



Identification of Projects of Common Interest in European Electricity Infrastructure

Final Report



Contract details

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Disclaimer

The views expressed in this report are purely those of the writers and may not in any circumstances be regarded as stating an official position of the European Commission

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Executive Summary

This report describes the assistance work done for the Commission regarding the selection of Projects of Common Interest (PCIs) in European electricity infrastructure. It describes the state of play until 18 May 2013, the contract end date. At that point, a final high-level decision about PCI projects to be selected had not yet been taken.

The work - performed under two different contracts for the Commission - consisted of an interactive process with four regional electricity infrastructure working groups over a period of more than one year. A methodology for selection of around 100 PCIs out of more than 300 electricity infrastructure projects handed in by project promoters was designed, discussed and agreed with the working groups. The methodology consisted of three steps: an eligibility check of projects based on criteria identified in the European Infrastructure regulation¹, a subsequent ranking of the eligible projects and finally discussions in the working groups to select PCI projects.

Application of the selection method resulted in the selection of **88 clusters of electricity infrastructure PCIs** divided over the four working groups.

Key parameters of the selected group of PCIs are:

- **Number of projects:** 78 clusters of electricity PCIs were selected, out of which 61 in transmission and 17 in storage².
- **Total investments involved:** 54 billion EUR
- **Total kilometres of transmission lines involved:** 22 898 km
- **Commissioning:** Almost all PCIs would be commissioned until 2020
- **Connectivity:** After implementation of the selected PCI projects, all Member States will meet their 10% connectivity target

¹ Regulation 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure

² In addition, 3 transmission projects and 1 storage project are still under discussion as of 1 May 2013.

1 Introduction

1.1 Background

The European electricity infrastructure grid faces a triple challenge for the future. It was designed for large scale, monopoly and mainly fossil-based electricity supply in the past, in a situation where the EU was much smaller than it is now. In order to serve the European Union's electricity needs for the decades to come, it should be adapted in three main ways:

- To include small and large-scale intermittent renewable energy capacity,
- To connect existing as well as new Member States and
- To provide the overall technical backbone for the European internal electricity market.

With that aim, the European Commission proposed a Draft Infrastructure Regulation which has been adopted by the European Parliament and the Council in 2012 and has been published in April 2013³. The Regulation establishes detailed guidelines for the selection of trans-European infrastructures as 'Projects of Common Interest' (PCIs). The PCIs will be supported with special regulatory procedures and financial aid if required.

The selection process outlined in the Regulation involves a step-wise procedure in which first infrastructure developers/ project promoters hand-in their infrastructure projects for consideration as a PCI to ENTSO-E (the European Network of Transmission System Operators for Electricity). This organisation performs an eligibility check and carries out a detailed cost-benefit analysis of all eligible projects. The outcomes of this analysis are subsequently discussed in four regional groups - EAST, WEST, NSOG⁴ and BEMIP⁵ - that consist of Commission representatives, project promoters, national regulatory authorities and ministries of the Member States. The regional groups then form a consensus opinion about the projects in their region to be considered as a PCI. Finally, a High-Level body consisting of ministries of the Member States takes a decision regarding a Union-wide PCI list based on the advice provided by the regional groups. The overall process described in the Regulation involves a period of two years.

However, in 2012 the Draft Regulation was still under discussion in the European Parliament and the European Council. Regional groups had just been established and were meeting for the first time early 2012. Until July 2012, some 300 electricity infrastructure projects had been handed in by project promoters for consideration as a PCI - while it was decided that around 100 projects could be selected for the Union-wide list.

Therefore a pragmatic and interim solution had to be developed that would make an optimal use of the limited information and time-frame available in order to come to a first Union-wide PCI list in 2013.

³ Regulation 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure

⁴ North-Sea Off-Shore Grids

⁵ Baltic Energy Market Interconnection Plan

1.2 Objectives

Main objective of the work described in this report was to assist the four regional groups in their process towards a consensus about the projects to be handed in to the High-Level body for consideration as a PCI. For that purpose, in close cooperation with the Commission an interim selection methodology of PCI projects was designed, discussed and agreed with the working groups. Basis for the interim method were the draft Regulation texts that were already available in 2012.

The work described in this report was performed under two specific contracts for the European Commission. One contract is directed at assistance of the EAST and WEST groups⁶, the other contract at assistance of the NSOG and BEMIP groups⁷. However, the assistance to the four groups in practice was found to be so closely related that the overall work is described together in this final report.

1.3 How to read this report

This report briefly summarizes the main steps taken in the assistance to the regional groups regarding the development of a selection methodology and the assessment of the projects handed in by project promoters conform this methodology. Chapter 2 describes the methodology developed, whereas Chapter 3 provides the main results of the application of the methodology.

The annexes to this report provide additional information for readers interested in the outcomes of this project. Annex A. shows the ranking results of eligible projects as of January 2013, and Annex B. gives the final list of projects selected by the regional groups to be confirmed by the High-Level body as PCI projects. Annex C. finally provides a list of documents in which supplementary information about the selection method and intermediate results can be found. These documents are sent separately to the Commission but are an integral part of the overall outcomes of this project.

⁶ 2012/ENER.B.1/443-2012/ETU/SI2.624167

⁷ 2012/ENER B.1/445-1/2012/SI632341. Originally, this contract was directed only at assistance of NSOG group, but Consultants agreed to also assist the BEMIP group under this contract.

2 Methodology

2.1 Overall methodology

The overall PCI selection methodology developed during this project was worked out in detail prior to, and discussed in, several working group meetings. Key presentations on the methodology and its application were given in working group meetings in

- July 2012;
- September 2012;
- November 2012; and
- January 2013.

The basis for the methodology were the draft Regulation texts as available and adapted in the course of 2012. Key data sources used were the ENTSO-E Ten-Year Network Development Plan 2012 (TYNDP 2012) and the answers to a questionnaire about their projects handed in by Project Promoters until July 2012 and later⁸.

Projects were handed in by Project Promoters on a so-called ‘investment item’ level, consisting of individual investments in grid infrastructure numbered E-1 to E-n on a PCI candidate list published by the European Commission in July 2012⁹. The list consisted of projects previously identified in the TYNDP (‘TYNDP projects’) and other projects (‘non-TYNDP projects’). The TYNDP projects originally were grouped together in ‘clusters’ of projects considered regionally interdependent, while non-TYNDP projects were not clustered. Furthermore, projects handed in consisted of ‘transmission’ and ‘storage’ projects, involving proposals for new or adapted transmission lines and for mountain water basin projects respectively.

The methodology developed for selecting those projects providing most benefits to the European Union as a whole consisted of three basic steps:

1. Eligibility Assessment
2. Ranking
3. Working Group Discussion

These steps are described in more detail in the following sections.

2.2 Eligibility assessment

First, an eligibility assessment of projects handed in for PCI selection was carried out. The following criteria were checked to determine eligibility of **transmission projects**:

⁸ It was accepted that several project promoters handed in their questionnaire after the formal deadline up to April 2013. Also, several additional questionnaires were received as a result of a public consultation held in Autumn 2012.

