

Evaluation FMO Access to Energy Fund

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Final report

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Inclusive Green Growth

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Abbreviations

Abbreviation	Full description
ADFD	Abu Dhabi Fund for Development
AEF	Access to Energy Fund
AfDB	African Development Bank
AREF	African Renewable Energy Fund
AREI	African Renewable Energy Initiative
BNEF	Bloomberg New Energy Finance
BIO	Belgian Investment Company for Developing Countries
DFID	UK Department for International Development
COP21	2015 Paris Climate Conference
CCR	Client Credit Review
CDC	CDC Group plc (former Commonwealth Development Corporation), DFI owned by the UK government
CDEN	Compagnie Française des Energies Nouvelles
CDFI-CIO	Climate Development and Finance Facility, later renamed Climate Investor One
CEM	Clean Energy Ministerial
CIO	Climate Investor One
CSP	Concentrated solar thermal power (plant)
DAC	Development Assistance Committee of the OECD
DDE	Sustainable Economic Development Department of MFA
DEG	German Investment and Development Corporation
DFI	Development Finance Institution
DGIS	Directorate General for International Cooperation of MFA
DRE	Distributed Renewable Energy
EAIF	Emerging Africa Infrastructure Fund Project
EDP	Energias de Portugal
EIB	European Investment Bank
EnDev	Energising Development
ES-MAP	Energy Sector Management Assistance Program
EQ	Evaluation Question
FFEM	Fonds Français pour l'Environnement Mondial
FMO	Netherlands Development Finance Company
FMO-A	FMO funds for investment (excluding government funds)
FP	Financial Proposal
GCF	Green Climate Fund
GEF	Global Environment Facility
GHG	Greenhouse gas
Global LEAP	Global Lighting and Energy Access Partnership
GIB	Green Investment Bank
GOGLA	Global Off-Grid Lightning Association
GoK	Government of Kenya

GoN	Government of Nicaragua
GoR	Government of Rwanda
GoS	Government of Senegal
IC	Investment Committee
IDF	Infrastructure Development Fund, managed by FMO
IEA	International Energy Agency
IFI	International Finance Institution
IGG	Inclusive Green Growth Department of MFA
IMR	Investment and Mission Review
IOB	Policy and Operations Evaluation Department of MFA
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
KPI	Key Performance Indicator
LDC	Least Developed Country
LIC	Low Income Country
LTWP	Lake Turkana Wind Power Project
M&E	Monitoring and Evaluation
MASSIF	Micro and Small Enterprise Fund, managed by FMO
MDGs	Millennium Development Goals
MFA	Ministry of Foreign Affairs
MFI	Microfinance Institution
MSME's	micro , small , and medium enterprises
MTR	Mid-Term Review
ODA	Official Development Assistance
OECD	Organisation of Economic Cooperation and Development
OPIC	Overseas Private Investment Corporation
PAYG	Pay-as-you-go
PPA	Power Purchase Agreement
PPP	Public-private partnerships
PREP	Promoting Renewable Energy Programme
PSD	Private Sector Development
PV	Photovoltaic
RE	Renewable Energy
REEEP	Renewable Energy and Energy Efficiency Partnership
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SACCO	Saving and Credit Cooperative
SDG	Sustainable Development Goals
SE4all	Sustainable energy for all
SEFA	Sustainable Energy Fund for Africa
Sme	Small and Medium Enterprises
SSA	Sub-Saharan Africa
ToC	Theory of Change
TOPL	Tema Osonor Plant Ltd.
ToR	Terms of Reference
UGEAP	Universal Green Energy Access Program

Executive Summary

Background

The Access to Energy Fund (AEF) was jointly initiated by the Dutch government (Ministry of Foreign Affairs) and FMO to support private sector projects aimed at providing long-term access to energy services in Sub-Saharan Africa. In 2007, AEF started with € 70 million, made available as a grant by the Ministry of Foreign Affairs (AEF I). In 2013, a top-up of € 32 million was added (AEF II) and the focus of AEF shifted exclusively to Renewable Energy in Sub-Saharan Africa. In 2016, DGIS decided in principle on another € 18 million top-up of AEF, creating a total fund size of € 120 million, of which € 50 million would be invested in Climate Investor One (CIO), a new fund originated by FMO, leaving € 70 million for AEF.

In October 2016, the Climate Team of the Ministry of Foreign Affairs commissioned an independent evaluation of AEF to the consortium of APE, MDF and Trinomics.

During the inception phase a reconstructed Theory of Change was elaborated, which served as the basis for a detailed evaluation matrix with evaluation questions and indicators, data collection and sources per evaluation question. The main data collection activities have been: literature review, portfolio analysis, strategic interviews with stakeholders and external experts including five other funds also investing in renewable energy in Africa, 20 case studies including 16 realised AEF investments and four AEF projects that did not materialise for various reasons.

Triangulation of findings from various information sources and methods has been carried out to draw robust conclusions for all (sub-)evaluation questions to enhance the validity and reliability of the findings. At case study level, the evaluation primarily relied on the information provided by FMO on the relevant investments (investment documents and interviews with investment officers). No direct primary data gathering on the case study projects itself have been conducted. The evaluation team dealt with a potential bias in the information provided by FMO by critically judging the information provided in the documents and in the interviews.

Main conclusions

1. *AEF has responded adequately to the rapidly evolving context regarding funding of renewable energy in Sub-Saharan Africa.*

AEF is a relevant and useful tool that has responded well to the rapidly changing conditions in renewable energy financing in emerging markets. AEF has clearly addressed the needs for differentiated capital in an early stage of project development. AEF has also adequately addressed the capital needs of risky new business models, both grid-connected and off-grid.

2. *The evolving policy priorities of the Ministry of Foreign Affairs on renewable energy and, in particular, on climate change are only reflected to a limited extent in the AEF operational and strategic objectives.*

The focus of AEF on access to energy for households has remained unchanged while the market has evolved. Especially the grid-connected projects, the majority of the AEF portfolio, cannot be exclusively focused on households. Furthermore, the link between renewable energy and inclusive green growth that is highlighted in government policy documents is not explicitly reflected in the AEF policy frameworks. This also applies to new policy goals such as the climate goals and improved knowledge on the links between climate, energy and development. In practice, DGIS provided little pro-active guidance to FMO regarding the (evolving) policy framework in which AEF should be functioning.

3. *AEF is largely additional to other funding sources for renewable energy in Sub-Saharan Africa, and has catalysed other funding.*

FMO has made good use of AEF with different types of finance (equity, loans, grants) and is complementary to FMO-A funding. All case studies showed a positive score on additionality, including the written-off investments or those with an early exit. AEF has mostly invested in the riskier part of project financing structures or provided seed capital for early stages of business development. FMO has also often acted as deal arranger, which meant that thanks to the AEF investment other investors were attracted in a direct or indirect way.

4. *There is clear evidence that the planned outputs have been realised. Despite measurement problems (see below), it is also likely that AEF has already exceeded the target of 3 million people to be provided with access to energy by now, assuming catalysing effects are taken into account and if all projects proceed according to plan.*

FMO invested in a sufficient number of relevant (renewable) energy projects that directly or indirectly provided additional energy connections. The evaluation team has made its own calculations of the number of people reached for the 15 case studies representing 60% of the overall portfolio in order to provide an estimate on the expected progress towards the goal. This analysis shows that the estimate of people reached lies between 348,000 and 2.3 million people reached for the 15 case studies. Extrapolated to portfolio level, this implies that between 0.6 - 3.8 million people have been provided with access to energy. There is still very limited information available on the socio-economic characteristics of the people reached.

5. *FMO very seriously overestimated the number of people provided with access to energy (approximately with a factor 10), which points at weaknesses in the monitoring system despite some recent improvements.*

The evidence basis at outcome level presented by FMO has so far been relatively weak, in particular for the key target the number of people provided with access to energy. This has been due to definition problems, measurement problems and weak linkages between the FMO Front Office responsible for the investments, the Mid Office in charge of Fund Management and the Back Office in charge of M&E.

6. *So far, there is limited evidence on the realisation of sustainable impact, but it is likely that the ongoing impact studies of AEF will demonstrate positive impacts at household level.*

7. The new M&E approach developed at the explicit request of DGIS was primarily focused on accountability and there is a risk that learning will remain very limited.

The FMO M&E approach was rolled out from 2014 onwards at the explicit request of DGIS. For accountability reasons, DGIS wanted FMO to focus on sound impact evaluations based on scientific methods and with a very limited focus on learning and timely available results. The length of the impact evaluations – between 1 and 3 years - may also limit the learning. Since 2014, the M&E approach is gradually changing as it starts to pay more attention to the learning purpose and the needs of primary stakeholders in FMO.

8. FMO appears to manage AEF efficiently by integrating the Fund's related activities in the other energy sector investments of the bank.

The integrated management model of AEF implies that the Front-, Mid- and Back Offices are all involved in AEF. This set-up has advantages and disadvantages. The advantages are that AEF deals are prepared and made by the Investment Officers who have specific skills and expertise for arranging these deals and do not have to deal with Mid and Back Office tasks such as M&E and reporting. The disadvantages, however, are the weak linkages between the three parts of the bank for the management of the Fund.

9. The utilisation of AEF funds was somewhat low, but is picking up. No definition for revolving has been defined, but according to all possible definitions, the revolving of the fund exceeds the original 50% target. Only for some definitions, revolving of the Fund meets the new 75% target set in 2012.

There has been a drop in utilisation rate around the time of the AEF II expansion, which was due to some repayments and sales of equity stakes, but also because only a small fraction of the large pipeline materialised into commitments. In recent years, the utilisation rate improved to 73% as at Q3-2016. This implies, assuming a full disbursement of all contracted amounts, that there is still € 28 million capacity available, which would be reduced to € 3 million if an additional € 25 million from AEF would be made available to CIO. Even though there is no clear agreed definition for revolving of AEF, it varies between 59% and 112% depending on the definition of revolving that is applied. This implies that the original target set for AEF-I of 50% revolving has been met, but it is unsure whether the new target of 75% revolving has been met as well as the Grant Decision for AEF-II that specifies the new target does not include a definition for the target.

Recommendations

1. *AEF should continue its operations in the years to come, given AEF's good performance in terms of relevance, additionality and effectiveness and in the absence of mature markets for financing of renewable energy projects in Sub-Saharan Africa and the continued demand for risk-appreciative capital.*
2. *In view of the evolving government policy priorities including increasing attention for climate goals and given the substantial differences between AEF (I and II) on the one hand and CIO on the other, DGIS should define a new overall policy umbrella framework for AEF and CIO.*
3. *The arrangements between DGIS and FMO and roles and responsibilities should be further defined. DGIS should focus more on (re-)defining the policy framework and setting clear and realistic targets. The governance risks of the arrangements regarding CIO need to be carefully assessed and risk mitigation needs to be elaborated. Similarly, FMO should put in place clear and measurable criteria and incentives for AEF deliverables, such as when to exit deals and engage private sector investors in refinancing. Jointly FMO and DGIS need to revisit the tension between positioning AEF as 'risk-appreciative capital' in a changing market, and the 'risk-avoiding' target on higher revolvability.*
4. *DGIS and FMO should increase cooperation on knowledge management regarding the evolving funding context of renewable energy, but also on learning from M&E.*
5. *FMO as the AEF Fund Manager should continue to adjust its working methods and investment policy in line with the evolving market by for instance actively exploring new renewable energy market segments.*

1 Introduction

This is the final report of the Evaluation of the FMO Access to Energy Fund (AEF). In 2007, the AEF started with € 70 million, made available as a grant by the Ministry of Foreign Affairs (AEFI). In 2013, a top-up of € 32 million was added (AEF II) and the focus of AEF shifted exclusively to Renewable Energy (RE) in Sub-Saharan Africa (SSA).

The Terms of Reference of this evaluation can be found in Annex I. The evaluation started early November 2016 and was meant to be finalised in 2016. However, this appeared to be impossible as December is the busiest period of the year for FMO. A new planning was proposed in the inception report and approved by the client, the DGIS Climate Team.

The inception report (final version 29 November 2016) presented the detailed evaluation approach against the background of the evolving context in which AEF is operating. The evaluation matrix is based on five main evaluation questions for which sub-questions, indicators, evaluation methods and information sources have been defined. It is presented in Annex II. In addition, one forward looking question regarding lessons learned and the future of AEF has been formulated. All these questions are addressed in this final report.

