEN-E Regulation or in monitoring activities from associations.

The lack of consistent data provided by the stakeholders does not allow to apply the standard cost model described under Better Regulation and to draw robust conclusions on the administrative costs of the TEN-E Regulation for individual types of concerned stakeholders as well as across all stakeholders that could be generalised across all Member States.

Stakeholders at the **Permitting and Public Acceptance focus group** mentioned that in several MSs, TEN-E has introduced an additional layer to the permitting process which is inefficient.

Conclusion

- Stakeholders have provided limited and not sufficiently representative/consistent input with regard to the estimated administrative costs associated with the specific measures included in the TEN-E Regulation. The reported administrative cost levels for NRAs and CAs show a very wide range of costs, depending on the country specifics.
- TSOs and other project promoters reported that PCI reporting and monitoring costs are for them the most significant costs (resulting in a cost of around EUR 12,000 per year per project promoter, but reaching up to EUR 100,000 per year and per promoter), while costs for other PCI related activities (participation in regional meetings, etc.) were in the range of up to EUR 10,000 per year and per TSO.

Estimates about the administrative costs related to the application and implementation of PCIs vary significantly across countries and stakeholders, and seem not fully consistent. Whether the specific measures provided within the Regulation have been cost-efficient, can hence not be adequately answered on the basis of the available stakeholder feedback (see also next question).

6.3 E.3 – Administrative Efficiency

6.3.1 Could the same results have been achieved with lower cost / resources (including administrative)? Or with the use of other policy instruments or mechanisms?

In order to asses the efficiency of the current framework, it needs to be compared to alternative frameworks or policy instruments (in particular the framework preceding the 2013 Regulation) that contribute to the same policy targets or facilitate the implementation of the same investment projects that are identified and supported within the TEN-E Regulation.

Evaluation based on literature review

From our review of the literature it appears that detailed empirical assessments of the *efficiency* of the current PCI framework in comparison to alternative policy instruments or mechanisms have so far – at least outside the impact assessment - not been conducted. Within the impact assessment on the "Proposal for a Regulation on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC" from 2011 alternative options for the permit granting process, cross-border-cost allocation and investment incentives, and for the financing of infrastructure investments have been evaluated.

The implementation of the regulatory proposals for the organisation and duration of the permit granting process (establishing a full one-stop shop and specifying a maximum time limit of 3.5 years for the final positive or negative administrative decision concerning the construction of the PCI) has been estimated to provide administrative cost savings of 31% compared to the former framework (28% at the promoters' side, and 46% at the authorities' side).

Stakeholder consultation

The **targeted survey** did not explicitly focus on the question whether the same results could have been achieved with lower cost / resources (including administrative), or with the use of other policy instruments or mechanisms.

The survey only provides limited input with regard to the actual impact of the TEN-E Regulation on cost levels and resource needs. Cost savings (or additional expenses) for *NRAs* as a result of implementing the CBCA process and for processing requests for incentives have not been reported, either because NRAs were not able to estimate such cost impacts (three respondents), there has not been a CBCA application (one respondent) or the estimated cost impacts are negligible (two repondents[468]).

[468] However, no further details were provided.

In response to the survey, competent authorities did also not provide useful estimates regarding cost savings (or additional costs) compared to the former process related to permitting requirements, or as a result of their participation in regional groups; no further input from authorities was obtained during the stakeholder interaction.

Three TSOs or project promoters mentioned not being able to identify any cost savings resulting from the new monitoring and reporting obligations under TEN-E. One respondent added that there is no national process which has been discontinued or reduced as a result of TEN-E.

Only one TSO or project promoter specified cost savings resulting from the new permitting procedures estimated at 45 days per year. The other TSOs/project promoters (i.e. six) reported no cost savings or were unable to identify any cost savings.

Regarding cost impacts related to the public participation obligations in the TEN-E Regulation, only one response was provided; the concerned stakeholder was not able to identify any cost savings as a result of TEN-E.

According to three respondents, cost savings related to the CBCA process are not traceable, either because there were no CBCA request or a cost comparison is not possible or CBCA have not led to savings. Cost savings resulting from the TEN-E provision regarding incentives granted by NRAs and participation in regional groups were also not identified for similar reasons.

Stakeholders at the **Network Planning Focus Group** discussed the **monitoring** during the network planning, TYNDP drafting and PCI selection and considered the related administrative burden as an issue.

TSOs pointed to the high administrative burden related to PCI reporting, in particular for projects receiving subsidies. Moreover, at present reporting is required to different entities, each of which imposes its own reporting format and periodicity. The reporting requirements could/should be simplified and streamlined. A suggestion from TSOs was to have a central registry where all PCI projects report, with specific additional data if they receive CEF funding.

An ENTSO representative highlighted that the ENTSO is aware of projects in the implementation phase that did not reapply for PCI because of the (perceived) too high administrative burden. The stakeholder suggested implementing an exchange of information across the concerned authorities and highlighted that ENTSOG already provides all information collected for the TYNDP to ACER. DG ENER confirmed that for the third PCI list, the TYNDP application is carried over to the PCI application list. The establishment of a reference table, which would be made available to all concerned entities and stakeholders (with NDP, TYNDP and PCI references), was also suggested.

Stakeholders agreed that an annual reporting frequency is appropriate. Both ACER and the ENTSOs have databases on the projects: ACER is implementing a projects' database with 50 parameters which will record the changes, allowing comparisons across time; ENTSOG has a TYNDP portal and reports on it (allowing projects to be tracked across TYNDPs).

Conclusion

- The impact assessment realised in 2011 concluded that the implementation of the current Regulation would lead to substantial cost savings compared to the former situation.
- This conclusion could however not be confirmed on the basis of the feedback provided by stakeholders in the context of the present study. Cost savings could in general either not be identified by stakeholders (i.e. negligible cost impact) or not be estimated (by NRAs, competent authorities, TSOs and project promoters).
- Only a few stakeholders answered that the TEN-E procedures have effectively provided cost savings, while others refer to additional administrative costs resulting from e.g. the implementation of the one-stop—shop and the participation in regional meetings.

The literature review and stakeholders feedback do not provide relevant input to the question whether the same results could have been achieved with lower cost / resources (including administrative) by using other policy instruments or mechanisms.
The implementation of the TEN-E Regulation seems not to have led to (substantial) cost savings compared to the previous framework, and on the basis of the current input there is no evidence that an alternative framework could have provided the same results at lower costs. This issue should be further analysed in a specific impact assessment study.

6.4 E.4 - Justification of Costs

6.4.1 To what extent are the costs involved justified given the changes/ effects they have resulted in?

Several measures of the Regulation are associated with additional (administrative) costs. If these costs result in benefits related to facilitating and improving the selection and implementation processes of PCIs they can be justified.

Evaluation based on literature review

According to ENTSO-E[469], since 2013, several project promoters have complained about the additional administrative burden and requirements, including the need to re-apply every two years to maintain a PCI label and substantial reporting obligations. Furthermore, some promoters estimate that the benefits of the Regulation are low compared to the additional work required.[470] No concrete figures on cost levels are provided in the publication by ENTSO-E.

Based on the CBAs and plans presented by promoters, EUR 49.8 billion will be invested in electricity and EUR 52.7 billion in gas.[471] For 71 out of 109 electricity projects the overall benefits were determined and would reach EUR 66.1 billion (although this estimation is subject to a number of assumptions and the presence of competing projects and other methodological imperfections). These benefits provide socio-economic welfare (SEW) benefits (EUR 67 billion), the negative effect of increased losses (EUR -4.6 billion) and security of supply (SoS) benefits (EUR 1.4 billion) and other benefits (EUR 2.3 billion).[472] With regard to the benefits of gas PCIs, only 12 PCIs reported complete information, which prevented ACER from carrying out an analysis of expected PCI benefits.

[469] ENTSO-E website 'A push for Projects of Common Interest'(http://tyndp.entsoe.eu/insight-reports/common-projects/#enabling-investments-with-cross-border-impacts)
[470] ENTSO-E website 'A push for Projects of Common Interest'(http://tyndp.entsoe.eu/insight-reports/common-projects/#enabling-investments-with-cross-border-impacts)
[471] ACER (2017a), Consolidated Report on the progress of electricity and gas projects of Common Interest for the year 2016
[472] ACER (2017a), Consolidated Report on the progress of electricity and gas projects of Common Interest for the year 2016

Comprehensive assessments of the impact of the PCI framework on the overall costs and benefits based on empirical evidence, have not yet been conducted.

Stakeholder consultation

The responses to the **targeted survey** did not provide relevant information on whether the (administrative) costs have changed due to the implementation of the Regulation (see previous question). However, feedback provided by some stakeholders has indicated that the Regulation has been effective in several dimensions as regards the selection and implementation of PCIs, although other stakeholders reported no or limited positive impact or referred to the fact that it is too early to estimate any impacts (see chapter 4 on effectiveness). Since both the costs and benefits could not be adequately quantified by the stakeholders, it is not possible (yet) to conclude whether the described benefits outweigh the implementation costs of the concerned TEN-E processes.

Additional information on the presumed benefits of the Regulation has been provided via **interviews**. An energy sector expert stated that the PCI label is not offering what was expected; it should have speeded up projects, but in practice there are too many steps to be taken which leads to a large administrative burden. This criticism was shared by a TSO representative, who considered that the PCI status does not improve the public acceptance of projects, and does not necessarily lead to accelerated permit granting and improved regulatory treatment. The benefits of a PCI label do not seem to outweigh the additional administrative burden. This expert also refered to the time limit of 3.5 years in the Regulation for the permitting process; this time limit only covers two phases and does not include the preliminary phase which is necessary for most large transmission projects, i.e. a review of regional or local zoning plans. The TEN-E provisions did not lead in practice to cost or time savings.

Another TSO representative stated that its national legislation works well (revised national permitting regulation with one-stop-shop), and that the national label 'project of economic interest' has a higher positive effect than the PCI status.

Another TSO expert gave more positive feedback about the PCI status and highlighted that it offers high political visibility and access to CEF funding. An independent project developer also highlighted the positive impact of the PCI label: it gives access to financial support, it provides priority recognition with the concerned authorities, it underpins the motivation for public acceptance, it shows international recognition of the PCI to the local authorities. The permitting for large PCIs remains in his country however a complex and lengthy process; multiple authorities are involved (including municipalities, regional authorities, water authorities, etc.), and discussions with land owners about financial compensations are delaying projects and are difficult due to the lack of a clear regulation.

Conclusion

- As presented in chapter 4 assessing effectiveness, the Regulation has effectively had a positive impact on the selection and implementation processes of PCIs according to several stakeholders , while others have expressed doubts about the positive impact of some TEN-E provisions, e.g. PCI label and one-stop-shop.
- Stakeholders were in general not able to give consistent estimates of the involved cost levels.

- For these reasons, it is not (yet) possible to conclude whether the described benefits of the Regulation outweigh the specific costs.

The feedback provided by stakeholders during the consultation process did not provide clear evidence on the impact of the TEN-Regulation on the administrative cost levels. It is also unclear to what extent the TEN-E provisions have led to more effective processes, which enable the selection and implementation of PCIs that offer a higher overall social welfare, compared to the former framework. On the basis of the current input, we can hence assume, but not demonstrate, that the costs involved are effectively justified given the positive changes/ effects they have resulted in.