⁹ http://ec.europa.eu/energy/infrastructure/consultations/20120620_infrastructure_plan_en.htm

Necessity

- Art. 4. *Necessity*: “The project is necessary for at least one of the energy infrastructure priority corridors and areas.”;

Voltage

- Annex II. *Voltage*: Overhead Transmission Lines of 220 kV or more, underground and submarine transmission cables of 150 kV or more;

Essential Equipment

- Annex II. *Essential equipment*: “any equipment or installation essential for the systems [...] to operate safely, securely and efficiently, including protection, monitoring and control systems at all voltage levels and substations” - questionnaires) or two-way communication equipment (“any equipment or installation, both at transmission and medium voltage distribution level, aiming at two-way digital communication [...]

Cross-border Impact of Transmission Projects

- Art. 4 and Annex IV. *Involvement of two Member States*: “[The project] (i) involves at least two Member States by directly crossing the border of two or more Member States; (ii) is located on the territory of one Member State and has a significant cross-border impact as set out in Annex IV.1; (iii) crosses the border of at least one Member State and a European Economic Area country.
Significant cross-border Impact: “The project increases the grid transfer capacity, or the capacity available for commercial flows, at the border of that Member State with one or several other Member States, or at any other relevant cross-section of the same transmission corridor having the effect of increasing this cross-border grid transfer capacity, by at least 500 Megawatt compared to the situation without commissioning of the project.”

For **storage projects**, the same eligibility criteria were assessed as for transmission projects, with the exception of the criterion of cross-border impact. For storage projects this criterion reads:

Cross-border Impact of Storage Projects

- Annex IV. Significant cross-border impact of storage projects: “A project on the territory of a Member State, which fulfils the following conditions: the project provides at least 225 MW installed capacity and has a storage capacity that allows a net annual electricity generation of 250 Gigawatt-hours/year.”

After various intermediate assessments and discussions with the working groups, in January 2013 the following overall conclusions of the eligibility assessment were presented: Of the 257 investment items still under assessment in January¹⁰, 233 were transmission projects and 24 were storage projects. 119 transmission projects were considered eligible, 74 non-eligible and 40 needed further discussion and assessment. Of the 24 storage projects, 17 were considered eligible and 7 non-eligible (Table 2.1).

Table 2.1 Eligibility of investment items as of January 2013

	Transmission			Storage	
	Eligible	Non-Eligible	Pending	Eligible	Non-Eligible
EAST	62	37	28	4	1
NSOG	18	25	1	3	0
WEST	26	9	12	8	6
BEMIP	10	4	1	2	0
Total	119	74	40	17	7

2.3 Ranking

In the second part of the PCI assessment, the eligible and pending projects were ranked based on the criteria provided in the Draft Regulation: market integration, sustainability and secure system operation. Ranking of projects was carried out separately for transmission and storage projects and consisted of two steps for the transmission projects: first a ranking was done of TYNDP-clusters and non-TYNDP projects, then a ranking of individual investment items within the TYNDP clusters together with the non-TYNDP projects. Outcomes of the ranking exercise as of January 2013, both for clusters of PCIs and storage projects, can be found in Annex A.

2.3.1 Cluster ranking of transmission projects

Ranking of the transmission projects was performed via the methodology described in brief below. A detailed description of the methodology can be found in the presentations given for the individual working group meetings.

TYNDP clusters

For the ranking, a combination of information from the TYNDP 2012 as well as from the questionnaires was used in order to operationalize the criteria of the Draft Regulation¹¹. In addition, bonus points were assigned to projects contributing to reach the target of 10% interconnectivity for Member States as specified in the Regulation (see text box). An overall score for each cluster was calculated by summing the scores for the individual criteria. The overall score was finally weighted based on a weight factor decided by each of the working groups.

¹⁰ Up to January 2013, several projects were regrouped and subsequently assessed as one project. A group of projects specified as Regional Investment Plan projects in the TYNDP was considered collectively non-eligible prior to the January meetings.

¹¹ See for a detailed description of the methodology used the presentations given for the various meetings.

Interconnectivity target

Annex IV. “Market integration, competition and system flexibility shall be measured in line with the analysis made in the latest available Union-wide 10-year network development plan in electricity, notably by calculating, for cross-border projects, the impact on the grid transfer capability in both power flow directions, measured in terms of amount of power (in megawatt), and their contribution to reaching the minimum interconnection capacity of 10 % installed production capacity [...]”

Non TYNDP projects

The non TYNDP projects were first assessed by ENTSO-E in order to arrive to comparable scores as those for the TYNDP projects. Then the ranking exercise was performed equal to that of the TYNDP clusters.

2.3.2 Investment level ranking of transmission projects

In addition to the cluster ranking, it was intended to carry out a ranking of transmission projects on an investment item level as well. Basis for this assessment should be the data provided in the questionnaires by project promoters. However, the questionnaires and discussions with project promoters showed that it was impossible for many project promoters to provide quantitative data on an investment item level that could have distinguished the individual investment items within clusters from each other.

An initial ranking on investment item level was carried out, but showed to be little conclusive and helpful for the selection process due to this lack of data. It was therefore decided not to continue with the investment item ranking and instead refer to the working group discussion and assessment to come to a final ranking of transmission projects.

2.3.3 Ranking of storage projects

Following the criteria of the Draft Regulation, storage projects were ranked in a different way than transmission projects. Here size of storage capacity and installed capacity were used as main ranking criteria. Bonus points were assigned to storage projects in areas where there are no other storage projects so far.

2.4 Working group assessment

In addition to the eligibility assessment and the ranking of projects and clusters, a discussion process and assessment was performed with the participants of the working groups. The discussions in the working groups led to the following activities:

- National Regulatory Authorities (NRAs) performed a validation check to see if cross border values stated by project promoters were conform their data;
- Promoters of clusters with more than three investment items identified themselves the three most important investment items of their cluster;

- Eligible and pending investment items after the January meetings were re-clustered in order to obtain a best-fit for projects that jointly solved one bottleneck in European cross-border electricity transmission.

The result of this final phase of the assessment was a consolidated list of projects identified by each working group as the most suitable candidates for PCIs. The final list of PCIs that was decided on by the working groups to be sent to the High-Level panel can be found in Annex B.

3 Main Results

The detailed final selection results are presented in a **spread sheet that is sent separately from this final report**. Main parameters of the selected projects are outlined here.

The results reflect the state of play up to 18 May 2013, the final contract end date. At that time, a final high-level decision about adoption of the PCI list had still to be taken.

3.1 Selected Projects

By 18 May 2018, In total **78 clusters of PCIs** were selected by the regional groups to be proposed to the High-Level Group to be considered as a Projects of Common Interest, out of which 61 in transmission and 17 in storage¹². See Table 3.1.

Table 3.1 Total number of PCIs and clusters of PCI selected by the Regional Groups

Group	Transmission clusters of PCIs	Storage Projects
BEMIP	5	2
NSOG	17	3
WEST	19	7
EAST	20*)	5**)
Total	61	17

*) plus 3 projects still under discussion

***) plus 1 project still under discussion

The overall list of selected projects can be found in Annex B.