The following activities have been carried out:

- Strategic interviews with representatives of the key stakeholders DGIS Climate team, FMO and additional telephone interviews with five ‘peer-funds’ of AEF that have co-invested with FMO/AEF in RE for Africa)¹ (see List of people interviewed in Annex III);
- Literature review (see List of documents in Annex IV);
- A reconstructed Theory of Change (Annex V) that served as the basis for the evaluation matrix;
- Portfolio analysis (see Annex VI for a detailed overview);
- Twenty case studies representing approximately two thirds of the portfolio. The evaluation team has selected 15 projects of the total of 30 realised projects² as case studies (see overview of case studies in Annex VII), of which 10 projects are still active, 2 projects are closed and 3 projects are

¹ 1) ResponsAbility, an investment fund based in Switzerland with offices in Africa – FMO is a co-investor in their funds, with ASN Bank and private families; 2) BIO – the Belgian Development Finance Institution. BIO is a small niche-player with limited operational capacity and sourcing its RE deals largely via an arrangement with FMO; 3) Norfund – the Norwegian Development Finance Institution. A leading RE investor with front-runner projects, sharing several deals (funds and projects) with FMO; 4) Triodos Investment Management - the investment management arm of Triodos Group. Triodos manages several funds with RE in its mandate, and for Africa this is the Triodos Groenfonds with private investors. Groenfonds can place 10% of its capital for debt financing in emerging markets, which adds up to approximately € 70 mln. Groenfonds has co-invested with FMO; 5) African Development Bank, via its SEFA-facility (The Sustainable Energy Fund for Africa), a multi-donor trust fund administered by the African Development Bank. SEFA has provided equity in co-investment with FMO.

² Including written-off and closed projects (see Section 4.1).

written off.³ In addition, we analysed four non-realised projects: two cancelled projects and two potential AEF projects for which DGIS and FMO did not agree on the interpretation of investment criteria. Finally, the investment of AEF in Climate Investor One (CIO) can be considered as a separate case; adding up to 20 case studies. For each of the case studies the responsible FMO Investment Officers and portfolio analysts have been interviewed (see Annex III).

Triangulation of findings from various information sources and methods (see evaluation matrix) has been carried out to draw robust conclusions for all (sub-) evaluation questions. The combination of two triangulation approaches has enhanced the validity and reliability of the findings and has allowed to corroborate different evidence. The first triangulation approach refers to the use of the abovementioned data collection tools. In addition, data triangulation has been applied through the use of information collected from multiple sources and stakeholders.

The evaluation team presented its preliminary findings, conclusions and recommendations in a workshop on 30 January 2017 with participants from DGIS and FMO. The discussions during the workshop have been taken into account in the draft final report, which was submitted on 20 February 2017. The main stakeholders the Climate Team of the Ministry of Foreign Affairs and FMO provided detailed comments on the draft report. Also the Policy and Operations Evaluation Department of the Ministry of Foreign Affairs (IOB) provided comments. These comments have been addressed in the final evaluation report. In a separate Response Sheet the Evaluation Team has indicated whether and how the main comments have been addressed.

The evaluation team had to address the following methodological challenges and risks:

- Via its Front Office, FMO has provided good and adequate information on the AEF projects included in the Financial Proposal (FP), the Investment and Mission Review (IMR), the Analyst Advice and Investment Committee (IC) decision, and the Client Credit Review (CCR). However, this does not include project monitoring information, which is provided by the Back Office. Although FMO has improved the monitoring of its projects over the last years, information on key performance indicators (KPI) - in particular on the number of people provided with access to energy - is still not available for all AEF projects. In addition, the measurement methods and data verification have changed and are undergoing further changes (see chapter 4);
- At the kick-off meeting DGIS and FMO informed the evaluation team that a € 18 million top-up of AEF was about to be decided upon, creating a total fund size of € 120 million, of which € 50 million would be invested in CIO, a new fund originated by FMO. The evaluation team was informed that this new decision was beyond the scope of this evaluation. An earlier addendum to the AEF grant decision, dated March 2015, would be included in the evaluation. This addendum concerned a € 7 million AEF investment in CIO, which was in the start-up phase at the time. During the workshop on 30 January 2017, when the evaluators presented preliminary findings and recommendations, it became clear that the future relation between AEF and CIO required further analysis, beyond the initial € 7 million investment. Additional information was provided to the evaluation team and an additional meeting with all key stakeholders of the Ministry of For-

³ During the inception phase 14 realised projects and 5 additional non-realised projects were selected for further in-depth analysis. However, the detailed analysis made clear that one of the five perceived non-realised projects had been started, but led to an early exit.

eign Affairs, FMO and CIO took place. Based on these inputs, the scope of the evaluation does still focus on the present and future relation between AEF and CIO and the transparency of the arrangements made, but it does not include the structure and governance of CIO as such.

- Already at the proposal stage, it was clear that limited time and resources were available for this evaluation. From the inception phase onwards various adjustments to the timing were made as finalisation of the evaluation in December 2016 proved to be impossible, given the work load of FMO staff. It was decided to do a sufficiently representative number of case studies, but to skip the field visits in order to spend the limited resources as efficiently as possible. The discussion on the AEF-CIO relation mentioned above led to a later submission of the draft final report than originally planned.
- Given the limited resources available for this evaluation and the specific complex character of the Fund, the focus of this evaluation was on the strategic level of analysis of AEF and a sufficient large number of case studies. Therefore, not only documents from the Ministry of Foreign Affairs and FMO were analysed, but also independent sources. The same applies for the interviews that were carried out with direct stakeholders, but also with independent external experts (in addition to the evaluation team that consists of independent experts). A benchmarking of AEF with comparable funds originally planned, but cancelled as the case studies were deemed more important. The evaluation could only pay attention to sustainability to a limited extent, because the evaluation was meant to focus on the period 2012-2016, most projects especially on-grid projects take quite a long time before they start yielding results and FMO has limited information on sustainability.
- As the main focus of the 15 case studies of realised investments is on the assessment relevance and additionality – and on the calculation of number of people with access to energy – the evaluation team decided to make use of a four-point scoring system for these two evaluation criteria based on the sub-evaluation questions and indicators as presented in the evaluation matrix (see sections 4.1 and 4.2).

2

Evolving international context

- Installed power generation capacity in Africa is growing rapidly, but cannot catch up with the steeply increasing demand, which is related to economic and population growth of most countries in SSA.
- Privatisation and renewable energy are both prioritised by many governments, but progress is slow.
- Renewable energy is becoming more competitive. Technology costs go down, efficiencies go up and risks of new business models, both grid-connected and off-grid, are gradually being addressed. Mini-grids is the newcomer, with high access-to-energy potential, but few viable plans yet.
- Financing for RE products grows in total funding and in differentiation. This is across the board of renewable technologies and for most stages of project development and business development.
- There are no mature markets or low-risk segments yet. To further support existing businesses and to fund the steep growth in new access-to-energy, more risk-appreciative capital remains needed, which is mostly publicly funded.
- As the market is very young and volatile, both innovativeness and long-term commitment are required from public funders.

In this chapter the evolving international context of funding of RE is described, which is essential to answer the evaluation questions on relevance and additionality (see chapter 3 and sections 4.1 and 4.2).

In 2015, at the Paris climate conference, 195 countries adopted the first-ever universal, legally binding global climate deal to support mitigation and adaptation efforts in developing countries. This is just one of many recent developments spurring investments in renewable energy in Africa. In this chapter, the recent developments in RE investments in SSA are described, including the steep increase in the number of project developers and (potential) financiers in the sector. This increase makes it crucial (but difficult) to narrow down the scope of this study to the market segments where the Access to Energy Fund is playing a role.

2.1 Changing power sector in Africa

Since 2000, most countries in SSA have experienced rapid economic growth in combination with population growth. This economic growth intensifies the demand for energy, which is not even remotely met by the current energy supply.

Despite the difficult investment ecosystem, energy investment in SSA has expanded tremendously in the last few years. Investments in electricity generation and networks totalled US\$ 17 billion in Africa in 2015, of which US\$ 10 billion in Sub-Saharan Africa (see Table 2-1). Investments have been

made in all types of energy sources (except for nuclear energy). The state of play has diversified, with many new players entering the market, as well as innovative funding mechanisms being used. Investments range from pico-solar and mini-grids to large scale hydro and wind parks such as Lake Turkana Wind Power.

Table 2-1 Electricity sector investments in Africa in 2015 (including North Africa, US\$ billion)⁴

	Coal	Gas*	Oil	Nuclear	Hydro	Wind	Solar PV	Other RE	Trans-mission	Distri-bution	Total
Africa	1	3	1	0	1	2	1	1	1	6	17
World	78	31	2	21	59	107	98	24	60	202	682

* The higher investment in gas compared to coal and oil can be ascribed to the high level of gas-based investments in North Africa. In Sub-Saharan Africa, the level of gas-fired electricity investments is similar to coal and oil.

The growing demand for investments in power generation, Transmission & Distribution led many countries to open up their energy market to more private sector participation. In Nigeria, for instance, the government-owned Power Holding Company of Nigeria was unbundled into six generation companies and eleven distribution companies.⁵

2.2 Renewable energy investment on the rise

Africa requires between US\$ 60 and US\$ 90 billion annually to address its energy shortfall, which means that investment levels need to quadruple those of today to meet demand.⁶ Africa has many natural energy resources, such as hydropower, solar and wind, as well as geothermal power in the East African Rift Valley.

Off-grid generation and distribution

Distributed RE (DRE) systems – systems that generate and distribute energy independently of a centralised system – are expected to play an increasing role for energy supply in regions without access to the grid. Sub-Saharan Africa has become the largest market in the world for off-grid solar products. In 2015, 1.37 million units of pico-PV systems (1-10 Wp) were sold. This market for solar portable lights has grown by 90% annually for the last four years.⁷

Grid-based electrification: improving cost trends for wind and solar

Technology cost trends are making wind and solar power more and more attractive. According to BNEF, the levelised cost of wind power generation is now half of what it was in 2009, while the cost of solar PV modules has on average fallen by 80% since 2008. On a US\$/kWh basis, solar PV and wind power are now the cheapest new-build options in South Africa, surpassing new coal.⁸ With power generation growing substantially in the coming years, reliable and efficient distribution via

⁴ Source: OECD/IEA (2014) 'Africa Energy Outlook: A Focus on Energy Prospects in Sub-Saharan Africa', World Energy Outlook Special Report.

⁵ <https://www.ntusbfcas.com/african-business-insights/content/nigeria/173-power-sector-privatisation-in-nigeria-opportunities-and-challenges>.

⁶ The Economist Intelligence Unit (2016) 'Power Up: Delivering Renewable Energy in Africa', Commissioned by IHS.

⁷ REN21 (2016) 'Renewables 2016: Global Status Report'.

⁸ The Economist Intelligence Unit (2016) 'Power Up: Delivering Renewable Energy in Africa', Commissioned by IHS.

the (state-owned) grid will soon become an investment priority in delivering the energy generated to provide actual access to the energy.

Access to capital still a major constraint

Access to capital at an affordable price is still considered a major constraint for most RE companies. Whereas new enterprises for e.g. solar products need start-up capital, for more mature enterprises working capital becomes a constraint to growth, as a large portion of their capital gets tied up in inventory. For RE projects such as waste-to-energy (biomass and biogas) and small and medium hydropower, most capital is needed for equipment and construction, but the financing of development costs is often an important hurdle. This seems to suggest that with the emergence of new funding mechanisms, specific funding needs can be addressed adequately.

2.3 New business models with new funding mechanisms

Procurement programmes for large-scale generation projects

In South Africa, the government-led RE Independent Power Producer Procurement Programme (REIPPPP) is an innovative approach to provide structure, investor certainty and a policy signal to the private sector. It has set an example for other countries, notably Uganda and Zambia.⁹ REIPPPP has awarded concessions for 3,725 MW to Independent Power Producers (IPPs) of which 652 MW is already operational.¹⁰

Innovative business models for solar home system suppliers

Decreases in the cost of technologies, mobile-enabled technology, pay-as-you-go systems and other innovative business models are creating new opportunities for private sector suppliers of electricity to rural off-grid communities.