7 Coherence

This section aims to assess how well TEN-E works within the context of the rest of the EU interventions, in particular energy and environmental policy. This section should provide evidence of where and how EU interventions are working well together (e.g. to achieve common objectives or as complementary actions), and point to areas where there are tensions (e.g. objectives which are potentially contradictory or duplication of efforts).

7.1 C.1 – Coherence with other EU Interventions

7.1.1 *To what extent is the PCI framework established by the Regulation coherent with other interventions which may have similar objectives including other EU policies (e.g. Regional Policy, Research, Neighbourhood Policy, Investment Plan for Europe) but also other elements of energy policy (e.g. internal market design, renewed RES framework, EE)?*

EU energy policy and Energy Union strategy consist of five policy areas: security of supply (SoS), a fully-integrated internal energy market (IEM), climate action or GHG emission reduction, energy efficiency (EE), and Research and innovation. The PCI framework has some potential influence / relevance in all these areas and we would expect respective policy objectives to be consistent as much as possible.

On 30 November 2016, the European Commission released its 'Clean Energy For All Europeans' Package in line with the Energy Union framework strategy. The Package addresses energy efficiency, renewable energy, the re-design of the electricity market, security of electricity supply and governance of the Energy Union. Other EC interventions, which are not necessarily focussed on energy, but are of relevance to it, include Regional Policy, neighbourhood policy and the Investment Plan for Europe. EU Regional Policy is an investment policy, it supports job creation, competitiveness, economic growth, improved quality of life and sustainable development. It focusses on the development of regions within Member States, but also on cross-border, transnational and interregional cooperation. Through the European Neighbourhood Policy (ENP), the EU works with its neighbours to the East and South to foster stabilisation, resilience and security. The aim of the Investment Plan for Europe, launched in November 2014, is to relaunch investment and restore EU competitiveness, thus increasing growth and creating jobs. A major pillar of the Plan is the European Fund for Strategic Investments (EFSI). The PCI framework has some potential influence / relevance in all these areas and we would expect respective policy objectives to be consistent as much as possible.

Evaluation based on literature review

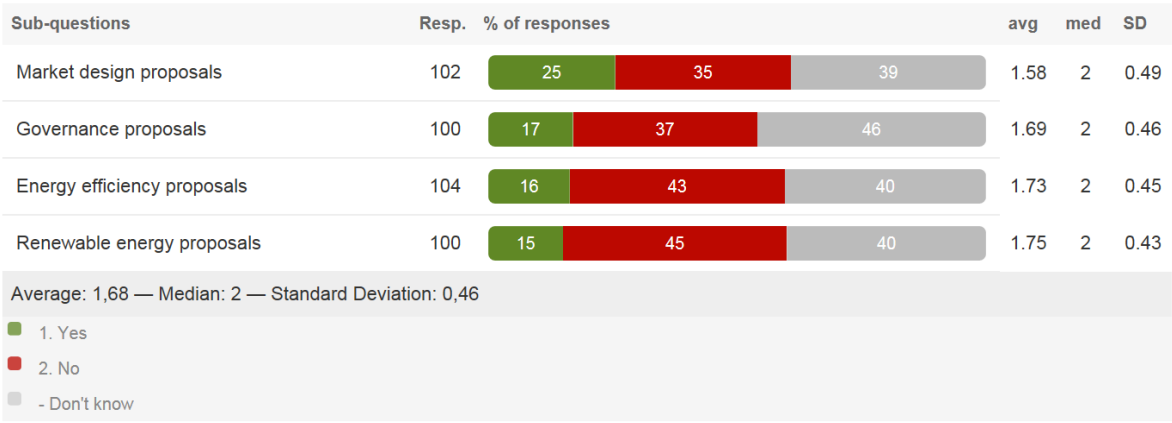
Various reports and studies suggest that the PCI framework and selection process should more proactively take into account the environmental and climate objectives. For example, CEER (2016b) highlights that DSOs and TSOs should be interacting with each other, as well as with public authorities and other stakeholders on a local and regional level, in order to ensure full coherence between network planning exercises and other relevant developments including local and regional urban planning, climate plans, as well as infrastructure development schemes for electric and gas vehicles. EEB & Birdlife International (2014) highlight that promoting gas and oil infrastructure via the TEN-E Regulation conflicts with the EU's climate objectives.

The 2011 IA explicitly addressed the consistency of the TEN-E Regulation with other European policies. It concluded that investments promoted by the TEN-E Regulation correspond to a no-regret strategy, and provide an important contribution to climate actions. Moreover, it concluded that the TEN-E Regulation was at that moment consistent with the different legislative initiatives regarding security of energy supply. The 2011 IA also concluded that "The objectives of this initiative [TEN-E Regulation] are furthermore consistent with EU policies on competitiveness and innovation. Finally, this initiative is without prejudice to and does not entail any formal amendment of existing EU environmental legislation." Since 2011, policy priorities have, however, evolved and more focus is now put on the transition to a low carbon energy supply by 2050. While the TEN-E regulation is in general still in line with other EU interventions, attention should be paid not to support fossil fuel based investments which might hinder this transition. Risks for fossil fuel lock in and/or stranded energy infrastructure investments should be minimised by properly scrutinizing all concerned new investment proposals.

Stakeholder consultation

The **targeted survey** revealed that between 35% and 45% of the respondents do not identify inconsistencies between TEN-E and the 'Clean Energy for all Europeans' package (see Figure 7-1).[473] However, around 40% of the respondents indicated 'don't know' about possible inconsistencies with the Clean Energy package.

Figure 7-1 Results targeted survey to the question: "Do you think there are any inconsistencies with the objectives of the TEN-E Regulation and the following proposals from the new 'Clean Energy for all Europeans' package"



25% of the respondents considered some **market design proposals** inconsistent with the objectives of TEN-E, and added that:

- Whereas TEN-E promotes innovative **energy storage**, the market design proposals i) focus on non-bankable short term contracts, and ii) prohibits system operators from owning storage facilities, which would limit the pool of potential investors in storage projects. This comment is however not shared by other stakeholders, who take the position that system operators should cover their flexibility needs (e.g. to mitigate congestion) via the market.
- The lack of electricity interconnection capacity has not been properly taken into account in the market design proposals, and the proposal for the capacity calculation method leads to an obstacle for **further interconnection expansion**. Some market design proposals (restrictions

[473] This survey question was also discussed in light of the relevance of TEN-E (in Sections 4.4.3 and 4.4.4), exploring to what extent the respondents are of the opinion that TEN-E is in line with the MDI and the 2030 objectives for RES and GHG.

to the provision of ancillary services by TSOs, changes to the operation of CRMs, restrictions on the use of interconnector congestion revenues, review of bidding zones) would result in higher risks for projects and therefore less incentive to build interconnectors.

- The market design proposals on the **network planning processes** (TYNDP) should have been more ambitious.
- The TEN-E Regulation falls short in supporting (some types of) **smart grid** projects, wheras the CEP promotes smart grids.

Inconsistencies mentioned in relation to the **governance proposals** were not always coherent. On the one hand, respondents said that the lack of interconnection capacity is not accounted for in the governance proposals. On the other hand, they argued that the proposed 15% interconnection target for electricity may contradict TEN-E criteria. In addition, the link between the proposed 'long-term greenhouse gas emission development strategies' (to be completed by 2019) and the TYNDP 2020 is missing. Other comments focused on the inconsistency regarding the role of ACER versus the NRAs.

Regarding the **energy efficiency proposals**, several comments strongly focused on the presumed contradiction between stimulating investment in additional infrastructure on the one hand and prioritising energy savings that reduce the need for infrastructure on the other hand. The TEN-E Regulation does not provide the possibility for supporting and prioritising non-infrastructure solutions such as energy efficiency. It therefore functions rather as an incentive for (e.g. fossil fuel) infrastructure expansion, at the expense of energy efficiency measures. Once energy infrastructure is built it stays for decades, therefore it is important to ensure that (EU) funding is spent in the most effective way.

With regard to the **renewable energy proposals**, stakeholders emphasised that there are no selection or priority criteria in the TEN-E Regulation to specifically stimulate RES, rather the conditions focus on market and supply impact. On the other hand some respondents indicated that TEN-E should be technology neutral (as far as possible). To reach the 2030 RES target it is important to resolve the intermittency issues, where storage, smart grids, interconnections and natural gas play a role. Small scale, decentralised RES projects are crucial, while TEN-E only focuses on large scale cross border projects.

In other survey questions, stakeholders also suggested that, in line with the Neighbouring Policy Strategy of the EU, it would be appropriate to include in the perimeters of Priority corridors neighbouring non-EU Member States, in particular North African or Energy Community Countries. In this way, regional infrastructure planning could also consider projects involving non-EU Member States, which are of key relevance to develop infrastructure corridors and to integrate isolated systems. In addition, some stakeholders suggested that the network planning process (TYNDP) in relation to PCIs is incoherent with the EU's renewables and efficiency policies and incompatible with the EU's 2030 targets and the Paris Agreement. In particular respondents pointed to inconsistency between PCI oil projects and climate policy.

The survey also mentioned **lack of coherence of CEF with other forms of EU support (such as EFSI)**. Both could potentially be merged into one instrument. It was also mentioned that "The upcoming Multiannual Financial Framework proposal (from 2021 onwards) needs guidance on the direction of future EU energy network infrastructure which it will partly draw from the TEN-E Regulation".

Most **interviewees** were in general not aware of inconsistencies between the TEN-E Regulation and other EU interventions.

An NRA representative considered the Regulation to be coherent with the RES framework, market design and energy efficiency policy, and with the transition towards an integrated RES-heavy European grid, enabling regional specialisation in renewables and removing constraints and curtailment. However, a TSO representative raised the point that the scenarios which are used for the elaboration of the TYNDPs should be defined in a more coherent way with the 2020-2030 and 2050 EU climate and energy targets.

An NRA representative considered that the Regulation attempts to integrate the complete process for the infrastructure design model at European level in the PCI decision making, e.g., requiring that PCI candidates are included in the TYNDPs of the ENTSOs. However, the Regulation is not prescriptive enough about the relationship with other policies, which results in contradictions with measures on energy efficiency or climate change. Moreover, the achievement of a real and liquid internal energy market will modify infrastructure needs.

An energy association representative considered that the PCI framework belongs to a collection of policies pursued by the EC to develop RES and infrastructure and is overall coherent with the collection. Nonetheless, it would be useful to ensure that a developer can easily understand whether programs are cumulative or not, which is currently not always clear. For example, it is not entirely clear how the support that can be obtained for PCIs interacts with EFSI support (are they cumulative or alternative forms of support?).

An NGO argued that there is a lack of coherence between the TEN-E Regulation (PCI list) and the energy efficiency proposals. The impact of energy efficiency measures on consumption levels is not sufficiently taken on board in the determination of the need for, and dimension of, the EU's transmission system. The coherence with the RES framework should also be improved. The conditions for getting the PCI status do not prioritise network integration for renewable energy over fossil fuels, but rather focus on market and supply impact, and even support fossil fuel based projects.