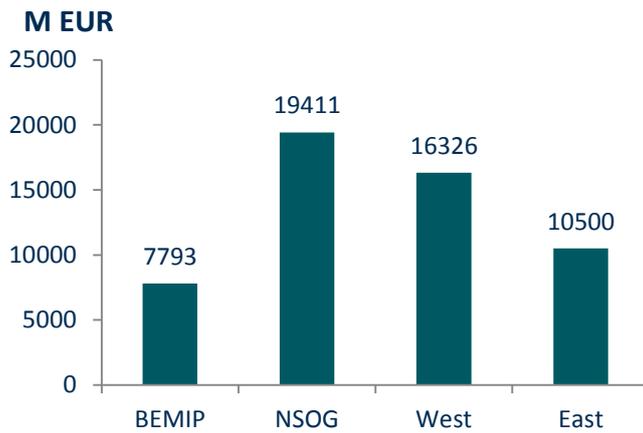
3.2 Total Investments Involved

The total investments involved in the transmission projects amount to 54 030 million Euros. This implies an average of 886 million Euros per PCI. However, average investments per PCI vary largely per group.

Total investments per group (in million Euros) are presented in Figure 3.1, which shows that the highest investment expected is in the NSOG group, and the least in BEMIP:

¹² In addition, 3 transmission projects and 1 storage project are still under discussion.

Figure 3.1 Total investments per regional group (M Euro)

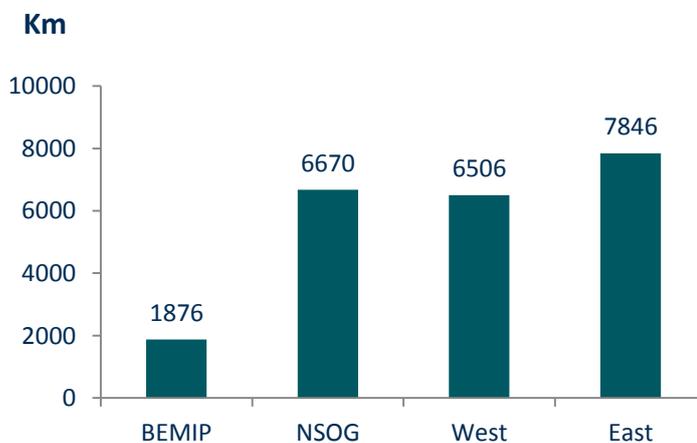


3.3 Transmission Lines Affected

The total length of transmission lines involved in the PCIs is 22 898 kilometres. The group with the most kilometres involved is the East group, while the BEMIP group has the least length of transmission lines involved (Figure 3.2). The average length of transmission lines involved per PCI is 375.3 kilometres; and per group this average varies from 340 to 390 km.

The cost per kilometre of transmission line amounts to 4.2 MEUR/km (BEMIP), 2.9 MEUR/km (NSOG), 2.5 MEUR/km (WEST) and 1.3 MEUR/km (EAST).

Figure 3.2 Total length of transmission lines per regional group (km)



3.4 Number of PCIs per Country Selected

Table 3.2 shows the number of PCIs and investment items (or sub-PCIs) selected per country. All Member States have PCIs, except for Finland and Malta. The largest number of PCIs (17) is found in the UK, but counting sub-PCIs Germany has by far the largest number of projects (30). While the transmission projects are spread over all Member States, more than one third of the storage projects are located in Austria.

Table 3.2 Clusters of PCIs and PCIs per country

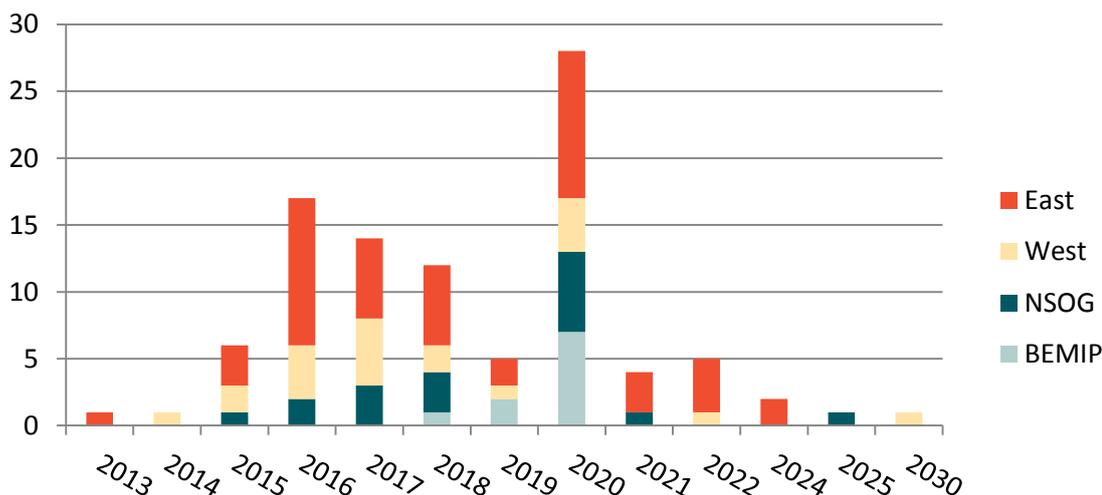
Country	Transmission		Storage
	Clusters of PCIs	PCIs	PCIs
UK	17	19	1
DE	13	30	1
AT	6	10	7
IT	10	18	1
IE	8	8	2
FR	8	10	0
ES	7	10	1
DK	4	4	0
HU	4	10	0
PL	3	9	1
EE	2	3	1
LV	3	5	0
LT	2	6	1
BG	2	9	1
SK	3	8	0
EL	2	5	1
SI	3	5	0
NO *)	3	3	0
BE	3	5	0
CH *)	3	5	0
HR	2	5	0
RO	2	8	0
NL	2	2	0
PT	2	4	0
SE	1	2	0
BA *)	1	3	0
CZ	1	10	0
CY	1	1	0
IL *)	1	1	0
RS *)	1	3	0
ME *)	1	3	0
LU	1	1	0
MT	0	0	0
FI	0	0	0

*) non EU country

3.5 Commissioning Dates

The commissioning dates for the different PCIs, as far as available, are shown in Figure 3.3. Most of the PCIs are at a pre-feasibility, feasibility or permitting stage, while only two PCIs are already in a construction phase. By far the largest number of PCIs will be commissioned up to 2020.

Figure 3.3 Commissioning dates of sub-PCI projects



3.6 Connectivity Target

All Member States should reach a connectivity level of at least 10%, measured as the electricity import capacity divided by the net existing generating capacity. Currently, certain countries are below this level. With the implementation of the PCIs all countries will reach their targets (See Table 3.3).

Table 3.3 Contribution of PCIs to achievement of connectivity targets by Member States with connectivity levels <10%

Country	Cross Border Impact of PCIs (MWs)	Net existing Generating Capacity (GWs)	Existing Connectivity level	PCI contribution to 10% target (Delta)	Achievement of target?
PL	3 295	34	2%	+10%	Yes
IT	8 975	105.9	9%	+8%	Yes
UK	29 630	83.1	4%	+36%	Yes
IE	17 130	9.3	1%	+184%	Yes
FR	10 985	125.9	8%	+9%	Yes
ES	10 000	94.7	3%	+11%	Yes
PT	1 600	17.6	7%	+9%	Yes
CY	2 000	1.6	0%	+125%	Yes

As a result of the implementation of the PCIs, the average connectivity level of all Member States will change from 29% to 62% (Table 3.4).