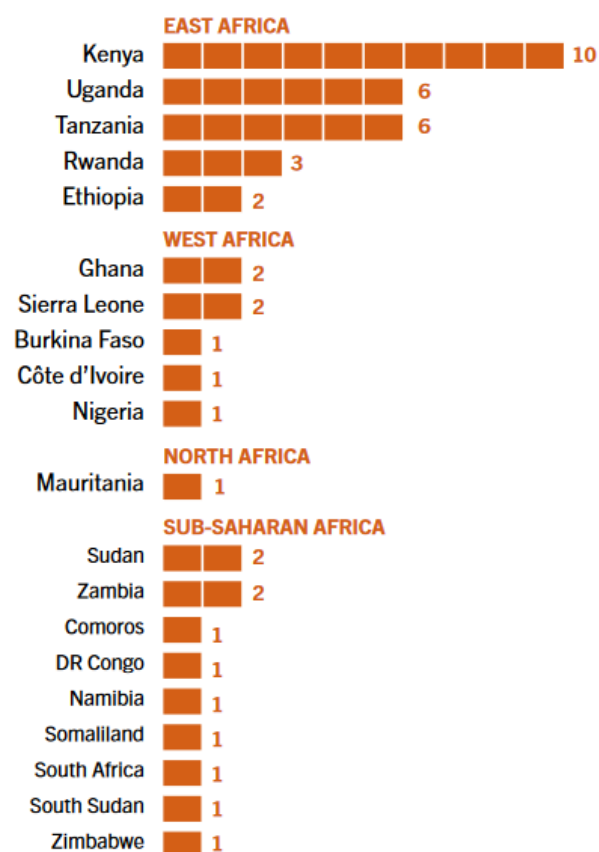
Innovative business models are becoming more widespread in Africa and are maturing. Energy companies are increasingly working together with telecommunications to design and implement such models, such as the use of mobile payment systems and scratch cards. Pay-as-you-go (PAYG) schemes have become one of the most popular business models. Under these schemes, customers provide a small upfront fee for a solar home system, and then pay for the energy they consume (either in advance or on a regular basis). PAYG schemes are most present in East Africa. Especially Kenya is using PAYG on a large scale for solar home systems.¹¹

Microfinance has proven to be one of the most popular finance models for disseminating off-grid RE systems in SSA. Energy companies often collaborate with microfinance institutions (MFIs) and credit cooperatives (SACCOs) to distribute their products. One-stop-shops are also expanding, in which companies act as both supplier and micro-financier.

⁹ The Economist Intelligence Unit (2016) 'Power Up: Delivering Renewable Energy in Africa', Commissioned by IHS.

¹⁰ KPMG (2015) 'Power in Africa', Sector report.

Figure 2-1 Number of PAYG enterprises by country



Source: REN21 (2016) 'Renewables 2016: Global Status Report'.

2.4 Main players

Players in the African energy market are increasingly diverse. Dozens of international actors and many international programmes focus on improving energy access with renewables.¹²

Public-private partnerships and international finance institutions

International Finance Institutions (IFIs) and Development Finance Institutions (DFIs) such as FMO offer co-financing options for a wide variety of projects. Table A- VII and Table A- VIII in Annex VIII give an overview.

Many new financing initiatives were launched at the COP21 in Paris. Under the mandate of the African Union, the Africa Renewable Energy Initiative (AREI) was launched, which plans to install 10 GW of large-scale RE capacity on the continent by 2020 and 300 GW by 2030. The African Development Bank (AfDB) operates as host organisation for this initiative¹³, to which the European Union, Sweden, the Netherlands and G7 have committed to mobilise US\$ 10 billion.¹⁴ The European Union enabled the establishment of ElectrIFI, with initial funding of US\$ 116 million to support private sector investments, electrifying underserved areas in developing and emerging countries.

¹² REN21 (2016) 'Renewables 2016: Global Status Report'.

¹³ Africa Renewable Energy Initiative (AREI) (2015) 'Transforming Africa towards a renewable energy powered future with access for all', http://www.arei.org/wp-content/uploads/2016/09/AREI-Brochure-ENG_web.pdf

¹⁴ Joint Statement on Advancing of the Africa Renewable Energy Initiative, <http://www.cop21.gouv.fr/wp-content/uploads/2015/12/AREI-statement-final-07-12-15.pdf>

Private investors and commercial enterprises

The international private sector plays an increasingly important role in addressing Africa's energy deficit. A key driver is the increasing demand for energy by industries such as the mining sector, construction sector (esp. cement) and industries (e.g. timber processing). Many companies supply their own energy with costly diesel generators, but there is a trend of using more sustainable energy sources, of which any surplus energy can be sold to the grid.

There is also an increase in private sector participation for grid-based electrification, as well as small-scale energy systems and mini-grids. Suppliers of off-grid solar systems are growing in number and size. The majority of mini-grid projects are still in the pilot phase and receive substantial public financial support, mostly to make connection fees affordable. In Mozambique, for example, Energías de Portugal (EDP) secured US\$ 1.95 million to finance a 160 kW hybrid solar/biomass micro-grid to power 900 households, 33 productive users and 3 community buildings.¹⁵

Specialised intermediaries are stepping in to get DRE off the ground, such as SunFunder, formerly a crowdfunding platform (2013), recently closing a solar fund of US\$ 15 million (capitalised by OPIC).¹⁶

¹⁵ REN21 (2016) 'Renewables 2016: Global Status Report'.

¹⁶ <https://www.greentechmedia.com/articles/read/SunFunder-Closes-15-Million-Round>.

3

Relevance of AEF policy and set-up

- From 2007 to 2012, AEF I focused on providing 2.1 million people with access to energy. AEF II started in 2013 and the focus of AEF changed to providing 3.5 million people in SSA with access to renewable energy.
- The set-up of AEF and the relationship with DGIS has left ample room for FMO as trusted partner and manager of the AEF government fund to flexibly operate.
- The evolving DGIS policy priorities on RE and climate change are only reflected to a limited extent in the AEF operational and strategic objectives. While the focus on access to energy for households is clear, the link between RE and inclusive green growth (access for poorer households and specifically for women) is not explicitly articulated in the AEF policy frameworks. This also applies to the climate goals and improved knowledge on the links between climate, energy and development.
- The (evolving) policy framework in which AEF is functioning, has not been pro-actively defined or updated by DGIS. Rather it was mostly left up to FMO to interpret the DGIS policy priorities in its formal requests that form the basis for the grant decisions. The Mid-Term Review (MTR) already recommended to further detail the arrangements between DGIS and FMO on the objectives of AEF in 2011, but this recommendation was not formally followed up.

In this chapter the policy context and institutional setting that determine the set-up and the functioning of AEF is described in order to answer the following relevance questions at the higher level (see evaluation matrix in Annex II):

- Do the operational and strategic objectives for the AEF adequately reflect the policy priorities of the Dutch government?
- Are the operational and strategic objectives for the AEF clear and do they allow responding to developments in supply of funding and business models (demand)?

The findings in this chapter are primarily based on document review and complemented with insights from the strategic interviews. The assessment of the relevance of AEF projects is completed in section 4.1 via an analysis of portfolio and the case studies.

3.1 Development cooperation policies on Renewable Energy

In 2004, the Minister for Development Cooperation formulated an output target of providing 10 million people with access to energy by 2015.¹⁷ The Netherlands expressed its keen interest in funding affordable and socially acceptable techniques for the provision of modern and clean energy services

¹⁷ The set-up of the AEF fund is indirectly linked to the World Summits on Sustainable Development (Rio 1992 and Johannesburg 2002) and the formulation of the Millennium Development Goals (MDGs) in 2000. The Dutch government, in particular the Minister of Development Cooperation developed an action plan towards realisation of the MDGs, with a specific focus on MDG7 'ensure environmental sustainability'.

to poor people. This target concerned all forms of energy, because the decisive factor was the cost effectiveness of technological options for providing access, including fossil fuels.¹⁸ The Dutch Minister for Development Cooperation at the time noted that this would stimulate sustainable economic growth and poverty reduction.

In 2007, the Dutch government listed energy as one of its policy priorities for development cooperation. Poverty reduction, sustainability, climate and energy were considered to be interlinked and this led to an increased focus on RE. In this context the Promoting Renewable Energy Programme (PREP) was launched in 2008 with a budget of €500 million. The establishment of AEF at the end of 2006 (named “AEF I” in the remainder of the report) has to be situated against this context. When AEF was launched in 2007 neither the policy nor AEF focused exclusively on RE, the policy shifted already in 2008 towards RE, but it took time for AEF to adapt to this change.

When a new government took office in 2010, the focus of development cooperation shifted away from RE as a priority towards themes where the Netherlands, in particular the private sector, would have a strong added value such as the water and food sectors. The RE budget would be reduced after finalising the PREP programmes.¹⁹ In the meantime climate change had become one of the new priorities and with the start of a new government coalition RE became part and parcel of the climate change policy in 2013.²⁰ This was also the time when AEF II was created. The annual budget for Foreign Trade and Development Cooperation indicates that RE is part of Article 2: Sustainable development, food security and water. AEF falls under Article 2.3 focusing on sustainable use of natural resources, combating climate change and increasing the resilience of the population. The government mentions AEF and also the Climate Development Finance Facility (CDFF, later renamed Climate Investor One - CIO) as FMO climate funds in its 2016 budget, but in the 2017 budget these funds are not specifically mentioned anymore.²¹ As the Ministry of Foreign Affairs has committed the AEF funds to FMO in relation to the AEF I and AEF II grant decisions, the AEF funds do not appear separately in the annual government budget.²² The government budget includes the AEF commitments made in the year of the grant decisions. In addition, the government informs the Parliament annually on the realised results including the number of people provided with access to energy (approximately 2 million per year), which includes AEF results.²³

IOB carried out an evaluation of the RE policies during the period 2004-2014. IOB concluded that the Netherlands had contributed to providing an estimated 16.7 million people with access to energy through various initiatives including AEF. While formally AEF is part of the RE policies and portfolio of DGIS, IOB did not select any of the AEF funded activities as part of the ten case studies and AEF is not explicitly dealt with in the policy analysis of the IOB report. In the policy reaction to the IOB evaluation of RE, a new target was set in 2015 of providing 50 million people with access to RE by 2030.

¹⁸ Ministry of Foreign Affairs, IOB, Renewable Energy, Policy review on the Dutch contribution to renewable energy and development 2004-2014, Summary report, August 2015.

¹⁹ Focusbrief ontwikkelingssamenwerking, Brief van de Staatssecretaris Ontwikkelingssamenwerking aan de Tweede Kamer, 18 maart 2011.

²⁰ Ministry of Foreign Affairs, *Wat de wereld verdient*, 2013.

²¹ Ministerie van Buitenlandse Zaken, XVII Buitenlandse handel en Ontwikkelingssamenwerking, Tweede Kamer vergaderjaar 2015-2016 en Tweede Kamer 2016-2017.

²² The AEF contribution to Climate Change is still taken into account, but AEF is not explicitly mentioned in all government budgets, which is due to the fact that grants only figure in the budget in the year the grant decision is taken (so only in 2006 and 2012).

²³ Kamerbrief inzake ontwikkelingsresultaten in beeld, editie 2016.

The new efforts will focus on: i) access to RE for the poorest and specifically for women; ii) large-scale investments in RE generation; iii) cooperation with the private sector; and iv) improved knowledge on the links between climate, energy and development.

In addition, the Directorate for Inclusive Green Growth (IGG) of DGIS, which includes the Climate Team, has developed an internal Theory of Change (ToC) regarding Climate Change.²⁴ This ToC indicates that the overall mandate is to contribute to 1) sustainable inclusive growth; 2) eradication of extreme poverty in one generation; and 3) success for Dutch companies abroad. The results area 'Renewable Energy'²⁵ would contribute to the specific goals of providing 50 million with access to RE in 2030, prevent/reduce CO₂ emissions and expand the RE capacity.

3.2 The set-up of AEF

AEF I

In 2006, DGIS and FMO agreed on the set-up of AEF. AEF became active in November 2006 with a total capital of €70 million for the period 2007-2012. The Fund would provide risk-bearing funding such as equity, subordinated loans, local currency loans and grants for private investors or semi-public organisations (if they operate independently and on commercial terms).²⁶ All funding should fulfil the ODA-criteria and concession requirements. The document on the establishment of AEF²⁷ refers to the government target of providing 10 million people access to energy before 2015, with FMO being responsible for 3.5 million people, mostly through AEF.²⁸ The formal grant decision specifies that the main objective is to provide 2.1 million people with sustainable access to energy. AEF would invest in various types of energy including traditional energy as RE might be too expensive in some cases. The subsidy and implementation agreements between DGIS and FMO²⁹ specify that 75% of the projects should be implemented in SSA and LDCs.

Mid-Term Review (MTR) of AEF

In September 2011, the final report of the MTR of AEF was published. The conclusions were mainly positive:

- The majority of AEF means were invested (€ 60.3 million, i.e. 86% of the fund size);
- AEF was likely to meet the (partly implicit) objectives (0.5 million people connected at the time of the MTR, increase to 1.6 million if all current projects would reach the estimated capacity and 2.1 million could be possible by 2015 through effective revolvment of AEF's funds);
- The performance of AEF could be further improved through a more pro-active role in the development phase of projects, stronger support to public sector entities and some short-term actions;
- The main AEF problem was probably not the lack of funding, but the lack of bankable projects developed by solid sponsors.