Conclusion

The stakeholders' feedback and our analysis did not reveal major inconsistencies between TEN-E and other EU policies. Regarding the 'Clean Energy for all Europeans' package, the survey revealed that less than half of respondents do not identify major inconsistencies with TEN-E. Wherever respondents indicated inconsistencies, these were mainly related to the market design proposals, which in their opinion, i) are not properly promoting innovative energy storage, ii) might be an obstacle for further interconnection expansion, iii) would not be ambitious enough on network planning processes, and iv) promote smart grids while TEN-E uses (too) strict eligibility criteria for smart grids.

Several stakeholders also indicated that the PCI selection process could be improved by incorporating non-EU neighbouring countries and increasing consistency with the latest energy and climate policies.

TEN-E is focussed on large scale cross border energy infrastructure, which is clearly needed for helping achieve more large scale renewable energy uptake and better functioning energy markets. The presumed lack of coherence of TEN-E, mainly concern future changes in the energy system where stakeholders feel that energy efficiency, demand response, storage and small scale local renewables should get a more important role in the infrastructure planning process. It appears that these criticisms are based on differing views about the speed and nature of the energy transition. In the long term it might be the case that some of the TEN-E investments are not (or less) needed, because of these changes. However, most energy experts appear to believe that they are needed in the short to medium term as part of the transition. Therefore, the difference of opinions is about transition pathways (and speeds), not about TEN-E. In the worst case TEN-E might slow down some parts of the transition (local renewable and energy efficiency/demand response). However, there is no convincing evidence that this is the case, because there are many other drivers and policies that should help promote these initiatives and to consider support for TEN-E projects as support taken away from these other parts of the energy transition is not a reasonable position.

7.2 C.2 – Future Coherence

7.2.1 To what extent is the Regulation coherent with the CEF Regulation and existing network codes on cost allocation?

In relation to the TEN-E Regulation, the Connecting Europe Facility (CEF) is meant to cover the gap in financeability in order to make projects commercially viable or to allow regulators to allocate reasonable costs to consumer tariffs (see section 5.20 for more information regarding CEF). To be eligible for financial support under the CEF, a project must be identified as a PCI.

Existing network codes on cost allocation mainly are the Capacity Allocation and Congestion Management (CACM) in electricity, and the network codes on Capacity Allocation Mechanism (CAM), Congestion Management Procedures (CMP), and Transmission Tariff Structures (TAR) in gas.[474]

Evaluation based on literature review

The EP assessed the CEF Regulation in early 2016 and a mid-term evaluation by the Commission is currently (2017) underway, but has not yet been published, or made available. Coherence of the CEF with TEN-E is not mentioned in the EP review.

The 2011 IA explicitly addresses the consistency of the TEN-E Regulation with other European policies (in paragraph 7.3). The Connecting Europe Facility (CEF) is regarded as 'logical' package parallel to the TEN-E Regulation and was part of the same energy package with a joint IA. Although CEF is dealt with under a separate regulation, the general principles for financing and the criteria for eligibility of PCIs to CEF funding are provided in the TEN-E Regulation, while the CEF Regulation specifies the selection and award criteria. CEF in particular provides grants for studies and works concerning energy infrastructures. In addition, it opens up the possibility of using some of the EU budget allocated to energy infrastructure through different financial instruments, notably debt and equity instruments and project bonds (these mechanisms are presented separately under the EU's new financial regulation for

[474] Electricity: https://ec.europa.eu/energy/node/194; Gas: http://ec.europa.eu/energy/node/54

the next multi-annual financial framework). Overall, the CEF complements the measures in the field of permit granting and regulation provided by the TEN-E Regulation (2011 IA, paragraph 7.3).

Stakeholder consultation

In the **targeted survey** the following relevant views on the coherence of the TEN-E Regulation with CEF and cost allocation rules can be extracted:

- **Unnecessary link of CBCA and CEF**. It was mentioned that this leads to additional work for promoters and regulators. A stakeholder stated: "A decoupling of the two processes could help to alleviate the administrative burden and focus both processes on their desired outcomes". Another stakeholder mentioned that this link often leads to "an unnecessary CBCA process, especially in cases where no hosting member state has a negative net benefit and the decision for 100% cost bearing by the hosting country or not to reallocate costs between countries is clear from the beginning."
- **Contradictions between TEN-E and CEF Regulations and missing elements** for PCI selection and eligibility for CEF funding. The TEN-E Regulation excludes projects that have received an exemption from third party access from any financial assistance from the CEF programme. This condition remains valid even though the third party access exemption is granted for part of the PCI and the private investment is only a minor share of the total investment (which is mostly financed by public resources). The TEN-E and CEF Regulations should support schemes where public and private entities cooperate to find the financial resources necessary to develop capital-intensive projects and should allow mixed projects to benefit much more from EU financial assistance. The CEF eligibility criterion for grants for works concerning the CBCA, risks delaying PCIs implementation and adds a regulatory risk. It would be reasonable to make the above mentioned eligibility criteria for grants for works less restrictive as the current condition moment that "the project has received a CBCA decision pursuant to Article 12 of the 347/2013 Regulation" is not viable and it is difficult to be put in place in particular for projects with impact on several countries.
- **Interconnection targets**. A respondent considered that such a target is not helpful when applied on a Member State basis. For example, the Republic of Ireland can meet the target by developing connections with Northern Ireland which could still leave the island of Ireland with insufficient connection. The 10% target needs to be applied to any and every region or area of the EU, e.g. to the island of Ireland. Another respondent argued for legally binding interconnection objectives of 10% and 15% for 2020 and 2030 respectively. Moreover, following the European Council´s recommendation, the stakeholder encouraged the Commission to increase the number of instruments so that projects linked with the achievement of interconnection targets have relevant EU financing support. Cost allocation efficiency principles suggest that projects with large European significance should also be largely financed at European level. EU funding of PCI projects whose main benefits are not located in the hosting countries or which are needed for RES integration or market Integration need to be urgently addressed. Another respondent also considered the absence of clear and binding targets for the full interconnection of the energy networks, as a weakness of the EU energy strategy. He referred to the efforts to achieve a well-interconnected European electricity market, as well as to the TEN-E strategy which is focused on linking the energy infrastructure of EU Member States. However, results show that further efforts are needed at political, regulatory and economic level to unlock the development of the missing infrastructures and

allow a well interconnected Europe. The stakeholder therefore suggested establishing binding interconnection targets on the basis of the European Council agreement of October 2014.

- Incoherence with some electricity network codes / guidelines. For example, it was mentioned that the use of congestion rents in the CACM guideline is related to the financing of projects; while the congestion income distribution is related to CBCA.

An NRA expert **interviewed** stated that the TEN-E Regulation is in general coherent with the CEF, but added that CEF funding should only be envisaged for projects which are not beneficial to the hosting country but which offer overall added value at EU level. An NRA expert mentioned that the CEF Regulation is not fully compliant with the TEN-E Regulation, as different indicators are used. This leads to some projects which can be financed via national tariffs being supported by CEF. The methodology and criteria should be clarified and harmonised, and CEF funding should only intervene to cover the residual financing gap.

An energy sector representative stated that the TEN-E Regulation should be consistent with all other policies, including the revenue sharing provisions included in the network codes. All issues should be coordinated, including cost/revenue sharing, use of congestion income, and CEF funding.

Another NRA expert would be in favour of decoupling the CEF and CBCA instruments, preventing CBCAs that are not needed and decreasing the administrative burden both for promoters and NRAs. If these instruments were decoupled, more scrutiny from NRAs might however be needed for the CEF process.

The expert also suggested that the realisation rate for PCIs could be improved if promoters would be granted more flexibility to choose the financing model. 76% of CBCAs allocate all the costs to the hosting country/countries, which may indicate promoters are only applying for CBCA to have access to CEF funding. If there is a lack of funding at national level, one needs to look at the nature of the project (e.g. possible cross border asymmetry) and have a multilateral exchange between NRAs and NEAs in order to consensually decide the shares that will be covered by the different countries.

The actual link between CBCA (in TEN-E) and CEF funding for capex was questioned by an NRA representative; the link seems sensible on paper but it drives inefficient behaviour in practice. In addition, this NRA does not think (in line with ACER views) that the harmonisation of tariffs has been sufficiently justified.

Conclusion

The general conclusion appears to be that the TEN-E Regulation is coherent with the CEF Regulation and existing network codes on cost allocation in terms of overall objectives and rules. However, at a more detailed level, inconsistencies have been identified by some stakeholders (although these are not the prevailing view). Specifically that CEF eligibility should not be dependent on having received a CBCA decision. Stakeholders also mentioned that further alignment is needed between cost allocation principles (CBCA), CEF funding and interconnection targets.

7.2.2 To what extent is the Regulation consistent with the proposed institutional changes of the MDI and SoS for electricity proposals? To what extent are the regional groups set up under TEN-E consistent with the idea to introduce ROCs in the new MDI proposal?

Proposed changes of the MDI and SoS for electricity are contained in the proposed Regulation on the electricity market[475] (recast of Regulation 714/2009) and in a proposal[476] for a Regulation on risk preparedness in the electricity sector and repealing Directive 2005/89/EC (the Security of Electricity Supply Directive).

The proposed new Electricity Regulation is aimed at making the electricity market fit for flexibility, decarbonisation and innovation by providing undistorted market signals. It revises the rules for electricity trading, clarifies the responsibilities of the market participants, and defines principles for assessing capacity needs and for market-based capacity mechanisms.

The proposal for a Regulation on risk-preparedness is intended to provide EU-wide rules in the event of a major electricity supply crisis, to support regional cooperation and assistance among Member States instead of dealing with it at the national level.

The proposal for a Regulation on the electricity market (recast of Regulation 714/2009) in the 'Clean Energy for All' packages, lays down rules for the creation, functioning and powers of Regional Operational Centers (ROCs) in order to facilitate cross-border management of the electricity grid and cooperation of transmission system operators in case of a crisis. The proposed Regulation on risk-preparedness further details the role of the centres in the event of an electricity crisis. These ROCs are a proposed extension and upgrade of the existing RSCIs (Regional Security Coordination Initiatives): Coreso in Brussels and TSC in Munich since 2008 and SCC in Belgrade since 2015. Recently, three new RSCIs have been created for the Nordic area (Nordic RSC), the Baltics (Baltic RSC), and Southeast Europe.

While the regional groups under TEN-E have mainly a network planning and PCI identification role, regional operational centres will carry out administrative and technical functions whose regionalisation brings added value compared to functions performed at national level. There is hence in principle no overlap between both regional structures. An extensive list of specific funtions to be performed by ROCs is provided in the MDI proposal, including coordinated capacity calculation, coordinated security analysis, consistency assessment of TSO's defence and restoration plans, coordination and optimisation of regional restoration, regional sizing of reserve capacity, outage planning coordination and optimisation of compensation mechanisms between TSOs.

Article 3 and Annex III of theTEN-E Regulation establish the regional groups and the framework for their functioning. The regional groups adopt regional lists of proposed PCIs which are then adopted by the EC.