Table 3.4 Contribution of PCIs to achievement of connectivity targets for all Member States

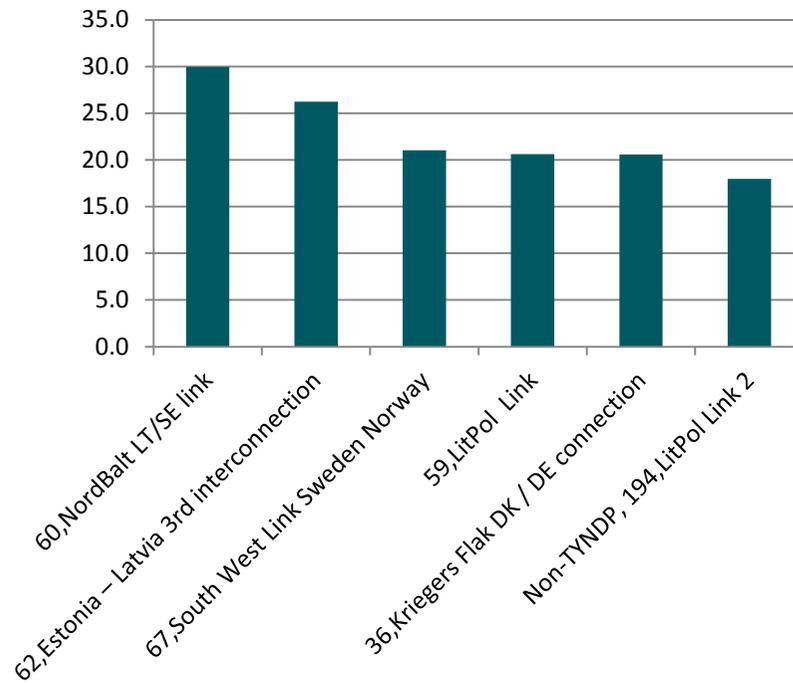
Country	Cross Border Impact (MWs)	Net Generating Capacity (MWs)	Existing Connectivity level	PCI contribution to 10% target (Delta)	New connectivity level
AT	6639.5	23200	NA	29%	NA
BE	3000	18800	19%	16%	35%
BG	3800	11800	12%	32%	44%
CY	2000	1600	0%	125%	125%
CZ	890	18000	17%	5%	22%
DE	13201	160200	11%	8%	19%
DK	2554	12300	37%	21%	58%
EE	1525	2500	26%	61%	87%
EL	3300	14100	11%	23%	34%
ES	10000	94700	3%	11%	13%
FI	0	17800	22%	0%	22%
FR	10985	125900	8%	9%	17%
HR	0	4100	76%	0%	76%
HU	1250	9000	22%	14%	36%
IE	17130	9300	1%	184%	185%
IT	8975	105900	9%	8%	17%
LT	2000	3700	39%	54%	93%
LU	719	1700	244%	42%	286%
LV	2225	2500	20%	89%	109%
MT	0	NA	NA	0%	NA
NL	2323	26600	18%	9%	27%
PL	3295	34000	2%	10%	12%
PT	1600	17600	7%	9%	16%
RO	3050	16700	11%	18%	30%
SE	700	36900	24%	2%	26%
SI	1800	3100	79%	58%	137%
SK	1250	7500	37%	17%	54%
UK	29630	83100	4%	36%	40%
Average			29%		62%

Annex A. Ranking Results as of January 2013

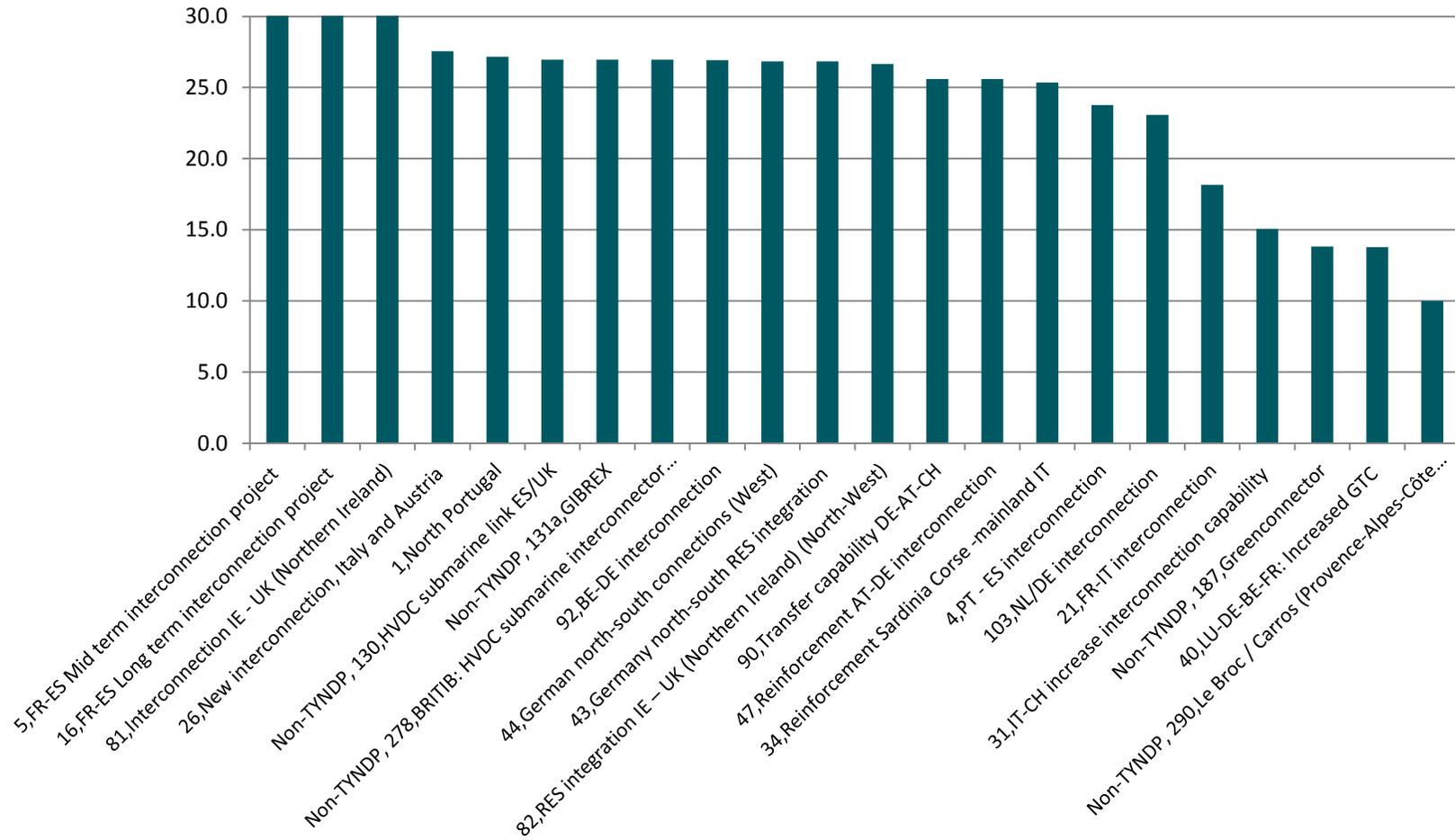
This annex shows the results of the ranking exercise performed as of January 2013. The results of transmission and storage clusters/projects are shown for each of the regional groups.