²⁴ Ministerie van Buitenlandse Zaken, Directie IGG, Theory of Change voor Klimaatverandering, update april 2016.

²⁵ The other three results areas are 1) Forests and land use; 2) Water; and 3) Food security.

²⁶ Website FMO accessed on 24-8-2016: <https://www.fmo.nl/accesstoenergy>.

²⁷ FMO, Voorstel tot oprichting van het Access to Energy Fund voor duurzame toegang tot energie in ontwikkelingslanden, 2006.

²⁸ FMO indicated that it would aim for a target of 5 million people through its combined investments in energy.

²⁹ Ministerie van Buitenlandse Zaken, Subsidieovereenkomst AEF, 28 november 2006 en Uitvoeringsovereenkomst AEF, 12 april 2007.

The MTR presented a series of recommendations. A main recommendation was to detail the arrangements between DGIS and FMO on the objectives of AEF. The MTR also suggested to specify the extent to which AEF is expected to participate in transmission and distribution projects and the extent to which AEF is expected to participate in smaller projects, but the MTR did not give a precise indication.

AEF II

In October 2011, just after the publication of the MTR, FMO made a request for a € 32 million increase in the AEF commitment including an exclusive refocusing of AEF on RE in SSA. This was formally agreed in a new grant decision of December 2012,³⁰ which specified that only RE activities in SSA could be funded. No other targets or criteria are included in this grant decision, but the grant request by FMO is an integral part of the grant agreement. Nevertheless, at the request of DGIS, FMO formulated in a letter to DGIS (23 November 2012) in preparation of the new grant decision on AEF II (4 December 2012) an additional 'Results Chain and Indicator Set'. This document specified that the target is now set at 3 million people to be provided with sustainable access to energy. In addition, the targeted catalytic effect should be 3.25, but how and why this target was defined is not clear from the documents.

From the documents³¹ and the interviews it appears that following the decision on the top-up of AEF, there were discussions between DGIS and FMO on the specific nature of AEF and what funding gaps it would be expected to fill. In addition, it was discussed whether AEF I (the initial € 70 million) and AEF II (the additional € 32 million) could be combined in one single fund to be extended until 2022. In June 2014, DGIS indicated in the changed grant decision agreement³² that for budgetary reasons it would not be possible to have one grant decision for the entire Fund, but there would be two separate agreements. Nevertheless, from a content point of view the Fund should be managed as one. The grant decision outlines that FMO is requested to give more attention to the role of Dutch business.

Based on this set-up of AEF I and AEF II, DGIS and FMO felt that it was needed to have one document regarding the rules and criteria that would apply for AEF funding. In May 2015 (more than 2 ½ year after the AEF II grant decision), based on discussions between DGIS and FMO, FMO elaborated an informal document specifying the rules and criteria for AEF I and AEF II (see section 4.1 for more details).³³ Some of the criteria were very clear and easy to assess, such as the exclusive focus on RE in SSA, the maximum amount of investments and a maximum tenor period. In general, the rules and criteria are not very clear and specific on policy priorities – with the exception of the target of 3 million people to be provided with access to energy – and on fund management criteria such as revolving ability (see 4.4 for details).

Addendum CDFF-CIO allocations from AEF and newly planned allocations

Another formal decision dates from 9 March 2015 and is an addendum to the earlier grant decisions specifying that at the request of FMO € 7 million of the AEF could be spent on the Climate Develop-

³⁰ Ministerie van Buitenlandse Zaken, Subsidiebeschikking AEF, 4 december 2012.

³¹ FMO, AEF Scenario's, 17 October 2013.

³² Ministerie van Buitenlandse Zaken, Wijziging Subsidiebeschikking AEF, act. Nr 14837/24463, 27 June 2014.

³³ Access to Energy Fund I and Access to Energy Fund II, Rules and criteria, May 2015.

ment and Finance Facility (CDFF, later renamed Climate Investor One - CIO). Of this amount, € 6 million could be spent on the development of 3-4 pilot projects (not necessarily limited to SSA), which would allow FMO to be more active in the 'upstream' funding of the development phase of energy projects. The remaining € 1 million could be spent on the funding of 2 FTE for the period from 1 January 2015 to 31 December 2019. The addendum also specifies that the AEF evaluation planned for 2015 should analyse this specific funding.

As indicated in the Introduction, at the start of this evaluation DGIS and FMO indicated that DGIS had planned to commit a total amount of € 50 million to CIO³⁴, which would contribute to the delivery of the fair share of the Netherlands in the global climate deal as agreed at the Paris climate conference in December 2015. Both AEF and CIO are considered as 'flagships' of the Dutch commitment, in particular of the Ministry of Foreign Affairs.

CIO was initiated by FMO to overcome the mismatch between on the one hand the need for project development of bankable projects and on the other hand project financing available for executing these projects.³⁵ In 2014 FMO participated with the CIO-plan in a competition of the Global Innovation Lab for Climate Change Finance. The Lab endorsed CIO as an innovative initiative for its 'one-stop shop' and helped to develop the CIO concept. The structure and governance of CIO as a three-tier fund for complete project-cycle financing of RE has been elaborated since. In the summer of 2016, DGIS and FMO asked an external consultant to advise on the structure and governance of CIO, including the multiple (and potentially conflicting) roles of FMO as sponsor, shareholder in the fund manager and investor in CIO-funds. These recommendations of the consultant were followed up. However, a remaining issue was how DGIS could practically realise its commitments to CIO. DGIS and FMO agreed in line with the letter that FMO sent to DGIS that this could best be realised within the existing AEF-FMO context with the following main adjustments:

- Top-up of the existing AEF;
- Extend the duration of the FMO mandate, to reflect the lifetime of CIO under AEF;
- Widen the AEF country criteria to allow investment outside SSA;
- Investment size and limits.

Subsequently, FMO made a concrete request to DGIS (*subsidieverzoek*) on 3 February 2017. The idea is that AEF would receive a top-up of € 18 million and the total AEF-fund size would become € 120 million, of which € 50 million would be invested in CIO.

3.3 Relations between FMO and DGIS regarding AEF

Formal relations

FMO is the Dutch Development Bank. The Dutch State holds 51% of FMO's shares (FMO-A funds). In addition, FMO manages three active funds for the Dutch Government MASSIF (support to financial institutions to aid MSMEs), Infrastructure Development Fund (IDF) and AEF. These funds allow FMO to cover the financial risks that FMO is not able to tolerate alone. FMO has appointed a Fund Manager for MASSIF and a Fund Manager for IDF and AEF. Furthermore, FMO Investment Officers and

³⁴ Consisting of € 32 mln to come from AEF II and € 18 mln additional funding

³⁵ FMO, Request for AEF investment in CIO fund for Climate Change mitigation in developing countries (*Subsidieverzoek*), 3 February 2017.

portfolio analysts – the so-called Front Office – are responsible for initiating, preparing and closing the financial deals including deals making use of the government funds.

Two DGIS directorates are involved in the management of the relations with FMO. DDE fulfils a central coordinating role being responsible for the regular policy consultations with FMO based on the government's shareholder's role. DDE is also responsible for MASSIF and IDF. The IGG Climate Team is responsible for AEF and CIO. FMO reports to the various DGIS directorates on the management and results for each of the government funds through quarterly reports, annual reports, annual activity plans and results fiches.

FMO

FMO has the ambition to become the leading impact investor in 2020 by doubling its impact and halving its footprint. FMO has chosen two Key Performance Indicators (KPIs) that underpin this ambition: Impact is measured by the number of jobs and Footprint by the amount of GHG avoided. These two KPIs are for each project determined at the moment of contracting based on the FMO Impact Model, in use since 2015. FMO strives for the use of harmonised definitions together with other DFIs.

FMO focuses on specific sectors and one of the key sectors is Energy. According to the FMO website³⁶ “FMO finances long-term projects that can fuel economies, open gateways to access, clear the way for low-carbon systems and safeguard energy supplies”. In principle, both FMO-A funds as well as the government funds can be used for investments in Energy. AEF is specifically meant for high-risk investments in RE in SSA, which has been assessed by this evaluation (see section 4.2 on additionality findings). The FMO annual sector evaluation Energy dd December 2015 focused on the two KPIs for the entire FMO energy portfolio and concluded that 90% of the expected production will be realised, 87% of the ex-ante estimated jobs and 82% of the GHG avoided. In the AEF results fiche that is sent to DGIS/IGG the two KPIs are reported, while also the number of beneficiaries reached – i.e. people with access to energy - is indicated (see section 4.4 for more details).

Analysis of government policy priorities reflected in AEF

For all grant decisions regarding AEF including the addenda, DGIS did not formally indicate the framework in which the requests from FMO should fit. In all cases, i.e. the set-up of AEF, the top-up of AEF and the decisions on CIO, FMO took the initiative and presented its ideas to DGIS. In all cases the reaction of DGIS was positive and subsequently FMO made a formal request, which formed the basis for the grant decisions or addenda to the grant decisions. In general, the grant decisions largely reflected the FMO-proposals and provided limited guidance on objectives and targets and reporting. The MTR of AEF in 2011 already concluded that the arrangements between DGIS and FMO were not very clear and it was recommended to further specify the arrangements. However, DGIS did not actively follow-up this recommendation.

The overview of policy developments and the AEF grant decisions presented above showed that the policy priorities changed over time and that RE policies have become further embedded in climate policies. In practice, however, the evolving DGIS policy priorities on RE and climate change are only

³⁶ Accessed on 1-2-2017.

reflected to a limited extent in the AEF operational and strategic objectives. Indeed, the focus on access to energy for households remains the primary objective. The link between RE and inclusive green growth (access for poorer households and specifically for women) which is part of the government priorities is not at all articulated in the AEF policy frameworks. More recent government priorities, such as the climate goals and improved knowledge on the links between climate, energy and development, are also not articulated. On the other hand, FMO did address other government priorities such as large-scale investments in RE generation and cooperation with the private sector via AEF.

In practice DGIS has not been pro-active in defining the (evolving) policy framework for AEF and it has been left to FMO to interpret the DGIS policy priorities in its formal requests (as the basis for grant decisions). The relationship between DGIS and FMO is built on mutual trust leaving sufficient room for FMO as trusted partner to flexibly manage government funds, including AEF. There is a continuous dialogue between DGIS and FMO on various issues, including the interpretation of criteria and targets. However, as provider of the funds DGIS should have more clearly defined the policy framework for AEF within which FMO should operate and at least unambiguously define the key AEF-objectives in such a way that they can be operationalised by FMO. This key aspect of the relationship between DGIS and FMO regarding AEF has been left too open by DGIS until now. Recent discussion between DGIS and FMO regarding AEF focused on the operational interpretation of indicators and measurement methods before these were properly defined and prioritised in the governance documents.

In practice, the lack of unambiguous objectives and clear related fund criteria have led to some mismatches between FMO's KPIs and the AEF-indicators agreed upon between DGIS and FMO based on the sometimes unclear objectives. This discrepancy is further aggravated by a lack of common definitions for key concepts such as revolvability and exact methods to calculate the number of people with access to energy and the catalytic effect.

During the inception phase of this evaluation a reconstructed AEF Theory of Change (ToC) has been elaborated (see Annex V)³⁷ based on AEF's Results Chain. At the same time, DGIS also still uses its own ToC for climate change. In the various documents, outcomes and indicators tend to be used interchangeably. For example, in the recent FMO letter on CIO-AEF of 3 February 2017, the number of bankable RE projects is mentioned as an outcome indicator, while it should be an output and the number of people with access to RE is mentioned as an output indicator while it should be an outcome.

The lack of a clearly articulated policy framework for AEF also affects the planned new allocation to CIO via AEF. As mentioned in the previous section, the AEF objectives are not adequately aligned with the current DGIS-priorities and have not been properly translated into operational criteria for (and by) FMO at present. With an allocation to CIO, AEF would commit to an investment with a uniquely wide scope (e.g. three funds, each governed independently), where FMO has multiple roles to perform (1. sponsor, 2. shareholder in the fund manager and 3. investor in CIO-funds), while also

³⁷ The ToC proved to be a useful building block for the evaluation design and presents in a synthetic way how AEF operates and what it aims to achieve in line with the government objectives. The Theory of Change has been discussed and validated with the main stakeholders during the evaluation.

carrying fiduciary responsibility for AEF to DGIS. Although from a climate policy perspective, the commitment to CIO makes sense, the funding of CIO through AEF leads to various questions. DGIS cannot directly invest in CIO (equity), as this would not be allowed under current government regulations. There are some similarities between the objectives and scope of CIO and AEF, such as the focus on RE, but there are also clear differences such as the set-up and management of both funds (AEF as a government fund and CIO as a fund with multiple investors which affects the reporting structure), the broader scope of CIO (beyond SSA) and the role of FMO (fund manager of AEF and shareholder in CIO).