Evaluation based on literature review

The 2011 IA concluded that the TEN-E Regulation was consistent with the different legislative initiatives regarding security of energy supply. On page 10 of the 2011 IA, the importance of energy supply security is emphasised. Ensuring the integrity, reliability and climate resilience of energy infrastructure is important to reach the EU's energy and climate policy objectives in general, and security of supply in particular. The TEN-E Regulation was also considered to be compatible with the legislation regarding

[475] http://eur-lex.europa.eu/resource.html?uri=cellar:9b9d9035-fa9e-11e6-8a35-01aa75ed71a1.0012.02/DOC_1&format=PDF
[476] http://eur-lex.europa.eu/resource.html?uri=cellar:1d8d2670-b7b2-11e6-9e3c-01aa75ed71a1.0001.02/DOC_1&format=PDF

infrastructure security, which is the subject of a specific, complementary policy called the European Programme for Critical Infrastructure Protection (EPCIP).

The regional groups under TEN-E have a different structure and objective than the ROCs. The proposed regional operating centers have a system operations function, while the regional groups under TEN-E have a network planning function (establishing regional lists). Network planning and system operations are executed in different time-frames before the actual transport and delivery of power takes place.[477] Nevertheless, both functions are interrelated which justifies mutual alignment or even integration.

The regions and countries covered by the current six RSCIs (and proposed ROCs?) overlap: some TSOs take part in multiple ROCs (e.g. 50Hertz both in Coreso and TSC). The TEN-E Regulation establishes four regional groups related to the electricity priority corridors, also with overlapping partnerships, e.g. CWE countries are in both NSOG and NSI.

In the Impact Assessment of the proposal for a Directive on the internal market for electricity (SWD(2016) 410), the introduction of ROCs has not been assessed in relation to the regional groups of the TEN-E Regulation. However, the role and missions of the regional groups within TEN-E appears less complex and intensive than the role and missions of the proposed ROCs.

Table 7-1 Differences between the TEN-E regional groups and the ROCs

Characteristic	Regional Groups	ROCs
Function	Network planning (PCI selection): long term	Network operations: medium and short term
Type	Priority corridors (4 on electricity + highways)	Electricity only
Composed of representatives of	Member States, NRAs, TSOs, Commission, ACER and ENTSO-E	TSOs, ENTSO-E
Constitution	Not a legal form. (Decision-making powers shall be restricted to Member States and the Commission)	To be established in a legal form

Stakeholder consultation

Stakeholders have provided various comments via the **targeted survey** on the coherence between the TEN-E Regulation and the SoS for electricity proposals:

- The TEN-E Regulation is promoting cross border electricity investment because of the vital role this infrastructure plays in delivering secure, sustainable and affordable energy to European consumers. These links bring important security of supply benefits in the form of increased adequacy margin (value of additional capacity to meet demand) and improved flexibility and system stability (voltage, frequency control, ancillary services, etc.).
- The possibility to reduce grid tariffs with congestion revenues should be kept. Interconnectors bring security of supply, i.e. a capacity value which materialises for instance on capacity mechanisms.
- Target interconnection capacities are related to the definition of congestion and the configuration of bidding zones. Security of supply indicators should be similar to the provisions in the risk preparedness proposal.

[477] Ecorys, DNV GL and ECN (2015). Options for future European Electricity System Operation. European Commission, December 2015.

A stakeholder pointed to potential inconsistencies between TEN-E and the new Market Design Initiative (MDI) proposal. The proposed Electricity Regulation[478] (in particular, Article 14 on capacity calculation and Article 17 on the use of congestion management income) would create "negative" incentives for building new interconnectors, which would thwart Art. 13 of the TEN-E Regulation on "appropriate incentives".[479]

The topic of coherence between TEN-E regional groups and ROCs has not been specifically addressed in the targeted stakeholder survey. However, with regard to the TEN-E regional groups, which aim to identify PCIs and assist in the implementation of projects (see section 5.21), stakeholders remarked that these EU regional groups are not in line with the ENTSO-E regional groups, which leads to inefficiencies. Yet another layer of regional structures through ROCs further adds to the inconsistency.

One stakeholder commented that it should not be possible to evade the regional group and to nominate a project on the PCI list outside the defined process (e.g. CESEC). Another comment suggested that instead of limiting their tasks to ranking projects, the regional groups could take a more strategic role in the direction of regional energy systems identifying needs to tackle challenges beyond energy infrastructure (e.g. harmonisation of regulatory systems). This stakeholder also focussed on the need for a more integrated energy system perspective: ENTSOG and ENTSO-E have already announced increased collaboration in developing their TYNDPs. To make best use of this more integrated view on the energy sector, regional groups need to maintain this integration in their options' assessment to reflect how a multitude of solutions (demand side response, electricity and gas storage, etc.) can contribute to security of supply, market integration and sustainability in the medium to long term. This will also require adapting the scoring criteria and cost-benefit analysis to enable the comparison of different options and technologies.

Conclusion

The setting up of ROCs is undoubtedely a positive initiative as it allows to further improve system management and market functioning, and it can be considered as a useful stepping stone towards an EU wide integrated energy system and market. The TEN-E regional groups have a network planning function (identifying infrastructure needs, establishing regional lists, monitoring and facilitating PCI implementation), while the proposed ROCs have a system operations function (with a short-term scope in relation to actual delivery of electricity). The stakeholder survey did not address the coherence between regional groups and ROCs, but as their roles are completely different, there is a priori no risk for overlap or inconsistency. Comments made by stakeholders related to the regional groups suggested not limiting their tasks, but rather to strengthen their strategic role and use their integrated view on the energy sector.

[478] COM(2016)861, Proposal for a regulation of the European Parliament and of the Council on the internal market for electricity
[479] Article 17 will more strictly restrict how TSOs can use congestion revenues, and potentially limit who can therefore invest. This reduces the incentives for new entrants and for external financing, both of which are core to the TEN-E objectives. Also in Article 17, the explicit allowance for amending transmission tariffs is proposed to be removed. This would create a (perhaps unintended) conflict with the Cap & Floor regulatory regime underpinning UK and Belgium interconnectors, potentnially undermining this succesful model. Furthermore it might translate into more public resistance since the limitations in using congestion income will lead to higher grid tariffs and prices paid by consumers. Stakeholders suggested to keep the possibility to to reduce grid tariffs with congestion revenues and to reincorporate the option to reduce revenues by congestion income givent that this measure is necessary to facilitate buy-in from citizens to foster further network development by avoiding increasing tariffs for the customers or non-submittal of benefits.

7.2.3 *To what extent would parts of the TEN-E content be taken over by the planned network codes under new MDI (e.g. harmonised tariffs)?*

New electricity market design initiatives are laid down in the proposal for a Regulation on the internal market for electricity (COM(2016)0861) recasts Regulation (EU) No 714/2009. Article 55 of the proposal provides a list of areas (16 in total) for which network codes can be established. Various network codes are already in place: Capacity Allocation and Congestion Management (CACM), Forward Capacity Allocation, Demand Connection, Requirements for Generators, and High-Voltage Direct Current (HVDC). According to the Commission's decision on the establishment of the annual priority lists for 2017, the following network codes will be the next to be established on harmonised electricity rules:

- Rules regarding system operation (entered into force on 2 August 2017),
- Rules on emergency and restoration requirements and procedures (awaiting validation by EP and Council),
- Balancing rules (awaiting validation by EP and Council).

Evaluation based on literature review

Existing network codes such as on CACM and HVDC also address issues that are relevant in TEN-E. For example, the CACM (recital 4) states that *"the available cross-border capacity should be one of the key inputs into the further calculation process [of available capacity], in which all Union bids and offers, collected by power exchanges, are matched, taking into account available cross-border capacity in an economically optimal manner."* TSOs should use a common set of remedial actions such as countertrading or redispatching to deal with congestion, and they should coordinate the use of remedial actions in capacity calculation. Moreover, the redispatching and countertrading cost sharing methodology shall include cost-sharing solutions for actions of cross-border relevance.
In addition, the HVDC network code states that its regulation also applies to HVDC systems whose connection point is below 110 kV when a cross-border impact is demonstrated by the relevant TSO. The relevant TSO shall consider the long-term development of the network in this assessment of cross-border impact.

The three new network codes mentioned above address some relevance to TEN-E issues, although they have a much more operational and short term character when compared to TEN-E. For example, the network code on System Operation describes the principle (Article 76) that costs of relieving cross-border-relevant congestion shall be covered by TSOs responsible for the control areas in proportion to the aggravating impact of energy exchange between given control areas on the congested grid element. In determining whether congestion have cross-border relevance, the TSOs shall take into account the congestion that would appear in the absence of energy exchanges between control areas.
The network codes on balancing and on emergency and restoration procedures contain more general provisions, e.g. on taking account of cross-border positions and on recovery of costs through network tariffs.

Stakeholder consultation

The above mentioned question was not specifically addressed in the **targeted survey**, but stakeholders mentioned the following relevant points:

- TEN-E has created a more positive investment climate for new cross border interconnections, which has contributed to successful final investment decisions for numerous projects, many of which are instrumental for market integration, energy and climate targets and security of

supply. Only by realising such physical projects will the theories of the new Network Codes be implemented in practice and only in this way will interoperability issues across TSO control boundaries be improved. Thus, TEN-E reinforces the network codes.

- The procedures for PCI selection, TYNDP and CBA are in practice linked, but some inconsistencies in the Regulation need to be addressed. Some of the network codes /guidelines need to be considered as well.
- Under current market conditions, a number of elements, e.g. network codes focussing on short-term bookings, do not contribute to long-term market commitments.

Conclusion

Existing and planned network codes establishing harmonised electricity rules address some issues that are also relevant in TEN-E. There is, however, no indication in the literature that parts of the TEN-E content be taken over by the planned network codes. This could be due to the short-term, operational focus of the network codes as opposed to the long-term focus of TEN-E; this conclusion is supported by stakeholder views.

7.3 C.3 – Climate Impact Reporting

7.3.1 How sufficient is the climate impact reporting within the PCI framework?

Article 4 of the TEN-E Regulation sets different criteria for PCIs, including general criteria and specific criteria for the different energy infrastructure categories. Annex IV of the Regulation defines further specifies rules and indicators concerning these criteria.

According to Article 4 of the Regulation, electricity transmission and storage PCIs should contribute to market integration, security of supply or sustainability (i.e. through the integration and transmission of renewable energy). Gas PCIs should contribute to market integration, security of supply, competition or sustainability (i.e. through the reduction of emissions, support of intermittent renewable generation and enhancement of the deployment of renewable gas). For both, electricity and gas PCIs, one of the eligibility criteria (sustainability) is directly linked to climate.

Annex IV includes an indicator to measure the level of sustainability (contribution of a project to reduce emissions) for gas and electricity PCIs. It also includes the transmission of RES for electricity transmission and storage PCIs. For oil PCIs, Annex IV is also referring to the climate impact as part of the "efficient and sustainable use of resources" criterion but the wording is different, referring to "contribution to minimising environmental and climate change".