Transmission

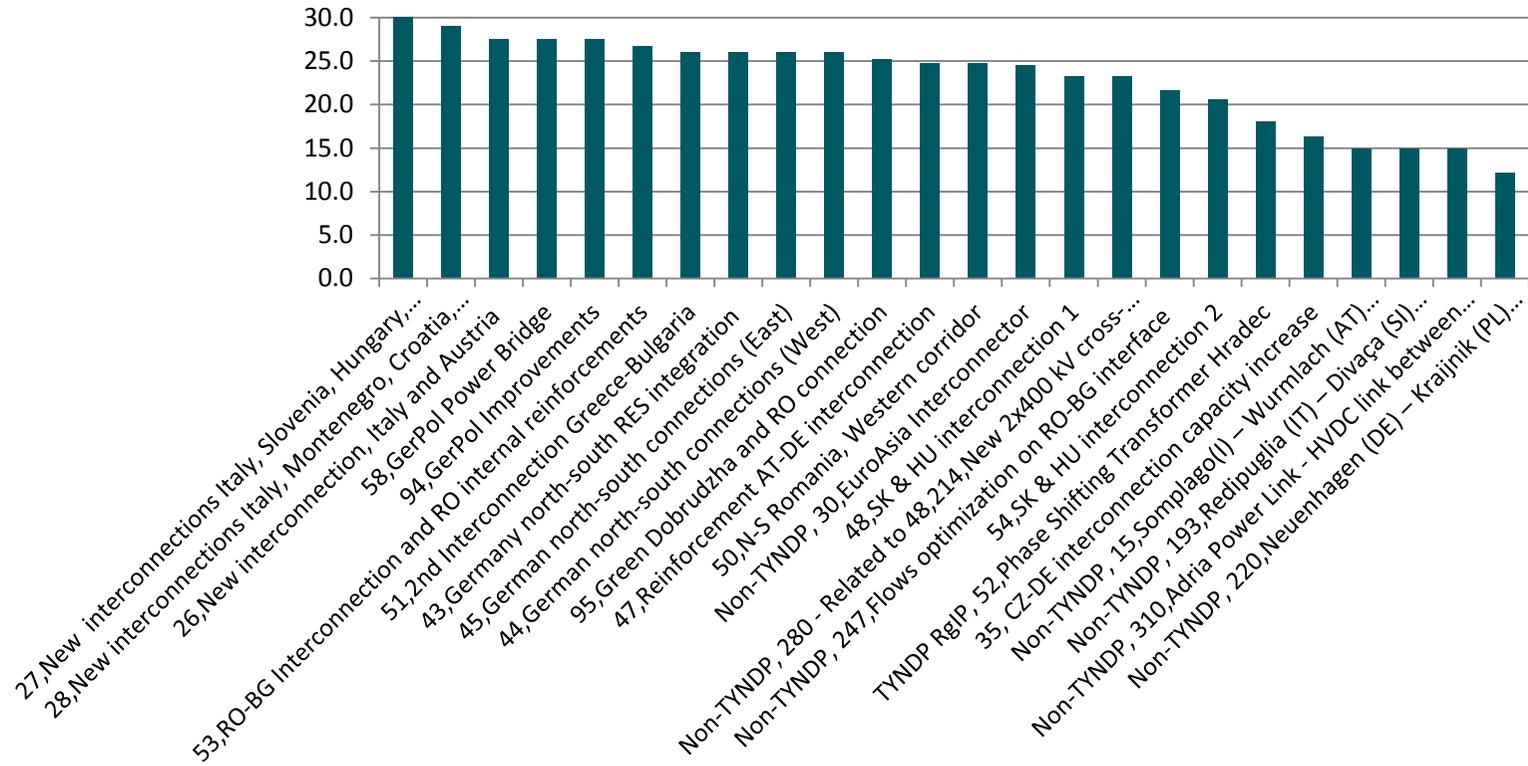
BEMIP Group



West Group



East Group



Storage

BEMIP Group

E nr	Name	Countries directly involved	Overall score
97	Muuga Hydroelectric Pumped Storage Power Plant (Muuga HPSPP)	EE	20
300	Extension of Kruonis Pumped Storage Power Plant (Kruonis PSPP)	EE /LT// LV/PL/SE	15

NSOG Group

E nr	Name	Countries directly involved	Overall score
149b	Natural Hydro Energy Project Highway	IE/UK	35
150b	MAREX (MAYO ATLANTIC RENEWABLE ENERGY EXPORT) IE/UK interconnection	IE/UK	35
151	Project CAES Larne NI	IE/UK	20

West Group

E nr	Name	Countries directly involved	Overall score
131b	GIBREX	ES/UK	35
303	Ausbau Kraftwerk Kaunertal (Extension Power Plant Kaunertal)	AT	20
10	Pumped Hydro Storage: Limberg II	AT	15
8	Pumped Hydro Storage: Reisseck II	AT	15
12	Obervermuntwerk II	AT	15
6	Pumped Storage Power Plant: Limberg III	AT	15
9	Energiespeicher Riedl	AT	10
184	Installation of 250 MW of storage systems (Batteries) on critical 150 kV transmission network in South Italy	IT	Project doubled. See East 171
284	CAES Harsefeld	DE	Non-eligible
7	Efficiency Increase Program: Power Plant Group Zillertal	AT	Non-eligible
11	Efficiency Increase Program: Power Plant Group Malta	AT	Non-eligible
13	Efficiency Increase Program: Power Plant Group Kaprun	AT	Non-eligible
302	Speicherkraftwerk Kühtai	AT	Non-eligible

305	L'Hospitalet hydropower plant - storage	FR	Non-eligible
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East Group

E nr	Name	Countries directly involved	Overall score
306	Mloty PSPP	PL	25
28	Yadenitsa Dam	BG	20
114	Pumped Storage Complex with two independent upper reservoirs: Agios Georgios and Pyrgos	GR	20
171	Installation of 250 MW of storage systems (Batteries) on critical 150 kV transmission network in South Italy (electricity)	IT	20
301	Pumped Storage Project in Cyprus	CY	Non eligible

Annex B. List of PCIs as of May 2013

In this annex, the selection of PCI projects is presented per group. The results reflect the state of play as of 18 May 2013. At that moment, the final high-level adoption of the PCI list was still outstanding.

Four projects in the EAST group are still under discussion as of April 2013. In several other PCI projects there are individual sub-PCIs still under discussion.

Legend:

- Those PCIs with text marked in red still need clarification regarding exact location.
- Those PCIs with text marked in green are still under discussion and have not been considered in the statistics presented.