Ability of AEF to respond to developments in supply of funding and business models (demand)

The set-up of AEF and the relationship with DGIS has left ample room for FMO as a fund manager to flexibly operate in the market. As there were no strict policy requirements, FMO could focus on its core business of identifying and financing bankable RE projects.

4

Main findings

In this chapter the main findings of this evaluation are presented in line with the methodological approach as summarised in the evaluation matrix (Annex II). Five main evaluation questions related to the evaluation criteria relevance, additionality, effectiveness and impact, efficiency and sustainability have been formulated. Given the focus of this evaluation on relevance and additionality, and to a lesser extent on effectiveness and efficiency and given the availability of data, little information was found on sustainability. Therefore, the findings on sustainability have been put together with the findings on effectiveness and impact (section 4.3).

The findings in this chapter are based on all data collection tools, including the portfolio analysis, strategic interviews, document review and case studies.

4.1 Relevance

- AEF is a relevant and useful tool that can respond well to changing conditions in energy markets. FMO utilises opportunities that come with an increasingly active private sector by mitigating financial risks in public-private partnerships. FMO also explores new opportunities in the emerging off-grid solar market, mini-grids and the use of funds with a local presence. The AEF investments are also in line with national energy policies and goals in SSA countries. All case studies show a positive relevance score.
- The investments meet the main investment criteria that were set out for AEF I and since 2012 for AEF II. In particular, the focus on SSA and on RE is well reflected in the portfolio. Although the case studies showed that the AEF investment criteria are consistently included in all FMO documents for approval of investments submitted by Investment Officers, but do not always explicitly indicate whether they have been met.
- Both on-grid and off-grid generation projects are relevant and serve the cause of access to energy, in distinct but complementary ways. However, the strong presence of on-grid projects in AEF's portfolio does not fit well with AEF's criterion to focus solely on households, as on-grid power generation serves both companies and households. Transmission & Distribution and mini-grid projects can complement power generation projects and provide access to energy in off-grid areas as well. These are currently not in the AEF portfolio, which can be explained to an important extent by the very high risk profile. Nevertheless, distribution was noted as the highly preferred category in the AEF I criteria document because it provides direct impact on sustainable access to energy

Some relevance questions at the policy level have already been addressed in chapter 3. Therefore, the assessment of relevance in this section complements that analysis and is based on the portfolio and case studies. The assessment of relevance in this section focuses on AEF investments in view of the evolving context of RE funding and the AEF investments in view of the investment criteria. The main portfolio data are presented in this section (Annex VI provides a complete overview of the

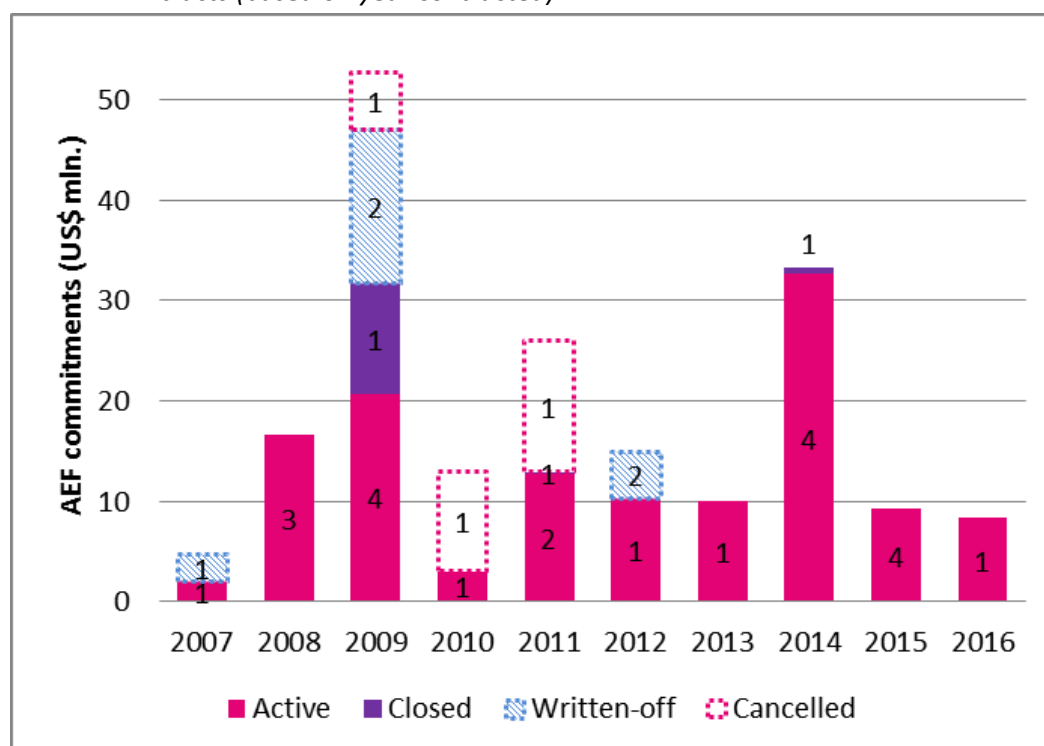
portfolio). CIO is treated as a separate investment (see chapter 3 and section 4.3.1 for CIO outputs) and is not included in the portfolio.

4.1.1 AEF investments in view of the evolving context of RE funding

AEF investments

Figure 4-1 gives an overview of the total number of projects and total sum contracted annually. AEF has currently 22 active projects, totalling US\$ 125.4 million, and 3 closed projects (one repaid loan of US\$ 11 million, and two grants of US\$ 0.2 and 0.8 million that were not converted to equity or debt). Five projects of US\$ 22.7 million were written off before the planned exit/final maturity date. In the case of the three written-off projects, AEF has disbursed only part of the total commitment. These projects were stopped prematurely due to changing circumstances such as bankruptcies. Another 3 projects were cancelled before any disbursements were made.³⁸

Figure 4-1 Number and committed amount of active, closed, written-off and cancelled AEF contracts (based on year contracted)



AEF saw a quick rise in contracted investments in the first three years, from 2 in 2007 to 8 in 2009 in a variety of projects, both on-grid and off-grid, renewable and non-renewable, to banks, funds and project developers. Four of these investments were cancelled or written off between 2010 and 2013. One project that was contracted in 2009, a special purpose vehicle called Saems Capital, had an early exit in 2014 (it was bought out by a Chinese investor).

Between 2010 and 2012, a relatively large number of investments (four) was cancelled or written off. This can partly be explained by the novel nature of some of these investments, which included

³⁸ In addition, AEF has invested € 7 mln in Climate Investor One, but this is not included in the portfolio overview.

an investment in one of the first pico-PV companies in East Africa, ToughStuff, and one in a mini-grid in Senegal, Inensus. One biomass project in Liberia, Buchanan, was contracted with a small grant in 2011 that was not converted to equity or debt, and therefore closed in 2012. An equity investment in the Lereko Metier Sustainable Capital Fund in South Africa was conditional on the fund obtaining preferred bidding status in a government tender, and was cancelled after it did not succeed to obtain this status. The AEF commitment in the Tema Osonor (gas fuelled) power plant in Ghana was cancelled due to long delays and disputes between investors. The plant was eventually financed by other investors.

Solar projects are strongly represented in new investments from 2012 onwards, with an increasing number of small-scale off-grid solar investments. So far, one off-grid investment closed during this period has been written off (ToughStuff). Another small grant to a solar project in Rwanda, Offgrid Solutions, was not converted to equity or debt and therefore exited in 2014.

The changes in the types of investments over the years reflect the evolving context of the energy markets in SSA, as reflected in chapter 2. FMO has used AEF to explore new opportunities within these changing markets. AEF has responded to the emerging off-grid solar market by testing new business models in this field, taking adequate risks and building relevant knowledge within FMO. AEF has also invested in the portfolio development of funds that invest in several smaller power projects and serial project development, which have a local presence in relevant markets and can respond quickly to changes in the markets. They can manage investments in power plants that are too small to be managed by FMO directly, but are still relevant to increase energy access in SSA countries with a very low energy supply. Lastly, AEF has signed one contract for a mini-grid. The results of these investments are mixed, indicating that AEF invests in funds and projects with significant risk profiles, for which it was designed.

Growing role of the private sector

The private sector has become more active in SSA's energy sectors. Many countries have opened up their energy markets to commercial parties. Still, the majority of investments in RE sources in SSA are heavily funded by public donors, DFIs and national governments. AEF has largely invested in projects with co-funding from public parties, often providing high risk instruments such as equity or subordinated loans. While both supply of and demand for capital are increasing, in the structuring of financing there will remain a role for the public sector for risk mitigating finance, at least to attract more private sector capital in the years to come (see chapter 2).

With the introduction of IPP procurement programmes, improved regulation and fiscal incentives for RE generation have been introduced in some countries, public-private partnerships (PPPs) are becoming increasingly relevant. Such PPPs, like the Lake Turkana Wind Power project, are complex structures absorbing project risks in the partnership. However, combining ("blending") public and private finance in a PPP creates separate, new, risks (e.g. interdependency) where risk mitigation via AEF may still be relevant (see also section 4.2 additionality).

4.1.2 AEF investments in view of policy priorities and investment criteria

Addressing national policy priorities in SSA

Energy demand is rising in many countries, making investments in energy generation highly relevant as indicated in chapter 2. Investments in on-grid RE power plants serve national policies and goals of SSA countries, which are focused on increasing domestic power production, improving energy access by stabilizing and expanding the grid, and diversifying and greening the energy mix. Investments in off-grid solar power and mini-grids contribute to rural electrification which is also a national policy priority in SSA countries.

Case studies

Table 4-1 provides a detailed assessment of the relevance of each case study. All case studies score high on relevance: they all address the need for an improved energy supply to cover the increasing energy demand and are relevant to the national context in each country. The financial tools provided respond adequately to the need for risk-bearing capital and are appropriate for the type of project it invests in. For instance, the Africa Renewable Energy Fund and Saems Capital received funding in order to target smaller-scale projects, which are less efficient for FMO to manage directly itself.

Only two case studies scored a 3 instead of 4 (the highest score), which means that they respond to urgent RE funding needs (see chapter 2 on the context) and match with the overall policy priorities (see chapter 3). Nyamwamba faced the exceptional situation of a temporary energy surplus in Uganda, which made the investment for more energy generation less relevant. Cenpower, a gas-fired power plant, became less relevant to the AEF due to the focus on RE only from 2013 onwards (see the discussion on RE below).