Evaluation based on literature review

Most PCIs require Environmental Impact Assessments (EIA), either because they meet Annex I conditions of the EIA Directive[480] or are otherwise considered as having significant impacts on the environment. The EIA procedure is a preliminary step in the permitting procedure and includes that project developers must provide comprehensive information on the environmental (including climate) impact of their PCIs (EIA report). The environmental authorities and the public (and affected MSs) must be

[480] Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment

informed and consulted, and the competent authorities have to take due consideration of this environmental information and the results of consultations in their permit granting decisions.[481]

There is no specific legal provision in the TEN-E Regulation with regard to the climate impact reporting, but the economic effects of climate and environmental impacts should in principle be included in the CBAs. The CBA methodologies prepared by the ENTSOs (for gas and electricity) and by the JRC[482] (for smart grid projects) include information on how to assess the sustainability criterion. The latter, for example, includes proposed calculation options for the key performance indicators (KPIs) mentioned in the Regulation related to GHG emissions reduction, energy efficiency and RES integration.

Detailed quantified impacts on both RES integration and CO_2 emissions are provided per PCI project in the electricity TYNDP as part of the CBA results.[483] However, limited information is provided in the gas TYNDP, and when available this is mostly presented in a qualitative way only.[484] This reporting is expected to improve once the new CBA methodology will be implemented (see 5.22.2).

Stakeholder consultation

Climate impact reporting was not specifically addressed in the **targeted survey.** Several stakeholders have however expressed critical views with regard to the climate impact of oil PCIs, and suggest that oil projects should not be recognised any more as PCIs.

An **interviewed** NRA considered that the current climate impact reporting is not sufficient for gas projects, while for electricity, it is considered as any other factor, but not with sufficient importance. An NGO critisiced the face that in their view there is currently no integrated climate impact assessment carried out in the run of PCI selection, and considering the importance that the integration of European grids plays in meeting the EU's climate goals, a proper climate assessment for PCI candidates would indeed be needed.

Conclusion

Most energy infrastructure PCIs require Environmental Impact Assessments (EIA), which include reporting on their expected climate impacts. There is no specific provision in the TEN-E Regulation with regard to the climate impact reporting, but the economic effects of climate and environmental impacts of PCIs are in general included in the CBA results published as part of the electricity TYNDP. For gas PCIs however, according to stakeholders, climate impacts are not yet properly quantified in the CBAs (mainly qualitative information is provided). While stakeholders do no deem appropriate to impose additional or more extensive legal obligations regarding climate impact reporting, a more consistent, transparent and comprehensive approach is needed in the EIAs and CBAs, particularly regarding quantitative climate impacts of oil and gas PCIs. In order to improve transparency and awareness about the contribution of PCIs to climate objectives, an overview of the expected climate impacts of all electricity and gas PCIs could be made available by ACER as part of its consolidated annual reports.

[481] DG ENV & DG ENER (2013), Guidance Document: Streamlining environmental assessment procedures for energy infrastructure Projects of common Interest (PCIs)
[482] JRC (2017a), Assessment framework for projects of common interest in the field of smart grids – 2017 update.
[483] Excel "TYNDP 2016 all projects data in Excel format" available for download in the ENTSO-E website (http://tyndp.entsoe.eu/reference/#downloads)
[484] ENTSOG (2016), TYNDP 2017 – Annex A: Infrastructure projects. A2: Project details.

7.4 C.4 -Environmental Impacts

7.4.1 Environmental impact – has TEN-E and / or the PCI projects had any excessive environmental impacts (e.g. Natura 2000[485] conflicts?)

The TEN-E Regulation aims to develop trans-European energy networks, while safeguarding the environment. The Regulation states that the harmonisation of the main principles for the assessment of environmental effects, including in a cross-border context, should be ensured by the correct and coordinated implementation of the SEA Directive[486], the EIA Directive[487], the Aarhus Convention[488] (where applicable) and the Espoo Convention[489]. MSs shall provide joint PCI assessments where possible. Guidance on environmental procedures for PCIs has been published in 2013 by the EC.[490]

PCIs must, like any other infrastructure project, comply with extensive environmental European and international regulation, which adequately addresses their environmental impacts (including their cross-border effects). According to Article 7(8) of the TEN-E Regulation, PCIs should be considered projects of public interest in the context of the the Habitats Directive[491] and the Water Framework Directive (WFD)[492]. The Habitats Directive and the WFD allow for some adverse environmental impact from projects that are considered in the public interest.

Evaluation based on literature review

The environmental impact of infrastructure projects, including PCIs, is extensively addressed in several European laws. The two main environmental assessment procedures required by EU legislation for PCIs are Environmental Impact Assessments (EIA)[493] and Appropriate Assessments (AAs)[494], which form a critical part of the overall permit granting process for PCIs. Assessments required by other EU environmental directives can be relevant in specific circumstances.

The **Habitats Directive** requires AAs of plans and projects that are likely to impact a Natura 2000 site[495]. In addition to the AA for individual PCIs, an AA may also be required for network development plans[496] depending on the nature, form and content of such plans. The CAs can only authorise the plan or project if the AA determines that it will not adversely affect the integrity of a Natura 2000 site, therefore, any possible mitigation measures (e.g. in relation to the PCI location, design, construction method and timing etc.) should be taken to avoid this. Should authorities wish to authorise a PCI for

[485] Natura 2000 sites are areas designated pursuant to the Birds Directive 2009/147/EC and/or the Habitats Directive.
[486] Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment
[487] Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment
[488] Aaruhus Convention on access to information, public participation in decision-making and access to justice in environmental matters, signed in Aarhus on 25 June 1998
[489] ESPOO Convention (Convention on Environmental Impact Assessment in a Transboundary Context)
[490] DG ENV (2013), Guidance on the Application of the Environmental Impact Assessment Procedure for Large-scale Transboundary Projects and DG ENV & DG ENER (2013), Guidance Document: Streamlining environmental assessment procedures for energy infrastructure Projects of common Interest (PCIs).
[491] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora
[492] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy
[493] According to the SEA Directive (2001/42/EC), an EIA is mandatory for plans/programmes in certain fields, including energy. The SEA Directive may in particular apply to network development plans established by TSOs under Directive 2009/72/EC12 in which candidate PCIs are specified.
[494] Required for nearly all PCIs, depending on their location. These AAs require precise data and careful expert analysis to effectively and accurately determine the extent to which a PCI may have adverse effects on one or more Natura 2000 sites.
[495] An area designated pursuant to the Birds Directive 2009/147/EC and/or the Habitats Directive
[496] As defined under Directive 2009/72/EC, these plans are established by TSOs and specify candidate PCIs

which the AA concludes a negative impact, they will have to establish that all conditions of Article 6(4) of the Habitats Directive are met, i.e. no alternative solutions are available and that the PCI is necessary for 'imperative reasons of overriding public interest'.[497] Under the **Water Framework Directive** (WFD), PCIs should not prevent the achievement of good groundwater status, good surface water ecological status or, where relevant, good ecological potential.[498] They should also not cause deterioration to the 'status' of surface water bodies and groundwater as reported in the River Basin Management Plans (RBMPs) required under the WFD.[499]

Justice and Environment[500] highlights that Article 7(8) enshrines that PCIs are of public interest from an energy perspective; while this needs to be – at the same time – interprested in conformity with Article 6(4) of the Habitats Directive[501] and Article 4(7) of the WFD[502]. Further, they recommend to monitor national PCI permitting with regard to the application of Article 7(8) of the TEN-E Regulation, in conjunction with Article 6(4) of the Habitats Directive and Article 4(7) of the WFD by the competent authorities.

The environmental impact of PCIs is still a critical issue, notwithstanding extensive legislation and continued efforts by authorities and project developers to prevent or mitigate these impacts. The European Commission has published, as required by Article 7(4) of the Regulation, guidelines on "Streamlining environmental assessment procedures for energy infrastructure Projects of Common Interest (PCIs)".[503] Justice and Environment[504] reviewed the TEN-E implementation in Austria, Croatia, Czech Republic, Hungary and Poland, and concluded that these countries had not taken any legislative measures or evident non-legislative measures (as of August 2016) in order to streamline the environmental assessment procedures and/or to ensure the coherent application of environmental assessment procedures required for PCIs as recommended by these Guidelines.

An NGO report[505] summarises some of the major threats to wildlife from PCIs. It also provides recommendations on how to best protect nature while establishing energy infrastructure, and particularly PCIs. The main recommendations from the study should be covered by the EIAs and SEAs (if done properly).

[497] DG ENV & DG ENER (2013), Guidance Document: Streamlining environmental assessment procedures for energy infrastructure Projects of common Interest (PCIs)
[498] Projects that could have important impacts on water status are those that involve the creation of reservoirs for pumped water energy storage plants. In addition, PCIs where pipelines cross watercourses may permanently alter water status through physical modifications of the water bodies caused by the infrastructure.
[499] DG ENV & DG ENER (2013), Guidance Document: Streamlining environmental assessment procedures for energy infrastructure Projects of common Interest (PCIs)
[500] Justice and Environment (2017), Energy Infrastructure Projects of Common Interest (PCI) - National Implementation of the EU Permitting Rules
[501] This article states that a project may only be carried out for "imperative reasons of overriding public interest". The public interest must be overriding and long term. Authorities need to decide whether they are more important than site conservation.
[502] This requires carrying out an interest test when new modifications and new sustainable human development activities hinder the achievement of the WFDs' environmental objectives.
[503] DG ENV & DG ENER (2013), Guidance Document: Streamlining environmental assessment procedures for energy infrastructure Projects of common Interest (PCIs)
[504] Justice and Environment (2017), Energy Infrastructure Projects of Common Interest (PCI) - National Implementation of the EU Permitting Rules
[505] EEB & Birdlife International (2014), Connecting energy, protecting nature.

During the 2011 IA, 20 projects were identified as having potential conflicts with Natura 2000. An NGO identified five PCIs[506] from the first list that could be environmentally damaging.[507] Based on the 2016 reporting from MSs' competent authorities to DG ENER, we have noticed that only for eight projects[508] issues related with environmental impacts are explicitly mentioned. Article 7(8) of the TEN-E Regulation allows authorisation of PCI projects which have an adverse environmental impact, for reasons of overriding public interest. On the basis of publicly available documents, it is however not possible to identify whether PCI permits have effectively been granted on the basis of this specific provision.

Stakeholder consultation

Several sakeholders referred in the **targeted survey** to perceived incoherences between TEN-E and the **environmental regulation.** They argued that the TEN-E Regulation does not properly take into consideration the specific environmental requirements, which are laid out in the Habitats Directive 92/43/EEC[509], the Birds Directive 2009/147/EC[510] and the EIA Directive 2011/92/EU[511]. For example, infrastructure plans would often not be in compliance with the SEA Directive (in some cases there would be no SEA carried out and no public participation parallel to project planning). Another example mentioned by stakeholders is that Article 7(8) of the TEN-E Regulation, which enshrines that PCIs are in public interest from an energy policy perspective, should be interpreted in conformity with Article 6(4) of Directive 92/43/EEC (Habitats Directive). In this context, there is a risk that Competent Authorities grant permits for PCIs with a negative assessment of their implications for the site, on the basis of overriding public interest, and without guarantees that appropriate compensatory measures are taken. Stakeholders highlighted that there is a need to further monitor the PCI permitting practice with regard to the application of Article 7(8) of TEN-E in conjunction with Article 6(4) of the Habitats Directive and Article 4 (7) of the Water Framework Directive by the competent authorities.