BEMIP group

PCI - Name & Description	Investment items (E numbers)	TYNDP Ref. nr	Countries directly involved
Sweden and Latvia internal reinforcements for interconnection LT/SE (NordBalt)	254	60.A52	
• Internal reinforcements between Ekhyddan and Nybro/Hemsjö (SE)	282	60.385	SE/LV
• Internal reinforcements between Grobina and Imanta (LV)			
Estonia - Latvia between Kilingi-Nõmme and Riga (3rd interconnection)	98	62.386	
• Interconnection between Kilingi-Nõmme (EE) and Riga CHP2 substation (LV)	281	62.388	EE/LV
• Internal reinforcements between Harku and Sindi (EE)			
Denmark - Germany between Ishøj/Bjæverskov and Bentwisch/Güstrow (Kriegers Flak)	96	36.141	DK/DE
• Interconnection between Ishøj/Bjæverskov (DK) and Bentwisch/Güstrow (DE)			
Lithuania - Poland between Alytus (LT) and Burbiszki (PL) (LitPol Link)	283	59.376	
• Interconnection between Alytus (LT) and Burbiszki (PL)	201	59.373	
• Internal reinforcements between Stanisławów and Olsztyn Mątki (PL)	204	100.335	LT/PL
• Internal reinforcements between Kozielnice and Siedlce Ujżanów (PL)	202	59.374	
• Internal reinforcements between Płock and Olsztyn Mątki (PL)	203	59.375	
Lithuania - Latvia - Estonia power system and market integration	Non TYNDP E194	Non TYNDP	LT/LV/EE
• Synchronous interconnection of Lithuania, Latvia and Estonia with the Continental European networks			
New hydro-pumped storage in Muuga (EE)	97	Storage	EE
Capacity increase of hydro-pumped storage in Kruonis (LT)	300	Storage	LT

NSOG group

Description	Investment items (E numbers)	TYNDP Ref. nr	Countries directly involved
United Kingdom - Belgium between Canterbury and Zeebrugge	262	74.449	
• Interconnection between Zeebrugge (BE), Richborough and Canterbury (UK)	263	74.450	UK/BE
• Internal reinforcements between Sellindge and Dungeness (UK)	264	74.443	
United Kingdom - Norway between Kvilldal and Blyth	200	110.424	UK/NO
• Interconnection between Kvilldal (NO) and Blyth (UK)			
United Kingdom - Ireland between xxx	154	106.A34	UK/IE
• Interconnection between locations tbd in UK and IE			
Germany - Denmark between Niebüll and Endrup	90	43.A90	DE/DK
• Interconnection between Niebüll DE and Endrup DK			
• Internal reinforcements between Brunsbüttel - Bart - Heide - Husum - Niebüll			

Description	Investment items (E numbers)	TYNDP Ref. nr	Countries directly involved
(DE) • Internal reinforcements between Audorf - Kiel - Göhl - Siems - Lübeck - Kaltenkirchen (DE) • Internal reinforcements between Kaltenkirchen - Itzehoe - Brunsbüttel (DE) • Transformers???			
Denmark - Netherlands between Endrup and Eemshaven • Interconnection between Endrup (DK) and Eemshaven (NL)	198	71.427	NL/DK
Ireland - United Kingdom between Co. Offaly and Pembroke/Pentir • Interconnection between Co. Offaly (IE), Pembroke and Pentir (UK)	Non-TYNDP E 156	Non TYNDP	IE/UK
United Kingdom - Norway between Peterhead and Sima/Samnanger • Interconnection between Peterhead (UK) Sima or Samnanger (NO)	Non-TYNDP E 261	Non TYNDP	UK/NO
Ireland - United Kingdom between xxx • Interconnection between Coolkeragh - Coleraine hubs (IE) and Hunterston station, Islay, Argyll and Location C OWFs (UK) • Interconnection between the Northern hub, Dublin and Codling Bank (IE) and Trausfynydd and Pembroke (UK)	Non-TYNDP E 291	Non TYNDP	IE/UK
Ireland - United Kingdom between North West Ireland and Midlands • Interconnection between North West Ireland (IE) and Midlands (UK)	Non-TYNDP E 149a	Non TYNDP	IE/UK
Belgium - grid-ready offshore platform for Northern Seas Offshore Grid • Connection of grid-ready offshore platform to Zeebrugge (BE)	17	75.A28	BE
Ireland - United Kingdom between Glinsk and Pembroke • Interconnection between Glinsk, Mayo (IE) and Pembroke (UK)	Non-TYNDP E 150a	Non TYNDP	IE/UK
Ireland - United Kingdom between xxx • Interconnection between the Irish midlands and Pembroke (UK) • Interconnection between the Irish midlands and Alverdiscott, Devon (UK) • Interconnection between the Irish coast and Pembroke (UK)	Non-TYNDP E 304	Non TYNDP	IE/UK
Germany - Denmark between Audorf and Kassö • Interconnection between Audorf (DE) and Kassö (DK)	69	39.144	DE/DK
Norway - Denmark between Tonstad and Wilster • Interconnection between Tonstad (NO) and Wilster (DE)	199	37.142	NO/DE
France - United Kingdom between Cotentin and Exeter • Interconnection between Cotentin, Yvetot-Bocage (FR) and a substation in the vicinity of Exeter (UK)	Non-TYNDP E 319	Non TYNDP	FR/UK
United Kingdom - France between Tourbe and Lee-On-Solent area • Interconnection between Tourbe (FR) and Lee-On-Solent area (UK)	137	25.62	UK/FR
France - United Kingdom between Calais and Folkestone • Interconnection between Calais (FR) and Folkestone (UK)	Non-TYNDP E 279	Non TYNDP	UK/FR
New hydro-pumped storage in North West Ireland (IE)	149b	Storage	IE
New hydro-pumped (seawater) storage in Glinsk (IE)	150b	Storage	IE
New compressed air energy storage in Larne (UK)	151	Storage	UK

WEST group

Description	Investment items (E numbers)	TYNDP Ref. nr	Countries directly involved
Spain - France between Vic and Gaudière • Internal reinforcements between Santa Llogaia and Bescanó (ES) • New substations in Bescanó, Ramis and Santa Llogaia (ES)	128	5.37	ES/FR
Spain - France between Gatica and Aquitaine • Interconnection between Gatica (ES) and Aquitaine (FR) • Coordinated installation and operation of PST on Arkale-Argia interconnection line (ES)	129 132	16.A17 16.38	ES/FR
United Kingdom - Ireland between Turleenan and Woodland • Interconnection between Turleenan (UK) and Woodland (IE)	155	81.462	UK/IE
Portugal reinforcements at PT/ES border • Internal reinforcements between Alfena, Pedralva and Vila Fria (PT) • Internal reinforcements between Frades B, Ribeira de Pena, Feira (PT)	222 223 225	1.2 1.3 1.4	PT/ES
Spain - United Kingdom between Gatica and Indian Queens • Interconnection between Gatica (ES) and Indian Queens (UK)	Non-TYNDP 130	Non TYNDP	ES/UK
Spain - United Kingdom between Mougas and Plymouth	Non-TYNDP	Non TYNDP	ES/UK