Table 4-1 Assessment of relevance for selected case studies

Name	Assessment	Score
Africa EMS Nyamwamba	Adding generation capacity in Uganda is almost by definition relevant due to the high need for additional capacity in the country. Investment also largely in line with AEF investment criteria (renewable and SSA). Demand for electricity is projected to continue growing strongly, requiring new capacity also towards the future that Nyamwamba can fill. Still, in 2016 additional generation capacity came online causing a temporary surplus in supply. A small project, it does not provide much extra capacity, making the additional impact from Nyamwamba minor, but it contributed to the decommissioning of thermal energy plants.	3
Africa Renewable Energy Fund	AREF has specifically been designed to overcome the hurdles in RE financing as discovered by an independent consultant for the AfDB. AfDB set out a tender for AREF to overcome the financing, energy and knowledge gap in the development phase of energy projects in Africa. AREF therefore directly addresses a financing and energy need. AREF is focused solely on Africa and RE and therefore strictly complies with the AEF investment mandate. AEF investment criteria are largely met.	4
Aldwych Lake Turkana Wind	LTWP responds to Kenya's rapidly growing energy demand. The construction of the 430 km transmission line facilitates expansion of grid access to new locations. It makes use of public and private finance, creating a unique private sector-led partnership.	4
Cenpower	Cenpower is a relatively unique case for the AEF as it is one of the largest, yet fossil-fuel powered generation project in the portfolio. Even though it does not meet the RE targets posed under AEF II, the project provides critical base-load electricity supply to a country in need of a stable source of additional electricity with frequent black-outs, demand for energy strongly growing and a large share of electricity supply volatile due to the dependence on hydro (44% of power). Due to its size and the important role of FMO in the entire project through the development equity from AEF (as well as AEF equity stake later on), FMO played an important role in realising a stable source of electricity in the country.	3
Consortia Eólico Amayo	Amayo responds to the Government of Nicaragua's primary objective to expand power generation from renewable sources. It was the second wind park in Nicaragua. It diversifies the ener-	4

Name	Assessment	Score
	gy mix and decreases Nicaragua's dependency on imported fossil fuels.	
Corporacion Polaris Energy NIC S.A.	Polaris responds to the energy demand of the Government of Nicaragua, which is still reliant on imported fossil fuels. The plant provides renewable and baseload energy, which is in line with Government of Nicaragua's RE priorities and aim to diversify the energy mix with more geothermal power. It is also useful for the Government of Nicaragua's electrification goals.	4
E+co Inc.	The AEF investment in E+Co Inc. is highly relevant in relation to the AEF objective and investment criteria as it exclusively focuses on clean energy investments in developing countries, mostly in AEF focus countries (across the entire AEF portfolio). E+Co focuses on very small enterprises and entrepreneurs (average loan size US\$200k), which will not receive funding from the commercial market due to their early stage status. Also commercial banks cannot help these companies in the way that E+Co does (with advice). Energy demand is high in all their target markets and by focusing on clean energy, E+Co provides a sustainable energy solution. Small-scale projects also typically brings energy to generally underserved regions, which has a high potential to increase access to energy	4
Gigawatt Global Rwanda	Gigawatt responds to a rapidly growing energy need in Rwanda. It produces 100% RE and diversifies the energy mix (mostly hydro). It can contribute to GoR's electrification programme by providing energy to the grid.	4
Global Innovative Consulting	The relevance of the GIC investment for the AEF is good. Ghana had been struggling with growing energy demand for some time, which in the past was mostly solved with additional thermal power. Most generation capacity is installed in the south and the reliance on hydro and thermal power is high. This first solar project diversifies the energy mix in a green manner.	4
Inensus	The Inensus project would provide highly needed access to energy in rural areas in Senegal, one of the main objectives of the AEF. It is in line with the rural electrification framework of the GoS. The project deviates from the AEF revolvability criterion by providing a concessional loan. In doing so, it addresses the need for high risk development finance and is highly relevant from an access to energy perspective.	4
Kivu Watt Ltd	Kivuwatt responds to a rapidly growing energy need in Rwanda. The methane gas plant can provide baseload power and diversifies the energy mix (mostly hydro), which is useful for GoR's electrification programme. It may be disputed whether this is RE or not.	4
Offgrid Solutions (Wakawaka)	Wakawaka responds to a rapidly growing energy need in Rwanda and is in line with GoR's policy priority of increasing access to energy. It aims to test the market with a new business model. The investment directly increases access to energy for rural households. Off-grid solutions are sustainable and decentralised energy generation is starting to play an increasingly important role in SSA.	4
Orb Energy	Orb responds to the rapidly growing energy demand in Kenya, and is in line with GoK's policy priority of rural electrification and climate policy. The investment directly increases access to energy for rural households. Off-grid solutions are sustainable and decentralised energy generation is starting to play an increasingly important role in SSA. Orb uses a new business model, collaborating with MFIs.	4
Saems Capital I BV	The AEF investment in Saems Capital is relevant as the finance fully focused on a portfolio of small RE projects that otherwise would be difficult to finance by themselves (due to the size and the risks). In this way, FMO helped support the development of small renewable power projects in Sri Lanka and Uganda, the latter of which faced severe power shortages. Fully compliant with AEF investment criteria.	4
ToughStuff	Increasing access to rural energy through portable solar lamps is strongly in line with the AEF targets and objectives. ToughStuff was one of the first of the wave of pico-PV companies. Each of these had difficulties finding finance, let alone from commercial sources. The finance for these highly relevant projects was therefore not sufficiently available and therefore AEF played an adequate role by providing finance for a high risk, but highly relevant project. Though risky, FMO moved along in the market and supported a new company in a promising and growing industry. However, the AEF criteria for grant financing not fully met as grant was used to finance expansion of the business into new and existing markets. Though these constitute high one-off development costs, there are not purely for non-commercial technical development purpose (minor issue).	4
Mean score		3.81

AEF's investment criteria

For AEF I the agreements between DGIS and FMO³⁹ specified that 75% of the projects should be implemented in SSA and LDCs and various types of energy could be considered. Financing could include generation, Transmission & Distribution, of which distribution was highly preferred, 'as it provides the most direct impact on sustainable access to energy'.⁴⁰ Each project should contribute to at least 50,000 people getting sustainable access.

The criteria for AEF I were changed when additional funding for AEF II was provided, narrowing down the scope to RE in SSA only, but as indicated in chapter 3 these criteria were not laid out in detail in the grant decisions. In 2015 a working document was elaborated further specifying the rules and criteria for AEF I and AEF II. It indicates that funding from AEF should always:

- Relate to RE (since 2012)
- Provide access to energy for at least 50,000 people;
- Be maximum € 10 mln in case of (quasi) equity;
- Be maximum € 20 mln in other cases;
- Have a maximum tenor of 20 years;
- Be maximum 75% for investments above € 5 mln;
- Be maximum 100% for investments below € 5 mln;
- In case of grants never be higher than 50% of the equity;
- In case of equity never be more than 49% of the share capital.

The new document does not mention the high preference for distribution that was stated in the document of 2010.

There have been discussions between DGIS and FMO on the interpretation of the criteria and the eligibility of specific projects. Several proposals that did not fully comply with the AEF investment criteria but that FMO considered to be interesting from a development impact perspective were presented to DGIS for approval (explicit exemption for compliance with investment criteria), but were not considered eligible; two of these proposals are included in the case studies for this evaluation. One proposal concerns finance for seven small hydropower stations at tea factories from Kenya's largest tea-farmers' cooperative. This proposal was rejected by DGIS because the project primarily provides access to energy for companies instead of households. It is of interest to note here that there is an ongoing debate in the energy sector if (and when) such projects eventually do contribute to household electrification. Considering other on-grid projects in the AEF portfolio, it is difficult to say whether this type of projects do provide more access to households than to companies. Both user groups are connected to the grid, and can therefore equally use the energy that is generated by the AEF projects.

Another rejected proposal concerns finance for the New Forest Company in Rwanda, which would contribute to the production of electricity poles to be employed for transmission on the national grid. According to DGIS this is too far off from the AEF objectives of providing access to energy for households. From the evaluators point of view the additionality of the AEF for this particular project may have been questionable.

³⁹ Ministerie van Buitenlandse Zaken, Subsidieovereenkomst AEF, 28 november 2006 en Uitvoeringsovereenkomst AEF, 12 april 2007.

⁴⁰ FMO, Access to Energy Fund Criteria ('AEF' or 'Fund'), 12 July 2010.

Assessing the investment criteria

All investment decisions should include an evaluation form, completed by the Front Office and signed off by front management that evaluates whether the proposed financing meets the criteria for funding from the AEF.⁴¹ This evaluation form should be included in the deal documentation of the CIP and FP and forms an integral part of the investment decision. All investment decisions for our case studies date from before May 2015 and worked with the evaluation form that was created in 2010, based on the investment criteria document of 2010. This form does not include all the criteria that were set out in the informal document of May 2015, which are therefore difficult to assess. The criteria that are omitted from the form are the RE criterion, the maximum share in the total investment (the general rule of 75%/100% and the specific rules for grants and equity) and the ODA compliance. We have assessed these specific criteria on the basis of our portfolio data (Annex VI).

Apart from the evaluation form, the AEF criteria do not appear to play a prominent role in the written investment decisions as prepared and processed by the Front Office. These generally focus on the risks and financial aspects of the investment. Whether the investment complies with AEF criteria is not explicitly mentioned in the written investment decisions of the selected case studies (see also the discussion below on specific investment criteria). Nevertheless, the more detailed assessment of relevance of the case studies presented above shows that all case studies were relevant, which appears to indicate that the assessment of the investment criteria by FMO was sufficient.

Financial criteria and ODA compliance

All projects meet the financial criteria for loans and equity (see the specific rules and criteria presented above), and the maximum share of the total investment. The shares of the grants and equity are also below the required 50% and 49% of the equity respectively. One exception could be Offgrid Solutions, where the grant of € 600,000 seems to be higher than 50% of the equity, but this depends on how this criterion is interpreted. In this case, FMO has indicated that the criterion is only met after the grant has been converted to equity (which would happen if the pilot were successful).

It is more difficult to assess whether the investments are ODA-compliant as indicated in the criteria. The criteria document of 2010 says that the risk/return profile of AEF's financing instrument should be in line with the market, under the condition that the financing complies with ODA criteria.⁴² There is some tension between the requirement to be in line with the market conditions on the one hand and at the same time fulfil the concession requirements of ODA. Finance in line with market conditions would not allow for concessional funding, whereas ODA makes concessional funding obligatory. In fact, it may well be the case that realizing strategic objectives for AEF is potentially conflicting: revolvability (or financial sustainability) as one objective incentivises a close-to-commercial profile, while funding access to energy in a high-risk market asks for risk-appreciation that may go beyond commercial standards. Since these criteria are not prioritised they need to be met in full in order to be formally compliant, while in practice this creates a dilemma, unless one criteria is clearly prioritised (generally, by the AEF-policy criteria, or case-by-case by the AEF Fund Manager). The case studies showed awareness of this dilemma and in general pragmatic solutions are being adopted.

⁴¹ No evaluation table was found in the investment decision documents of Gigawatt.

⁴² ODA compliance means that each transaction should be administered with the promotion of the economic development and welfare of developing countries as its main objective; and should be concessional in character and convey a grant element of at least 25%.

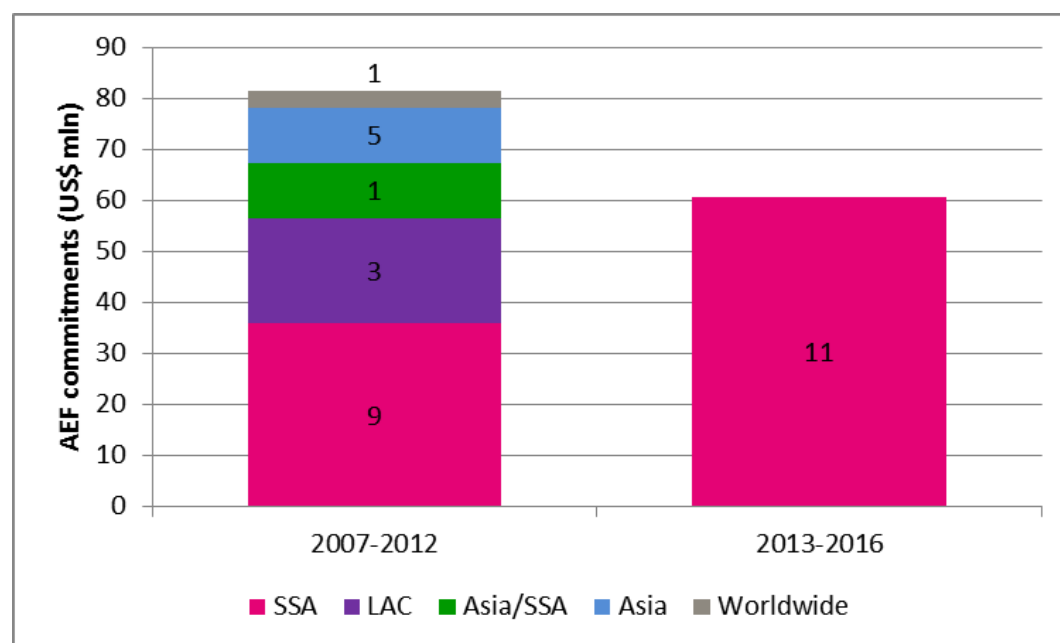
The evaluation forms do not state anything on this particular matter other than the question when the ODA-notification will be foreseen (to which the standard answer is that the notification will be done by DGIS).

Geographical focus

Figure 4-2 below shows the geographical distribution of the projects and the committed value. As per the grant decision for AEF II in 2012, all new investments were limited to RE only (i.e. no more fossil fuelled power plants) in Sub-Saharan Africa. These criteria have been met by all AEF investments since then. Before 2013, 44% of AEF's investments were in SSA. Especially in the early years of AEF, investments were made in Africa, Asia and Latin America, but in the period 2010 and 2012 the focus already clearly shifted towards SSA, with only one new investment contracted in LAC. After 2013, all new projects were in SSA, represented in the graph by the increased share of SSA in the portfolio.