Further, stakeholders suggested allowing a more flexible timeframe for the permitting procedure and the possibility of an extension in view of the environmental requirements. It was also mentioned that the integration of a proper environmental assessment process before granting the PCI label is lacking. Another possible conflict mentioned in the current approach is described in the following quote by an NRA: "*There is an inherent conflict between the goal of ever increasing public participation (e.g. Aarhus Convention) and environmental protection (e.g. Birds directive and Natura 2000) and the need to boost the energy infrastructure.*"

An **interviewed** NRA referred to the fact that some electricity PCIs had to cope with environmental impacts on neighbouring countries. Additional efforts adopted to mitigate these environmental impacts led to a less favourable benefit/cost ratio and constituted a disadvantage for these projects.

[506] PCI 6.19 (On-shore LNG terminal in Italy, no longer PCI, which among other things lacked an assessment of potential impacts on Natura 2000 sites in Slovenia); PCI 2.18 (Hydro-pumped storage in Austria, which intends to divert water from rivers through Natura 2000 areas, potentially breaching the Water Framework Directive and Habitats and Birds Directives); PCI 5.3 (LNG PCI in Ireland, which may damage Natura 2000 sites); PCI 3.11.4 (Internal electricity transmission lines in Czech Republic, which faced strong local opposition); PCI 8.1.2.2 (Gas PCI in Estonia which risks damage to Natura 2000 sites due to failure to fulfil the obligations under the Birds and Habitats Directives).
[507] Birdlife (2013), Case studies of environmentally damaging and controversial EU energy infrastructure 'projects of common interest' (PCIs).
[508] PCI 1.14 (DK-UK electricity interconnection); PCI 3.1.1 (AT-DE electricity interconnection); PCIs 3.7.2 & 3.7.3 & 3.7.4 (Internal electricity line, Bulgaria); PCI 3.4 (Austria – Italy electricity interconnection); PCI 2.18 (Capacity increase of hydro-pumped storage in Austria - Kaunertal, Tyrol (AT), Austria); PCI 2.17 (Portugal Spain electricity interconnection).
[509] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora
[510] Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds
[511] Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment

Another interviewed NRA did not have this experience yet but referred to some some longer-term projects (such as integrated meshed grids) which may have such impacts in the future.

An NGO argued that several PCI projects conflict with the EU's environmental acquis (e.g. Habitats Directive, Water Framework Directive), and refers to four concrete PCI examples mentioned on the websites of Birdlife and Justice and Environment.[512]

Conclusion

Based on the stakeholders' feedback and our analysis of the different PCI reports and files, it is difficult to assess to what extent TEN-E and the PCI projects have had environmental impacts. In 2011, 20 projects were identified as having potential conflicts with Natura 2000. In the 2016 reporting from MSs' competent authorities to DG ENER, specific issues related to environmental impacts are explicitly mentioned only for eight projects.

PCIs, like most other large infrastructure projects, often pose major threats to the environment. However, appropriate application of the EIA and SEA Directives (along with Natura 2000 and Water Directives) should address these concerns. A major specific concern regarding PCIs is however the application of Article 7(8) of the TEN-E Regulation and Article 6(4) of the Habitat Directive, which enable authorisation of environmentally adverse projects for reasons of overriding public interest. This aspect should be further monitored in the PCI permitting practices.

[512] Birdlife published five case studies in 2013 regarding PCIs which were damaging the environment: LNG terminal in Northern Adriatic, Italy (PIC 6.19 – no longer a PCI); Hydro-pumped storage in Kaunertal, Austria (PCI 2.18); LNG storage in Ireland (PCI 5.3); internal lines in Czech Republic (PCI 3.11.4), LNG gas terminal in Estonia (PCI 8.1.2.2) (Source: http://www.birdlife.org/sites/default/files/attachments/PCI_case_studies.pdf). Justice and Environment published three case studies of conflicting PCIS in 2014: Hydro-pumped storage in Kaunertal, Austria (PCI 2.18); internal lines in Czech Republic (PCI 3.11.4), LNG gas terminal in Estonia (PCI 8.1.2.2) (Source: http://www.justiceandenvironment.org/_files/file/2014/PCI%20case%20studies%202014%282%29.pdf)

8 EU Added Value

This section provides a qualitative analysis assessing the value resulting from TEN-E that is additional to the value that would have resulted from interventions initiated at regional/national level by public authorities and the private sector.

8.1 AV.1 – Additional Value of EU Intervention

8.1.1 *What is the additional value of EU intervention (as embodied in the PCI framework) compared to what could have been achieved by Members States at national and /or regional level? Could national authorities have achieved the same themselves (e.g. on CBCAs)?*

The PCI framework mainly presents EU intervention in relation to permit granting procedures, public involvement, cross-border cost allocation and financial support. The central question here is to what extent do these issues, addressed by the intervention, continue to require EU-level action as opposed to MS-level action, and to what extent has this EU intervention provided added value.

Evaluation based on literature review

Both the 2010 and 2011 IA[513] made clear that several large cross-border infrastructure projects that have regional or European-wide benefits would not have been realised without EU intervention. Although in some regions, where TSOs and NRAs were already closely cooperating, it may be expected that similar results could have been achieved without EU regulation. For example, in the Nordic region, TSOs (Nordel), Regulators (Nordreg) and energy authorities were already, before the publication of the TEN-E Regulation, closely cooperating in view of developing an effective and harmonised Nordic electricity market, and are in this framework coordinating the planning and realisation of infrastructure with cross-border impact.

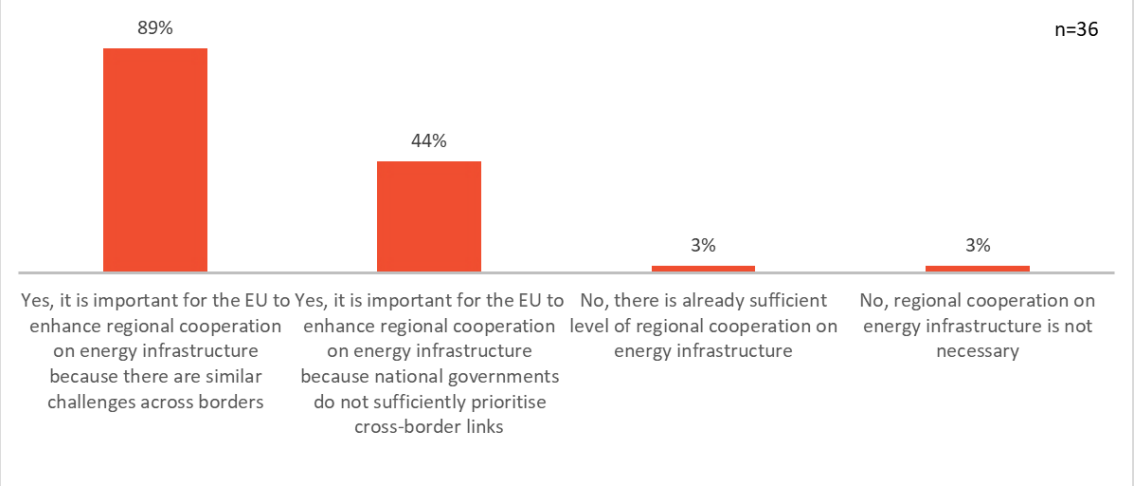
Stakeholder consultation

The **public consultation** explored the perceived need for EU-level action through a multiple-choice question. The results revealed highly positive attitudes towards EU-level action: 89% of the 36 respondents indicated that it is important to enhance regional cooperation on cross-border energy infrastructure and 44% estimated that national governments do not sufficiently prioritise cross-border links. See also

Figure 8-1. Only one respondent indicated that there is already sufficient regional cooperation on energy infrastructure, and one other respondent mentioned that regional cooperation on energy infrastructure is not necessary.

[513] SEC(2011) 1233, Commission Working Paper: Impact Assessment accompanying the document 'Proposal for a Regulation on guidelines for Trans-European Energy Infrastructure and Repealing Decision No 1364/2006/EC' and SEC (2010) 1395, Commission Staff Working Document: Impact Assessment - Accompanying document 'Communication: Energy infrastructure priorities for 2020 and beyond – A Blueprint for an integrated European Energy Network'

Figure 8-1 Results public consultation to the question: "Do you think it is worthwhile for the EU to try to enhance regional cooperation to develop energy infrastructure?"



The **targeted public survey** similarly asked whether the respondents considered EU-level action appropriate. The high positive score, with 46 out of the 77 answers being 'yes' and only two 'no', clearly indicates the predominantly positive opinion of the respondents with regard to the appropriateness of EU-level action in this domain. Overall the nature of the answers is that TEN-E "is a good step forward". One of the main arguments given is the cross-border nature of the concerned investments, as expressed for example in the answer of a project promotor:

"*Due to the cross-border nature of electricity PCI projects, and the fact that the benefits are multi-facetted and pan-European in nature (e.g. in terms of infrastructure as an enabler for wider EU energy and climate goals) this means EU level action is highly appropriate.*"

Other positive arguments refer to increased collaboration and ensuring consistency across borders, alignment with EU policy and strategy, holistic network optimisation, EU wide benefits, EU funding, and EU level enforcement. Some answers also highlighted the need for e.g. sufficient flexibility (specific MS challenges, MS level support and actions, MS subsidiarity), binding interconnection targets, a clear definition of 'commercially non-viable projects', and less restrictive criteria for CEF granting.

The few negative responses focused on leaving as much as possible to the market, new layers of complexity, risks and delays due to EU regulation, and the need for projects to pass an environmental filter before forming the final PCI list.

The following aspects were highlighted during the **focus groups**:

Regarding CBCA

Representatives from ACER at the **Regulatory Focus Group** mentioned that CBCA is an exceptional tool, whose added value is difficult to assess (the fact that CBCA decisions have only changed the cost

allocation across-border for few projects does not mean an unsuccesul outcome). Its main added value is to allow cost sharing for those PCIs which need it, and to assess costs and benefits at country level.

However, ACER also acknowledged that, due to the high uncertainties, there is not sufficient trust in the results of the CBAs which are the basis for the CBCA decisions. ACER's suggestion is to focus on improving the CBA and scenario development (as it is difficult to trust scenarios which have been developed by promoters themselves[514]). Currently CBAs need an approval by the EC, but scenarios do not.

An NRA mentioned that it is difficult to assess the added value of CBCAs because of their link to CEF; it is not clear to what extent CBCA and/or CEF are enabling investments. CBCA decisions are indeed often only considered as a doorway to CEF funding.

Regarding permitting

Some stakeholders at the **Permitting and Public Acceptance Focus Group** confirmed that the PCI label and political focus have contributed to a reduction of the permitting procedure duration (although the label has in general limited impact for citizens' acceptance). The time limit puts pressure on authorities to cooperate and coordinate (within and across borders) to meet the deadline.

Regarding public engagement

While stakeholders present at the **Permitting and Public Acceptance Focus Group** recognised the importance of consultation and public engagement for the acceptance of infrastructure projects, they agreed that there is limited added value from the TEN-E Regulation in this domain. TSOs highlighted they were aware of the positive value of adequate consultation from their earlier experience, and this was already common practice before the TEN-E publication, either on a voluntary basis, in particular for large projects, such as pipelines and cables, or on the basis of national legislation.