Description	Investment items (E numbers)	TYNDP Ref. nr	Countries directly involved
• Interconnection between Mougas (ES) and Plymouth (UK)	131a		
Spain - United Kingdom - France between Gatica, Indian Queens and Cordemais • Interconnection between Gatica (ES), Indian Queens (UK) and Cordemais (FR)	Non-TYNDP 278	Non TYNDP	UK/ES/FR
Germany - Belgium between Aachen/Düren region and Lixhe • Interconnection between Aachen/Düren region (DE), Herderen and Lixhe (BE) • Internal reinforcements (installation of transformer) in Limburg (BE)	19	92.146	BE/DE
Germany capacity increase at the Western and Northern borders • Internal reinforcements between Osterath and Philippsburg (DE)	88	43.A81	
• Internal reinforcements between Brunsbüttel, Wilster, Kaltenkirchen and Großgartach, Goldshöfe, Grafenrheinfeld (DE)	89	43.A88	DE
Ireland - United Kingdom between Srananagh and Turleenan • Interconnection between Srananagh (IE) and Turleenan (UK)	152	82.463	IE/UK
Germany - Switzerland - Austria capacity increase in the Bodensee area • Internal reinforcements between Herbertingen and Tiengen (DE) • Internal reinforcements between Herbertingen and Pkt. Rommelsbach (DE) • Interconnection between Herbertingen (DE), Meiningen (AT) and Rüthi (CH) • Internal reinforcements between Pkt. Wullenstetten and Pkt. Niederwangen (DE)	92	90.136	DE/CH/AT
Austria capacity increase at AT/DE border • Internal reinforcements between Westtirol and Zell-Ziller (AT)	5	47.219	AT
Italy - France between Codrongianos, Corse and Suvereto • Interconnection between Codrongianos and Suvereto (IT) (via Corse/FR)	182	34.A100	IT/FR
Spain - Portugal between Boboras - O Covelo and Vila Fria - Vila do Conde - Recarei • Interconnection between Boboras - O Covelo (ES) and Vila Fria - Vila do Conde - Recarei (PT)	230	4.18	PT/ES
Germany - Netherlands between Niederrhein and Doetinchem • Interconnection between Niederrhein (DE) and Doetinchem (NL)	93	103.145	DE/NL
Italy - France between Grande Ile and Piosasco • Interconnection between Grande Ile (FR) and Piosasco (IT)	133	21.55	
• Internal reinforcements between Trino and Lacchiarella (IT)	172	21.81	IT/FR
• Reinforcements in Magenta substation (IT)			
Luxembourg - Belgium/France capacity increase at the LU/BE/FR border • Interconnection between Bascharage or Schifflange (LU) and/or Aubange (BE) and/or Moulaine (FR)	197	40.A29	LU/BE or FR
Italy - Switzerland between Thuis/Sils and Verderion Inferiore • Interconnection between Thuis/Sils (CH) and Verderion Inferiore (IT)	Non-TYNDP 187	Non TYNDP	IT/CH
Italy - Switzerland capacity increase at the IT/CH border • Internal reinforcements between Tirano and Verderio (IT)	178	31.112	
• Internal reinforcements between Pavia and Piacenza (IT)	179	31.85	IT/CH
• Interconnection between Milan area (IT) and All'Acqua (CH)	186	31. A101	
New hydro-pumped (seawater) storage in Mougas (ES)	131b	Storage	ES
Capacity increase of hydro-pumped storage in Kaunertal, Tyrol (AT)	303	Storage	AT
Capacity increase of hydro-pumped storage in Limberg II, Salzburg (AT)	10	Storage	AT
Capacity increase of hydro-pumped storage in Reisseck II, Carinthia (AT)	8	Storage	AT
New hydro-pumped storage in Obervermuntwerk II, Vorarlberg province (AT)	12	Storage	AT
Capacity increase of hydro-pumped storage in Limberg III, Salzburg (AT)	6	Storage	AT
New hydro-pumped storage in Molln (AT)	318	Storage	AT
New hydro-pumped storage in Riedl (DE)	9	Storage	DE /AT border

EAST group

Description	Investment items (E numbers)	TYNDP Ref. nr	Countries directly involved
Croatia - Bosnia and Herzegovina between Lika and Banja Luka • Interconnection between Lika (HR) and Banja Luka (BA)	138 139	27.227 27.A105	
• Internal reinforcements between Brinje, Lika, Velebit and Konjsko (HR)	140	27.A106	HR/BA
Italy - Slovenia between West Udine and Okroglo • Interconnection between West Udine (IT) and Okroglo (SI)	159	27.92	
• Internal reinforcements between West Udine and Redipuglia (IT)	189	27.68	IT/SI