Another geographical criterion that was introduced in 2012 is the focus on low-income countries. In both periods, at least 60% of the projects is in a low-income country. Between 2007 and 2012, 74% of the projects (71% of investments) took place in a low-income country⁴³ and 52.6% (42% of investments) took place in a least developed country (LDC). Between 2013 and 2016 this was 63% (73% of investments) and 27% (24% of investments), respectively.

Figure 4-2 Distribution of AEF investments* among regions in 2007-2012 and 2007-2016



* This figure is based on the commitments for active and closed projects, and the disbursements that were made to written-off projects before they were cancelled (in US\$ mln), which also applies for all other portfolio figures and tables.

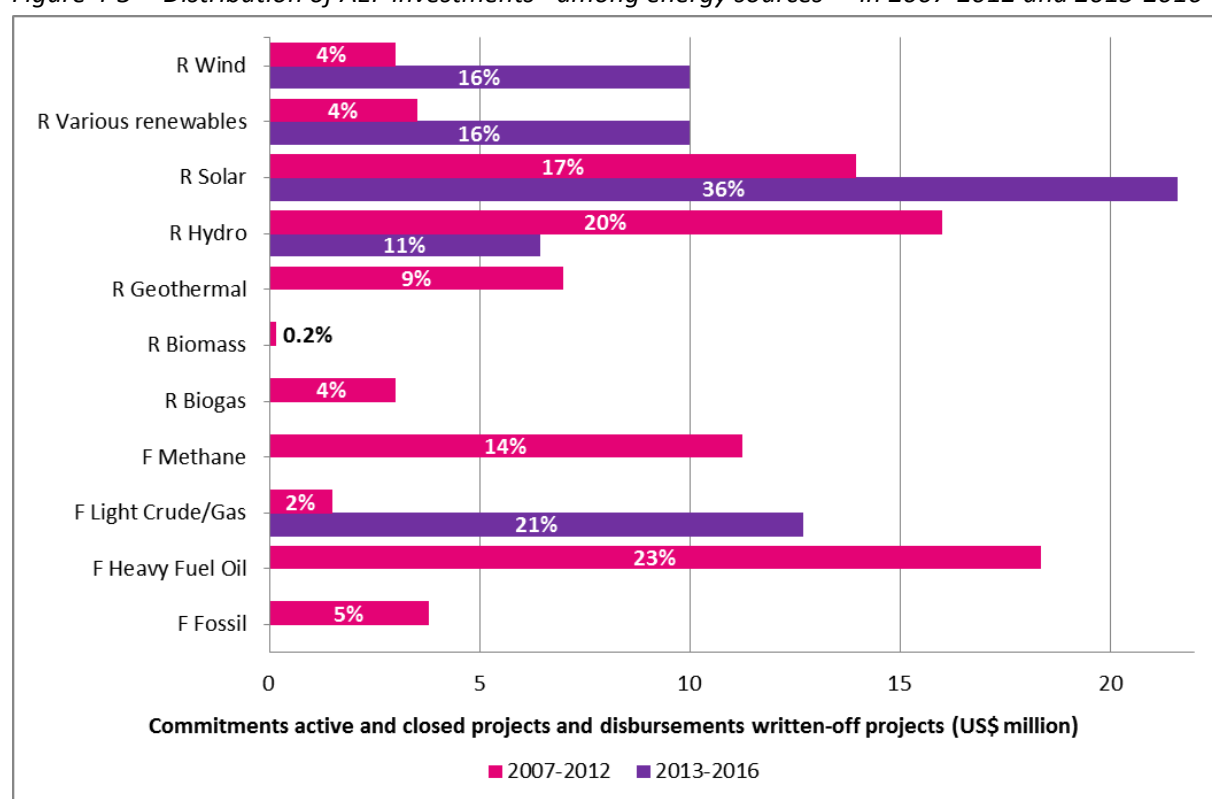
⁴³ In line with the classification of the OECD DAC list of ODA recipients. The category low income countries encompasses Least Developed Countries and Other Low Income Countries. For some countries, such as Ghana, the income status has changed since the start of the AEF. The used income status corresponds to the country income status in the year of contracting.

Renewable energy

In total 80% of the number of AEF-funded projects focus on RE. In terms of contracted value this is 78%.⁴⁴ From the 11 projects contracted since early 2013 – the start of AEF II – 10 out of 11 projects were focused on RE as shown in Figure 4-4. The one exception is the AEF investment in Cenpower in Ghana, which is a greenfield dual fuel (light crude oil and gas) fired combined cycle power plant. The equity investment in 2013 has been made following from an option included in the US\$ 1.5 million convertible grant provided in 2011 by AEF to participate in the project for 5% at par. Consequently, the only exception made can be clearly accounted for on the basis of previous commitments. The figures for the AEF focus on RE during the period 2013-2016 compare favourably to the figures for the period 2007-2012 when 6 out of 19 projects did not focus on RE corresponding to approximately one third of the commitments/disbursements.

From 2013 onwards six solar projects have been added to the portfolio; both on-grid projects such as Gigawatt Global in Rwanda as well as smaller scale off-grid projects such as Orb Energy in Kenya and Off-grid Solutions in Rwanda. The increased investment in wind energy can be solely attributed to the contracting of Lake Turkana Wind Farm in Kenya.

Figure 4-3 Distribution of AEF investments* among energy sources** in 2007-2012 and 2013-2016



* This figure is based on the commitments for active and closed projects, and the disbursements that were made to written-off projects before they were cancelled (in US\$ mln).

** R = Renewable energy source and F = Fossil fuel energy source.

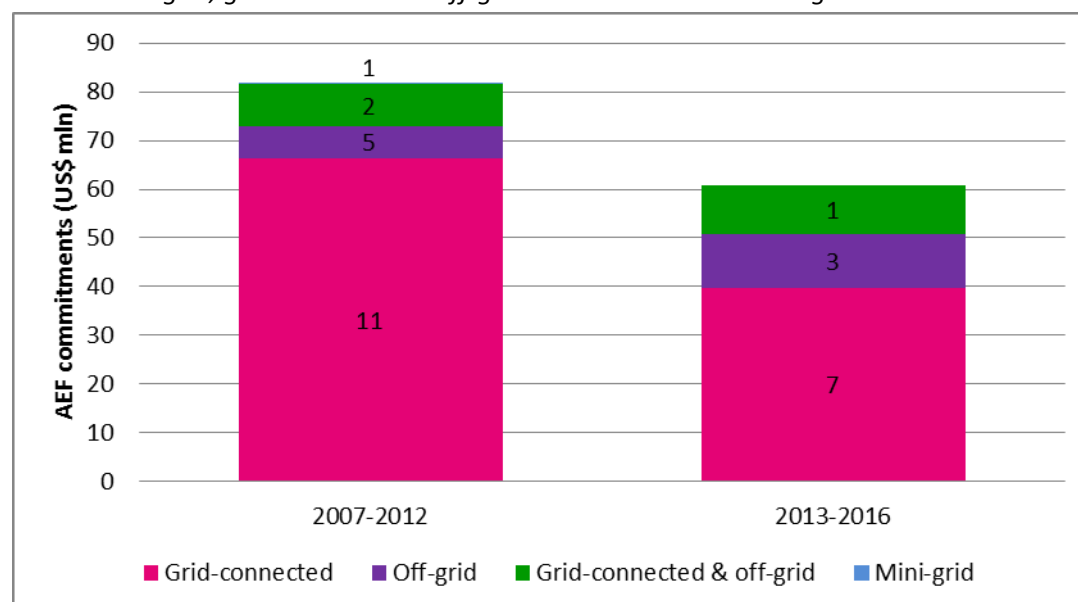
⁴⁴ One project was solely focused on distribution of existing power.

RE is a broad term that can be interpreted in different ways. The grant decision does not provide an exhaustive list of energy sources that would comply with this criterion and thus leaves it open to interpretation. An example of an investment that could be up for discussion is a methane power plant such as Kivu watt. Methane is a fossil fuel and could therefore be seen as a non-RE source. On the other hand, biogas from methane is often regarded as a renewable source when it is collected as a waste product. The methane in Lake Kivu is continuously created in a relatively short cycle. The methane is being emitted naturally into the air. As methane is a more damaging greenhouse gas than CO₂, Kivu watt's conversion of methane into (reduced) CO₂ emissions could be regarded as a technology that is good for the environment. Additionally, extracting methane from the lake could mitigate the risk of a natural limnic eruption, which can be lethal to inhabitants in the surrounding cities and villages. More insight into the rationale of the RE criterion could benefit the assessment of future investments that fall in a grey area (Kivu watt was signed in 2011, before the RE criterion was introduced).

Grid-connection

Figure 4-4 below demonstrates that the majority of projects (18 out of 30) is grid-connected. There are 8 pure off-grid projects, mainly consisting of solar home systems. The three AEF investments that cover both on-grid and off-grid projects are banks (the Clean Energy Development Bank) and energy funds (the Africa Renewable Energy Fund and E+Co, the latter of which was written off). One project, Inensus, involved mini-grids. This project, however, was also written off and only US\$ 20,000 was disbursed of a total commitment of US\$5.2 million.

Figure 4-4 Distribution of AEF investments* and number of projects among grid-connected, off-grid, grid-connected & off-grid combinations and mini-grid in 2007-2012 and 2013-2016.



* This figure is based on the commitments for active and closed projects, and the disbursements that were made to written-off projects before they were cancelled (in US\$ mln).

On-grid and off-grid investments both contribute to improved access to energy, but in very distinct ways:

- **Off-grid power generation** investments contribute directly to an increased number of people with access to energy. It is often focused on peri-urban and rural areas and contributes to rural

electrification. It does not require expensive Transmission & Distribution investments. The energy-output of these power systems is much smaller than on-grid power systems. They are usually limited to providing light, mobile phone charging, and sometimes radio or TV. The potential impact of this access to energy on households is therefore smaller ('pre-electrification') compared to households that are connected to the grid and can use more and more energy-intensive home appliances ('electrification').

- **On-grid power generation** investments do not directly contribute to an increased amount of people with access to energy. They do contribute directly to improved energy access for people who are already connected to the grid, which in SSA countries is still unstable with frequent power outages, mostly because of insufficient power being generated. Especially baseload power plants can improve the stability of the grid and thus energy access. It is essential for the expansion of the grid, especially if grid stability is low and load shedding is high, which is the case in most LMICs / LICs. The grid can only be expanded if there is enough energy supply to the grid. Investments in grid-connected RE generation do therefore indirectly contribute to an increased amount of people with access to energy. On-grid requires more T&D investments than off-grid, but benefits the stability of the national grid and ultimately decreases the country's import dependency (which is often fossil fuel-based), diversifies the energy mix and mitigate greenhouse gas emissions.

Both on-grid and off-grid generation are therefore relevant and serve the cause of access to energy, in distinct but complementary ways. However, the strong presence of on-grid projects in AEF's portfolio (18 of 30) does not fully match AEF's focus on households and the strict application of this criterion (see for instance the discussion on the Kenyan tea project above), as on-grid power generation serves both companies and households. On-grid financing is 'technically' similar to infrastructure project financing, which has been one of the key areas of expertise for DFIs such as FMO. Off-grid comes with different business models and has been the terrain of SME financing and venture capital. Recently, the off-grid market is growing fast and particularly 'pay-as-you-go' business models are becoming important for scaling up the off-grid market. Pay-as-you-go compares to leasing and is in fact quite similar to project financing, and is being picked up recently by DFIs including FMO.

Beside power generation projects, AEF has also contracted one mini-grid project, which was written off. Mini-grid projects can complement power generation projects and provide access to energy in off-grid areas as well. The same argument holds for Transmission & Distribution projects, currently not in the AEF portfolio, despite the fact that distribution was noted as the highly preferred category in the AEF I criteria document because it provides direct impact on sustainable access to energy. and AEF could play a potential niche role in providing early-stage risk capital. Nevertheless, Distribution remains mostly a public business, and has a very high risk profile. But with more on-grid renewables coming 'on-line', the weak spot moves from RE generation capacity to 'smart' distribution grids. Due to long lead times for investing in distribution (e.g. legal and institutional), this investment focus has to be developed on the short term, to set examples before it limits the growth of RE generation capacity.

Increasing the amount of people with access to energy

The criterion that at least 50,000 people should be connected with each investment is difficult to assess, as various calculation methods have been used for the AEF investments, showing differing numbers (see section 4.3 effectiveness). In all cases, these numbers are estimations only.