Regarding network planning

The **Network Planning Focus Group** concluded that the TEN-E Regulation effectively offers added value for network planning, as the same principles and methodologies are used for planning cross-border projects (which facilitates coordination). The PCI status/label itself also facilitates network planning. However, some provisions are duplicating efforts since they were already covered by national law.

A project promoter acknowledged that the Regulation offers added value for network planning, as it provides a supranational platform to discuss projects (regional groups) from a regional or pan-European perspective, allowing (competing) projects and their impacts to be compared. Another participant mentioned that, while aware that the CBA methodology could further be improved, it does provide the same assessment for projects across the EU, bringing a level playing field, although CBA is in principle not meant to compare projects, but rather to assess their impacts.

A TSO added that gas network planning has always been by nature European (since e.g. it has to take into account gas imports and transits) and there was a need for supranational cooperation. The markets' liberalisation and integration processes further increased the need for EU/regional planning. However, TSOs also recognised that the TEN-E Regulation was only published in 2013 and that there are

[514] TSO cooperation via ENTSO

elements which could be improved. At the moment, there are regions that are not yet sufficiently connected to the internal market and many PCIs are still to be implemented. More time is hence needed to properly assess the achievements of the TEN-E.

Most **interviewees** confirmed that the TEN-E Regulation effectively offers added value.

A TSO representative gave a positive feedback on this question, but added that political bargaining and the need for regional balances in investment plans might undermine the overall EU added value.

An energy sector expert considered that the added value is country dependent, but confirmed that some investments have effectively been realised thanks to TEN-E, and in particular CEF funding. The indirect impact of TEN-E is in general also positive: it has structured and intensified cooperation amongst competent authorities, NRAs and TSOs at regional level, it has improved the selection procedures of PCIs and driven the discussions about CBA and CBCA, which is considered as very useful. The PCI status seems however to have limited impact and added value.

An NRA representative also gave positive feedback, but added that the added value is difficult to quantify. The methodology for evaluating projects should be improved: more transparency is needed and a common basis for CBAs. Another interviewed NRA stated that some tools introduced by the TEN-E are complex, in particular CBCA, and may be used by promoters to benefit from the system, rather than contributing to the creation of a European single market. On the other hand, national authorities in charge of network planning are thanks to their participation in the regional groups, now are better capable to assess the need for infrastructure, even when lacking the European perspective

A third NRA refered to its national scheme which has been successful in bringing forward new electricity interconnector projects. Howevere, enabling regulatory frameworks at the other end of the interconnector are required for projects to progress and the PCI framework is very beneficial overall in progressing priority projects and facilitating cooperation and dialogue on a common platform between governments and NRAs. The TEN-E Regulation has hence added value, although the extent of this will differ between MS and RGs.

A fourth NRA was also positive about the added value of the Regulation. Although some results could have been reached without this European framework, it has effectively speeded up the process. In particular, the CBCA and regional groups are useful tools to help reaching decisions. National authorities may have been able to achieve similar results, but the Regulation (especially in the case of CBCAs) gives a common set of rules and principles that helps reaching common decisions.

A positive opinion was also expressed by an NGO representative: the TEN-E Regulation guarantees a pan-European approach on network development (and coherence on its contents) which is necessary for the achievement of the EU Energy & Climate goals. On Member State level, this would not be possible at all.

An energy association expert also pointed to the added value of the Regulation. EU intervention as it currently stands is a positive step in the right direction, but it should go further and a top-down approach should be adopted. The significant effort made by the EC to accelerate the regional development of infrastructure is appreciated. Proceeding by Regulation has certainly accelerated

projects and their implementation; EU Member States would not have been able to achieve such results individually at national level or even regionally. Further progress could still be made by granting the EU regulatory authorities a larger role in the cross-border decision processes, including regarding tariffs, to avoid the accumulation of requests, procedures, etc.

During the **Permitting and Public Acceptance focus group's** discussion, further information was gathered on the basis of the following subquestion "Is the direct applicability of the permit granting provisions in the TEN-E Regulation an advantage compared to similar provisions in a Directive?" Stakeholders agreed that the direct applicability of the permit granting provisions (e.g. in comparison to a Directive which has to be transposed in each MS) is the most efficient way, especially for cross-border projects, for which coordination between MSs is key. DG ENER mentioned that the Regulation leaves little room for manoeuvre for MSs to fit the permitting framework into national legislation and that having a Directive might ensure higher flexibility and compliance (e.g. avoid three stage processes).

DG ENER added that it would not be possible to set time limits in a directive (while most stakeholders welcome time limits, at least as an indication). A regulation gives a more level playing field for projects. The ideal option depends on the level of harmonisation required. It was acknowledged that transposing a Directive might lead to more flexibility for MSs but also to diverging interpretations. For national Regulatory and Competent Authorities, the basis should be the same as they need to work together across borders.

Conclusion

On the basis of stakeholders' feedback and our analysis, we can conclude that the TEN-E regulation does effectively offer benefits above and beyond what MS level action could achieve, but its added value is more pronounced for some MSs than others (as is often the case with EC action). Furthermore, as the Regulation has entered into force only four years ago, it is too early to conclude how beneficial it will be.

According to the stakeholders, **EU-level action to promote trans-European energy infrastructure is considered appropriate in general**. The main argument in favour is the existence of similar challenges across borders, and the need to coordinate network planning and large investment projects at supranational level. In this regard TEN-E is considered a good step forward. Stakeholders confirm that the PCI label and political focus have contributed to a reduction of the permitting procedure length, and that the TEN-E Regulation effectively offers added value for network planning thanks to more aligned principles and methodologies. There is, however, limited added value from the TEN-E Regulation in the domain of public engagement and acceptance of PCIs. Since the CBCA is an exceptional tool and is often only considered as a doorway to CEF funding, its added value is difficult to assess and is not unanimously confirmed by stakeholders. Its main contribution is to allow cost sharing for those PCIs which need it, and to assess costs and benefits at country level. However, there is not sufficient trust in the results of the CBAs which are the basis for the CBCA decisions.

Permitting issues related to PCIs could in principle have been regulated with a Directive instead of a Regulation, in order to offer more flexibility to Member States and avoid conflicting European and national rules. A Regulation is however considered the most efficient option, especially for cross-border projects, for which coordination and harmonisation between Member States is key.

9 Conclusions

On the basis of the different studies and reports that we reviewed, the stakeholders' feedback and our own insights, we can conclude that the TEN-E Regulation is overall a legal framework that has improved the planning of trans-European infrastructure and accelerated the selection and realisation of Projects of Common Interest (PCIs)

The Regulation has in particular contributed to improving the identification process of PCIs in the priority corridors and areas defined in its Annex and to facilitating and accelerating their implementation. It has also revolutionised the planning of trans-European infrastructure by its regional approach as a necessary step towards its planning at truly European level, and it allows, in exceptional cases, CEF co-funding for works for projects that have wider positive benefits, such as security of supply, solidarity and innovation, but whose costs cannot be included in the tariffs of the project developers.

The main **positive impacts** are as follows:

- The Regulation offers national competent authorities and regulators, as well as project developers, useful guidance, a common legal basis and adequate instruments and regional platforms for identifying priority needs for trans-European energy infrastructure investments and for facilitating and accelerating the implementation of selected projects. This Regulation has proven its added value for large infrastructure projects with cross-border impacts for which coordination and cooperation amongst Member States is key, particularly in the context of cost-benefit analyses, cost allocation and financing. The Regulation has also provided Competent Authorities with the same framework (including definitions, permitting procedures and timeframes), facilitating coordination across borders;
- The average time necessary to grant permits for PCIs has decreased since the entry into force of the Regulation. Although the correlation with TEN-E is difficult to demonstrate, we can assume that the provisions in the Regulation regarding permit granting have effectively contributed to this improvement;
- The Regulation provides an effective EU legal framework to facilitate and stimulate a regional approach to network planning and investment projects' selection. National network planning exercises are important and necessary to underpin regional and EU-wide plans, but the evaluation and review of national PCI proposals at supranational level via regional groups and adequate monitoring at EU level have proven their added value and allow the selection of the most appropriate infrastructure projects from a European macro-economic perspective;
- The elaboration of a harmonised methodology for energy system-wide cost-benefits analyses is welcomed by stakeholders and is in general considered as a very useful provision in the Regulation. This methodology can also be used for the evaluation of projects at national level;
- The Regulation offers access to instruments that facilitate financing of projects which present an overall net social welfare benefit at EU level, but whose financing by the hosting countries is problematic due to asymmetric costs/benefits and/or their high impact on national system tariffs. Reallocation of costs amongst concerned countries via CBCA and/or access to CEF co-funding or in exceptional cases through the provision of specific incentives, are in those cases useful instruments to address these problems.

Our analysis and the stakeholder consultation have also revealed some **weaknesses** in the current approach:

- The permitting procedures remain complex, difficult and lengthy. Permitting issues remain one of the main causes for delays in PCI implementation. The setting-up of a one-stop-shop should have contributed to streamlining and accelerating these procedures, but in practice, this solution has not yet proven successful in some MSs due to conflicting pre-existing procedures and/or their specific institutional context;
- The priority corridors and areas as well as the eligibility criteria have been defined in 2013. This approach is no longer fully in line with the evolution of the energy system and with the 'new' policy priorities (i.e. the Paris Agreement and the 2050 EU decarbonisation goals). An update of Annex I would hence be useful, in order to avoid supporting energy infrastructure investments that might not be future proof;
- As mentioned above, the Regional Groups have been proven to offer added value to the PCI selection and implementation processes, but there appears to be some overlap between the different regional structures. Therefore, a closer alignment seems useful in order to improve the efficiency of the structures and processes;
- The scenarios and assumptions which are used for the elaboration of the electricity and gas TYNDPs are not sufficiently coordinated and do not seem fully in line with the medium and long-term energy and climate policy options and targets. The CBA methodology is not yet consistent for electricity and gas, and does not always adequately capture and quantify all projects' costs and benefits, including their impact on the environment and security of supply (at project level). The results are also not yet presented in a consistent and transparent way for all PCIs;
- As mentioned above, CBCA is a useful instrument to facilitate financing of projects; however, the link with CEF funding leads to some CBCA applications only being submitted in order to gain access to CEF funding;
- Appropriate initiatives to enhance public acceptance of, and participation in, infrastructure decisions are key to facilitating permit granting. In accordance with the Regulation, Member States have drafted manuals of procedure which should have improved the transparency of the permit granting process. The overall added value of the concerned provisions and the "Guidelines for transparency and public participation" in Annex VI of the Regulation is however difficult to establish;
- The Regulation has led to the situation that in most Member States two (slightly) different permitting procedures are being used, one for PCIs and another for non-PCI infrastructure investments. This lack of consistency complicates the administrative processes.