Description	Investment items (E numbers)	TYNDP Ref. nr	Countries directly involved
Italy - Slovenia between Salgareda and Divača • Interconnection between Salgareda (IT) and Divača(SI)	190	27.A96	IT/SI
Slovenia - Hungary - Croatia between Cirkovce and Heviz/ Žerjavenec • Interconnection between Cirkovce (SI) and Heviz (HU)/ Žerjavenec (HR) • Internal reinforcements between Divača, Klece, Bericevo, Podlog and Cirkovce (SI)	256 257	27.223 27.225	SI/HU/HR
Israel - Cyprus - Greece between Hadera and Attica region (Euro Asia Interconnector) • Interconnection between Hadera (IL), Vasilikos (CY) and Korakia, Crete (EL) • Internal reinforcements between Korakia, Crete and Attica region (EL)*	Non-TYNDP E30	Non TYNDP	CY/IL/EL
Italy - Austria between Veneto region and Lienz • Interconnection between Veneto region (IT) and Lienz (AT) • Internal reinforcements between Lienz and Obersielach (AT) • Internal reinforcements between Volpago and North Venezia (IT)	4 16 157	26.218 26.63 26.83	IT/AT
Italy - Austria between Milan region and Nauders • Interconnection between Milan region (IT) and Nauders (AT)	167	26.A102	IT/AT
Italy - Montenegro between Villanova and Lastva • Interconnection between Villanova (IT) and Lastva (ME) • Internal reinforcements between Fano and Teramo (IT) • Internal reinforcements between Foggia and Villanova (IT) • Coordinated installation and operation of a phase shifting transformer in Villanova (IT)	143 160 161 168	28.A114 28.70 28.89 28.86	IT/ME
Germany - Poland between Eisenhüttenstadt and Plewiska (GerPol Power Bridge) • Interconnection between Eisenhüttenstadt (DE) and Plewiska (PL) • Internal reinforcements between Krajnik and Baczyna (PL) • Internal reinforcements between Mikulowa and Świebodzice (PL)	94 212 213	58.140 58.353 58.355	DE/PL
Germany - Poland between Vierraden and Krajnik • Interconnection between Vierraden (DE) and Krajnik (PL) • Coordinated installation and operation of phase shifting transformers in xx (PL)	95 217/218	94.139 94.A70/A68 94.A71/A69	DE/PL
Bulgaria - Romania capacity increase • Internal reinforcements between Cernavoda and Stalpu (RO) • Internal reinforcements between Gutinas and Smardan (RO) • Internal reinforcements between Gadalin - Suceava (RO) • Internal reinforcements between Dobrudja and Burgas (BG) • Internal reinforcements between Vidno and Svoboda (BG)	236 238 239 23 24 27	53.273 53.275 53.276 95.A119 95.265 95.266	BG/RO
Germany capacity increase at Eastern borders • Internal reinforcements between Lauchstadt and Meitingen (DE) • Internal reinforcements between Neuenhagen and Vierraden (DE) • Internal reinforcements between Halle/Saale and Schweinfurt (DE)	67 59 60	43.A75 45.191 45.200	DE
Greece - Bulgaria between N. Santa and Maritsa East 1 • Interconnection between N. Santa (EL) and Maritsa East 1 (BG) • Internal reinforcements between Maritsa East 1, Plovdiv and Burgas (BG) • Internal reinforcements between Maritsa East 1 and Maritsa East 3 (BG)	20 21 22 125	51.257 51.258 51.262 51.256	EL/BG
Austria - Germany between St. Peter and Isar • Interconnection between St. Peter (AT) and Isar (DE) • Internal reinforcements between St. Peter and Tauern (AT) • Internal reinforcements between St. Peter and Ernstshofen (AT)	1 2 14	47.216 47.221 47.212	AT/DE
Romania - Serbia between Resita and Pancevo • Interconnection between Resita (RO) and Pancevo (RS) • Internal reinforcements between Portile de Fier and Resita (RO) • Internal reinforcements between Resita, Timisoara, Sacalaz and Arad (RO)	231 232 233	50.238 50.269 50.27	RO/RS
Bulgaria internal reinforcements for capacity increase with Romania and Greece? • Internal reinforcements between Vetren and Blagoevgrad (BG) • Internal reinforcements between Tsarevets and Plovdiv (BG)	Non-TYNDP E 126	Non TYNDP	BG
Slovakia - Hungary between Gabčíkovo and Gőnyű • Interconnection between Gabčíkovo (SK) and Gőnyű (HU)* • Internal reinforcements between Velký Ďur and Gabčíkovo (SK) • Upgrade of substation in Győr (HU)	145 147 Non-TYNDP E280 258	48.A128 48.214 Non TYNDP 48.298	SK/HU
Slovakia - Hungary between Rimavská Sobota and Sajóvátka • Interconnection between Rimavská Sobota (SK) and Sajóvátka (HU)	144 148	48.A127 48.A126	SK/HU
Slovakia - Hungary between Velké Kapušany and Kiskvárd area • Interconnection between Velké Kapušany (SK) and Kiskvárd area (HU)	146 285	54.A127 54.294	SK/HU

Description	Investment items (E numbers)	TYNDP Ref. nr	Countries directly involved
<ul style="list-style-type: none"> Internal reinforcements between Lemešany and Velké Kapušany (SK) 	31	35.137	
	32	35.306	
	33	35.307	
	34	35.308	
Czech Republic - Germany between Vitkov and Mechlenreuth	35	35.309	
<ul style="list-style-type: none"> Interconnection between Vitkov (CZ) and Mechlenreuth (DE) 	36	35.311	CZ/DE
<ul style="list-style-type: none"> Internal reinforcements between Vernerov, Vitkov, Prestice, Kocin, Mirovka and Cebin (CZ) 	37	35.312	
	38	35.313	
	39	35.314	
	40	35.315	
	41	35.316	
Czech Republic - Germany between Hradec and Roehrsdorf	58	35.138	
<ul style="list-style-type: none"> Interconnection between Hradec (CZ) and Roehrsdorf (DE) Coordinated installation and operation of a phase shifting transformer in Hradec (CZ) 	Non-TYNDP E52	Non TYNDP	CZ/DE
Austria - Italy between Wurlach and Somplago	Non-TYNDP E 15	Non TYNDP	AT/IT
<ul style="list-style-type: none"> Interconnection between Wurlach (AT) and Somplago (IT) 			
Italy - Croatia - Bosnia and Herzegovina between Pescara, Split, Konjsko and Livno	Non-TYNDP E 320a	Non TYNDP	IT/HR/BA
<ul style="list-style-type: none"> Interconnection between Livno (BA), Konjsko (HR), Split (HR) and Pescara (IT) 			
New hydro-pumped storage in Mloty (PL)	306	Storage	PL
New hydro-pumped storage in Yadenitsa (BG)	28	Storage	BG
New hydro-pumped storage in Amfilochia (EL)	114	Storage	EL
New storage systems (batteries) in Central South Italy	171	Storage	IT
New hydro-pumped storage in xx (BA)	320b	Storage	BA

Annex C. Additional documentation

An extensive set of documentation has been prepared for the different meetings. A list of the documents available is presented below:

Document	File type
Meetings July 2012	
12 07 10 PCI Selection Methodology	PPT
Meetings September 2012	
12 09 25 West Group Summary PCI Eligibility and Cluster Assessment	DOC
12 09 25 NSOG Summary PCI Eligibility and Cluster Assessment	DOC
12 09 25 East Group Summary PCI Eligibility and Cluster Assessment	DOC
12 09 25 BEMIP Summary PCI Eligibility and Cluster Assessment	DOC
12 09 05 Interim Assessment Report Final	DOC
12 09 25 Assessment Interim Results Sept 2012	PPT
Meetings November 2012	
Project Assessment Methodology Note	DOC
12 10 23 Project Assessment and Storage Assessment methodology	DOC
PCI Assessment all projects 12 11 14	XLS
Assessment clusters 15 11 2012	XLS
12 10 26 Draft Final Eligibility all groups	DOC
12 11 08 BEMIP PCI Eligibility and Cluster Results Nov 2012 Final	PPT
12 11 08 WEST PCI Eligibility and Cluster Results Nov 2012 Final	PPT
12 11 08 NSOG PCI Eligibility and Cluster Results Nov 2012 Final	PPT
12 11 08 EAST PCI Eligibility and Cluster Results Nov 2012 Final	PPT
12 11 13 EAST Group Summary PCI Eligibility and Cluster Assessment	DOC
12 11 11 WEST Group Summary PCI Eligibility and Cluster Assessment	DOC
12 11 1 NSOG Group Summary PCI Eligibility and Cluster Assessment	DOC
12 11 1 BEMIP Group Summary PCI Eligibility and Cluster Assessment	DOC
Meetings January 2013	
13 01 23 Methodology note January final	DOC
13 01 23 Results BEMIP	DOC
13 01 23 Results NSOG	DOC
13 01 23 Results WEST	DOC
13 01 23 Results EAST	DOC
Assessment clusters 13 01 25 Version COM	XLS
13 01 28 BEMIP Final PCI January working group meetings presentation	PPT
13 01 28 EAST Final PCI January working group meetings presentation	PPT
13 01 28 WEST Final PCI January working group meetings presentation	PPT
13 01 28 NSOG Final PCI January working group meetings presentation	PPT
May 2013	
Main Results PCI	PPT
PCI Selection Statistics	XLS
2013 04 25 PCI technical assessment	XLS

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