In order to mitigate the weaknesses and reinforce the positive impacts of the EU Regulation, the following suggestions could be considered and further assessed:

- If a revision of the Regulation would be opted for, it might in particular be useful to update the list of priority corridors and areas, as well as the eligibility criteria.. To this end, the most appropriate instrument should be chosen, which allows for easy and regular updates in the future in view of further market, technological and policy developments. Non-binding guidelines, which are not a formal part of the Regulation, could be a suitable instrument to be considered;
- A more structural cooperation between the ENTSOs should be considered in order to have a more holistic approach and enhanced consistency between the TYNDPs and PCI selection in the

two vectors. Interactions between electricity and gas are gaining importance. Therefore, network and other infrastructure planning for both gas and electricity should be more integrated. A consistent and interlinked electricity and gas market and network model should be developed and effectively implemented. A stricter oversight by ACER also seems appropriate, in particular with regard to the scenario and assumption choices for network planning;

- The CBA methodology should be harmonised for electricity and gas, and further improved in order to consistently capture and quantify all projects' costs and benefits, including their impact on the environment and security of supply (at project level), and to offer an adequate basis for CBCA decisions. ACER could take up a more promiment role in this process and request, according to article 11,4 of the Regulation, the ENTSOs to elaborate an updated and improved CBA methodology, with due justification and timescale. Improving the CBA methodology would also lead to an improvement in the PCI selection process.;
- Some TEN-E provisions might be more efficient if they allowed Member State specific issues to be better taken into account, e.g. one-stop-shop and other aspects regarding permitting. The current lack of flexibility, which leads to parallel procedures in some Member States, could be addressed either by recommending such measures via best-practice sharing or non-binding guidelines or through legally binding acts such as delegated acts;
- Some procedures could be simplified in order to lower the administrative burden for project developers and authorities, e.g. renewal of PCI-label and reporting on progress by PCI promoters. Such simplification would also improve the monitoring of PCI progress;
- Several stakeholders are in favour of decoupling CBCA and CEF, and suggest that a CBCA decision should not be a prerequisite for having access to CEF funding. However, we think that, independently of a possible application for CEF support, a CBCA request canfor cross-border projects with asymmetric cost/benefits, be useful in order to assess whether a financing solution can be agreed upon at regional level. Only if the full investment cost cannot reasonably be included in national tariffs,, CEF funding should be applied for as 'solution of last resort'.

Overall, we believe that there is no overwhelming evidence that a revision of the Regulation is necessary at this stage. However, if a revision would be opted for in view of updating some aspects, e.g. the list of priority corridors and areas, as well as the eligibility criteria, the most appropriate instrument should be chosen, in order to have a more flexible and future-proof approach. Moreover, certain elements can be improved by better implementation of the Regulation at national level and additional guidance at EU level.

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Annexes

Annex 1 – Evaluation matrix

The matrix below summarises the questions and the methods we have used to answer them. The targeted survey column includes the codes referring to the survey questions. The column Focus Group mentions the focus group in which the topic was discussed. Finally, the column Public Consultation includes the section in which the topic was asked within the public consultation.

Question	Literature	Targeted Survey	Focus Group	Interviews	Public Consultation
Relevance					
To what extent are the objectives of the Regulation proving relevant to the needs identified in the original Impact Assessment?	✓	TS24, TS47-52	NA	✓	B
(Art 17.f) What evidence is there of (continued and/or new) market failures that justify the TEN-E Regulation and/or financing/subsidies?	✓	TS25-26	NA	✓	NA
(Art 17.c (part)) What evidence is there for gas and electricity network system failure events, their causes and related economic cost?	✓	NA	NA	✓	B
Changed / future context • To what extent would the proposed 30% binding EE target reduce the needs for interconnectors e.g. gas? • To what extent will interconnectivity /IEM/SOS targets still need to be promoted post 2020? • To what extent is promoting interconnectors in electricity still in line with the new market design proposed on 30th November and its focus on demand side and flexibility? • To what extent is the instrument, its PCIs and the sectors covered in line with the 2030 objectives for RES and GHG? • To what extent have technological advances in storage changed the need for transmission infrastructure?	✓	TS27-28	NA	✓	NA
Effectiveness					
How effective has the Regulation been in contributing to the goals for market integration by 2014, the 2020 climate and energy targets and move towards a low carbon economy by 2050? (Art 17.f)	✓	TS30	NA	✓	C
Progress in PCIs - What progress was achieved in the planning, development, construction and commissioning of PCIs? (Art 17.a) What evidence is there that the introduction of EU level infrastructure planning was successful and e.g. PCIs effectively receive priority status treatment at national level? Which factors outside the TEN-E Regulation affected the progress towards the specific objectives? (e.g. new additional obligations in national law, [e.g. legislation on grounding the cables in DE], budget cuts at MS level…) How many energy islands were addressed/alternative supply routes created by the PCIs implemented so far?	✓	TS34-35	NA	✓	C
What evidence is there of climate/energy policy benefits of giving more prominence to projects linking EU States with those outside the EU? What evidence is there that e.g. Energy Community and EuroMed frameworks for promotion of specific energy transmission projects would benefit from a closer alignment with the PCI framework?	✓	Several	NA	✓	NA
How many PCIs are caught by the transitional arrangements (Art. 19)? What pre-application schemes do the MSs use?	✓	(TS7-23)	NA	NA	NA
The average and maximum duration of the permit granting processes for PCIs, including the duration of each step of pre-application in comparison to that foreseen in Art. 10(4)	✓	TS31	NA	✓	NA

Question	Literature	Targeted Survey	Focus Group	Interviews	Public Consultation
The level of opposition faced by PCIs. Has the Regulation improved engagement with the public and public acceptance? Which aspect of the Regulation has helped most?	✓	TS31, TS33	Permitting	✓	C
Examples of best and innovative practice in stakeholder involvement and mitigation of env. impact during permit granting and project implementation	✓	TS32	Permitting	NA	C
Relative success of Art. 8(3) options - integrated schemes, coordinated schemes and collaborative schemes in meeting the time limits in Art.10	✓	TS31	Permitting	✓	NA
Has the creation of a one-stop shop added value (simplified, shortened) the permitting process? Have one stop shops effectively used the powers conferred in the Regulation? Would it be beneficial to use the permitting and public acceptance procedures introduced in TEN-E Regulation for projects other than PCIs (e.g. all those in the TYNDP)?	✓	TS31	Permitting	✓	NA
Has the two-stage pre-application/ application procedure been an effective/useful distinction? Is the 3,5 years permitting maximum length appropriate (e.g. for completing all consultations and EIA)? Has the quality of the documentation submitted improved since the TEN-E Regulation entered into force?	✓	TS31.4; TS46	Permitting	NA	C
The number of PCIs granted a CBCA decision and the outcomes of these decisions	✓	NA	NA	NA	NA
What motivates project promoters to request CBCA decisions?	✓	TS38	Network	✓	NA
How effective are CBCA decisions at enabling investment decisions and effective investments?	✓	TS37	Network & Regulatory	✓	NA
To what extent do CBCA decisions comply with the ACER guidelines? Do the ACER guidelines effectively guide NRAs into delivering useful CBCA decisions?	✓	TS39	Regulatory	✓	NA
What evidence is there that cross-border transmission capacities are or are not utilised effectively?	✓	NA	NA	✓	NA
How effective is the use of the congestion rents for new transmission capacities?	✓	Several	NA	✓	NA
To what extent have the investment incentive provisions of the Regulation been taken up? Were project promoters aware of the option (regulatory authorities are obliged to grant incentives as per Art. 13)? What might have dissuaded promoters from applying for investment incentives?	✓	TS40-42	Regulatory	NA	NA
Where used, what sort of incentives have been considered / developed? Have they been effective?	✓	TS40-42	Regulatory	NA	NA
What evidence is there that the current legal and regulatory frameworks encourage innovative solutions to infrastructure needs? What is the design (key elements) of successful incentive schemes promoting innovative solutions (across MSs)? Would more alignment between these schemes be needed? The role of TEN-E Regulation in this context? To what extent does the TEN-E Regulation allow for promotion of increased digitalisation of the energy networks and what possibly unexploited potential is still there?	✓	NA	Regulatory	✓	NA
Do the CEF funding eligibility criteria laid down in the Regulation effectively grant support to the most important/most needy projects? Are the criteria too wide/too restrictive?	✓	TS45, TS61, TS64	NA	✓	NA
How adequate and effective is the Regional group model for the PCI process? Is there any evidence for added value from a High Level Group format? Is there a need for formal recognition of the High Level Group format in the Regulation? What evidence is there that the Priority Corridors or Areas are defined optimally?	✓	TS43,TS47-52	Network	✓	NA
How adequate is the current set up for the electricity and gas network planning, including the network modelling exercise? Would relying on more detailed cost-benefit assessments for the selection of PCIs (beyond the results from TYNDPs) be beneficial to the process?	✓	TS43-44	Network & Regulatory	✓	NA

Question	Literature	Targeted Survey	Focus Group	Interviews	Public Consultation
How adequately is the interface and inter-linkage between transmission and distribution grids reflected in the PCI framework?	✓	NA	Network	✓	NA
How effective is the process of PCI identification in selecting projects that are most relevant to the fulfilment of policy objectives? Pros and cons of focusing on the limited number of strategic projects (e.g. as agreed by individual HLGs)? What changes in the PCI selection process could result in stronger commitment of all the actors to the timely approval and realisation of PCI projects?	✓	TS44 & others	Network	✓	NA
Efficiency					
To what extent have the Regulation and the mechanisms for improved network planning included therein been efficient means of selecting PCIs?	✓	TS53-60	NA	✓	NA
To what extent have the Regulation and the specific measures included therein (incl. priority status, regulatory, permitting, financing) been efficient means of assisting PCIs in their implementation?	✓	TS53-60	NA	✓	NA
Could the same results have been achieved with lower cost/resources (including administrative)? Or with the use of other policy instruments or mechanisms?	✓	TS53-60	Network	NA	D
To what extent are the costs involved justified given the changes/effects they have resulted in?	✓	TS53-60	NA	NA	D
Coherence					
To what extent is the PCI framework established by the Regulation coherent with other interventions which may have similar objectives (including other EU policies (e.g. Regional Policy, Research, Neighbourhood Policy, Investment Plan for Europe) but also other elements of energy policy (e.g. internal market design, renewed RES framework, EE)?	✓	TS27&28	NA	✓	B
Future coherence (see relevance as well) To what extent is the Regulation coherent with the CEF Regulation and existing network codes on cost allocation? To what extent is the Regulation consistent with the proposed institutional changes of the MDI and SoS for electricity proposals? To what extent are the regional groups set up under TEN-E consistent with the idea to introduce ROCS in the new MDI proposal? To what extent would parts of the TEN-E content be taken over by the planned network codes under new MDI (e.g. harmonised tariffs)?	✓	TS27&28, 30, 61 & 62	NA	✓	NA
How sufficient is the climate impact reporting within the PCI framework?	✓	Several	NA	✓	NA
Environmental impact – has TEN-E and / or the PCI projects had any excessive environmental impacts (e.g. Natura 2000 conflicts?)	✓	TS28	NA	✓	NA
Added value					
What is the additional value of EU intervention (as embodied in the PCI framework) compared to what could have been achieved by Members States at national and /or regional level? - could national authorities have achieved the same themselves (e.g. on CBCAs)? To what extent do the issues addressed by the intervention (permitting procedures, cost allocation, incentives, public consultation) continue to require EU level action?	✓	TS29	All	✓	D

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