There are a few cases where the criterion of 50,000 people connected was not clearly assessed or was not fulfilled. The investment decisions of two funds, E+Co and AREF, did not state in the investment decision how many connections were targeted, which can be explained as these are funds that would finance still to be identified projects. Africa EMS Nyamwamba and Offgrid Solutions did not fulfil the criterion. Nyamwamba targets 17,000 people. Offgrid Solutions had a target of 9,000 households, which was translated to roughly 27,000 people.⁴⁵ This was justified in the investment decision by indicating that this was the target for the pilot phase only, and the further roll-out of the programme would have a much higher reach (an estimated 570,000 households) which would be in line with the criterion. If the AEF is intended to invest in innovative business models and off-grid projects targeting households, allowing this exception to the rule for pilot projects seems justified. Still, any diversions from the investment criteria should be given a substantiated justification, which is not always given in the investment decisions.

4.2 Additionality

- Across the portfolio, AEF is used as a risk-appreciative source of funding in e.g. early stage of RE project financing, or as seed capital in early stage business models. In such cases AEF provides funding that is scarcely available and may be considered additional.
- When AEF is used as risk-bearing capital in financing structures, it catalyses other capital, such as debt, which most likely otherwise could not be sourced.
- When applied as seed capital in early stage businesses, AEF allows for less risk appreciative capital to come in at a later, less risky stage.
- All the 15 case studies show a positive score on additionality, including the written-off investments or those with an early exit. The few written-off investments illustrate the high-risk nature of the AEF investments and illustrate the need for this fund.

In line with the evaluation matrix (Annex II) there are several sub-questions on additionality that are addressed in this section: the different types of AEF investments (4.2.1), the AEF investments in combination with other FMO-funding (4.2.2) and the specific role of AEF investments including a link to catalysing effects (4.2.3).

The common definition of financial additionality is that the provided support should make a contribution beyond what is available or that is otherwise absent from the market and should not crowd out the private sector. There is also the related crowding-in effect or the catalysing effect of the investment, which means for AEF that the AEF investment is supposed to attract other investors into the same project in a direct or indirect way.

The assessment of AEF's additionality in this sub-section is based on the portfolio analysis, the strategic interviews with DGIS and FMO representatives and additional telephone interviews with five 'peer-funds' of AEF (see chapter 1) that also invested in RE in Africa, but which are completely independent from FMO. The five peer funds studied are: 1) ResponsAbility; 2) BIO – the Belgian Development Finance Institution; 3) Norfund ; 4) Triodos Investment Management; 5) African Develop-

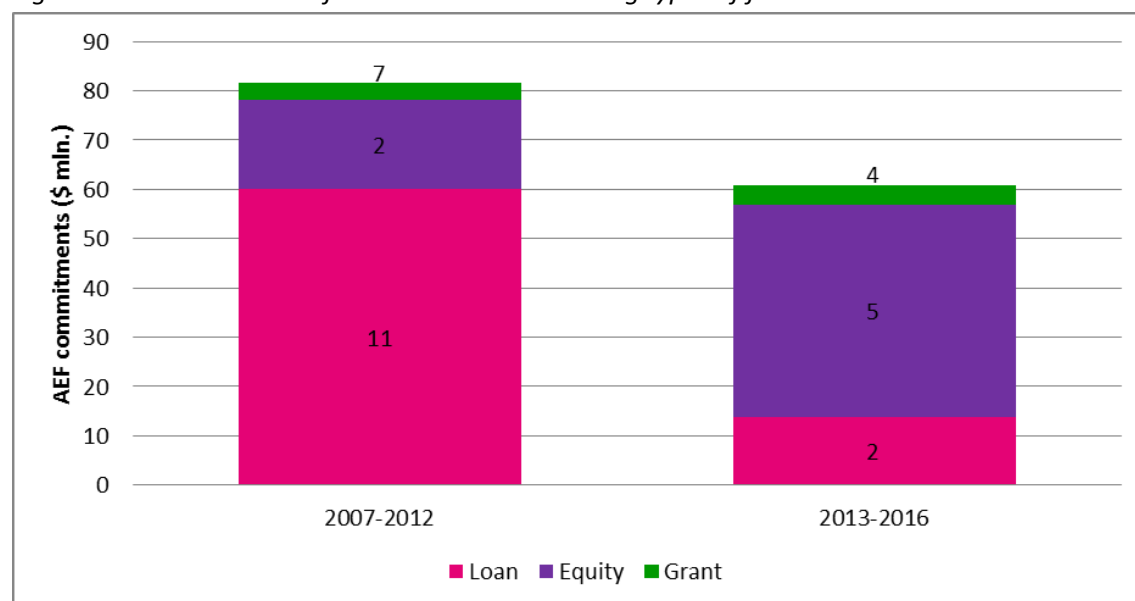
⁴⁵ This seems a very low estimate, as the average amount of people per household in Rwanda is 6. Using this average, the total households reached would be 54,000 and thus fulfil the criterion.

ment Bank, via its SEFA-facility (The Sustainable Energy Fund for Africa) (see Chapter 1 for more details).

4.2.1 Different types of AEF investments

Figure 4-5 shows that the 43% of the projects concern loans representing 52% of total contracted value, followed by grants (35%) representing only 5% of contracted value and equity investments (22%) representing 43% of contracted value. The figure also illustrates that since the start of AEF II in 2013 the share of equity in total portfolio increased and the share of loans decreased substantially.

Figure 4-5 Distribution of AEF investments* among types of finance** in 2007-2012 and 2013-2016



* This figure is based on the commitments for active and closed projects, and the disbursements that were made to written-off projects before they were cancelled (in US\$ mln).

** In 2009, one project received both a loan and a grant (based on disbursements). The total number of projects for the period 2007-2012 is 19.

AEF has mostly invested in the riskier part of project financing structures or provided capital for early stages of business development for off-grid electrification. Using either debt or equity in such cases does not necessarily reflect the risk-profile nor would this suggest less additionality. In fact, providing unsecured loans to an early stage solar company may be riskier than providing equity capital to a hydropower operating company. Therefore, one cannot conclude from the portfolio analysis that there has been a shift towards higher risk-bearing capital investments. The shift from debt to equity in the total portfolio rather reflects the legal and financing structure of projects in the pipeline, instead of an explicit change in the AEF investment strategy. For example, the financing provided to E+Co was to a non-profit investment company that could only accept loans and not equity. More recently, AEF has provided funding to project developers, who are mainly funded with equity only because their businesses are typically in an early stage and not yet cash generating (so the debt cannot be repaid (yet)). Repayment of equity typically occurs via an exit at completion of projects on the basis of a multiple of the original investment.

In the off-grid sector, the AEF investment opportunities consist of manufacturing and distribution of solar products (small lamps and the larger home systems) and the end-user financing thereof (leas-

ing-style and Pay-As-You Go). AEF's investments in this sector have not always been successful, which is most likely due to the very early stage of that sector, with little benchmarks (and templates like in project financing) to assess investee companies. Subsequently, this type of investments constitutes high risk investments that cannot obtain funding from the commercial market according to literature and interviews. In addition, these companies, unlike projects, are more like ventures (or sometimes even: adventures), which require close monitoring by the investor. FMO (and other DFIs), operating without local presence in Africa, may not per se be well equipped to make such investments. In fact, there are other investors such as impact investment funds (ResponsAbility), SME-funds (French I&P) and private investors taking a role as investor of this type of companies these days.

This brings us to the topic of exits by AEF from its portfolio companies. Case studies indicate that most investments show considerable delays in realising their business plan's targets.. Many have adjusted their ambitions downwards and extended their timelines to reach these targets. This is particularly the case with AEF investments made in years when RE (both on- and off-grid) was far more unpredictable than today. Some businesses went bankrupt and after time-consuming procedures have now been written off. More successful investments seem to be needing extra capital to finance their growth and new financiers often do not allow early financiers to exit, even if this was previously agreed between the company and AEF. Hence it appears justifiable that only very few deals have been exited (two early exits only, of which one concerns an unplanned repayment of the FMO loans due to the takeover of the project by a Chinese investor). The AEF Fund Manager informed the evaluation team that one exit was expected in the course of 2017 and that one or two more were being considered.

It appears that there are no direct criteria for refinancing of AEF (repayment or exits). Indirectly, the AEF does specify maximum tenor lengths for debt and foreseen exit moments for equity. Refinancing of portfolio investments does come with considerable costs of valuing the portfolio, sourcing and negotiating funding for the refinancing and consent for the exit-terms and acceptance of the new financier from the investee company. Even though these costs are considerable, they are likely to be less than the initial investment as the project is better known at the stage of reinvesting. The costs are smaller when it is refinanced by FMO-A, as all the required information is already available in-house. In practice, Fund Managers also have an incentive to successfully exit a risky investment. Note that this regards repayments and profit coming into the fund. For AEF, this incentive is that money returning to AEF becomes available for a next investment. As such this could be appropriate since DGIS's compensation of the AEF Fund Management is not related to the returns of the Fund. It was noted by FMO that it is difficult to refinance successful AEF projects (which could be sold to FMO-A).⁴⁶

4.2.2 AEF investments in combination with other FMO funding

Often, FMO-financing of RE projects is sourced from multiple funds in FMO, including AEF. It is common practice in the finance industry to structure the financing of a project with products that vary in risk-profile through for example repayment structures (debt, equity, guarantees) and tenors (exit or repayment schedule). Therefore, FMO manages its energy portfolio on the basis of the different

⁴⁶ For selling to FMO-A an external valuation needs to be done before AEF can transfer to FMO-A. As this is expensive and time-consuming, FMO frequently waits for a "natural" refinancing moment, when FMO can make use of a third party valuation.

funds available, including the government funds AEF and IDF.⁴⁷ According to FMO, AEF has a catalyst function as it reduces the investment risks both for other FMO-funds as well as external investors.⁴⁸ This catalyst function should mainly leverage private funds and FMO-A funds. Table 4-2 shows for the selected AEF case studies to what extent other FMO investments occurred in AEF projects.

Table 4-2 AEF investments in combination with other FMO projects for selected case studies

Project			Committed amount (US\$ mln)				
Name	Year granted	Status	Loan/equity/Grant	AEF	FMO-A	IDF	Total project
Corporacion Polaris Energy NIC S.A.	2009	Active	Loan	7.0	37.6	8.0	376.4
Consortia Eolico Amayo	2010	Active	Loan	3.0	22.8		60.0
Kivu Watt Ltd	2011	Active	Loan	11.3		20.0	141.7
Aldwych Lake Turkana Wind	2013	Active	Equity	10.0	35.0		622.0
Gigawatt Global Rwanda	2014	Active	Loan	8.9			23.7
Africa Renewable Energy Fund	2014	Active	Equity	10.0		10.0	205.4
Cenpower	2014	Active	Equity	12.7	44.0		891.6
Africa EMS Nyamwamba	2015	Active	Loan	5.0	8.0		28.7
Orb Energy	2015	Active	Equity	2.0			4.4
Global Innovative Consulting	2015	Active	Grant	0.8			2.2
Saems Capital I BV	2009	Closed	Loan	11.0	15.0		83.6
Offgrid Solutions (Wakawaka)	2014	Closed	Grant	0.6			1.5
E+co Inc.	2009	Written-off	Loan	14.6 ^A			44.5
Inensus	2012	Written-off	Loan & Grant	2.1 ^B			5.2
ToughStuff	2012	Written-off	Grant	2.5 ^C			12.6

A Disbursed AEF investment = US\$ 3.5 mln.

B Disbursed AEF investment = US\$ 0.02 mln.

C Disbursed AEF investment = US\$ 1.0 mln.

In six of the 15 case studies, the AEF-investments was accompanied by a simultaneous FMO-A investment. The amount of catalysed FMO-A funding was substantially higher than the total of AEF financing. FMO-A invested US\$ 163 million in the six projects compared to US\$ 49 million of AEF-financing. This reflects that high-risk capital creates a multiplier for low(er)-risk capital: in this case it catalyses $163/49 = 3.3$ times the AEF-amount, while the target set for the overall catalysing effect is 3.25. This target appears to be rather low.

In three case studies, the AEF financing was accompanied by IDF funding. In one case, Polaris, three FMO funding sources were combined. IDF finance was provided when additional finance was needed to develop the plant, which could not be provided by AEF because the Fund's pipeline was filled at the time. In principle, AEF and IDF have the same risk profile and therefore should not be accounted for as catalysed finance for AEF investments. For large projects with a high risk profile, such as Kivu-Watt and AREF, the two government funds invest and share the risks jointly with private investors.

⁴⁷ IDF has a broader energy focus than AEF, not exclusively SSA and RE, and also no specific focus on households.

⁴⁸ Some co-investors that are mentioned in the annual reports are: EAI, DEG, BIO, AfDB, Norfund, Finfund and Triodos Bank.

Public funding can accept a higher risk than commercial funding at a moderate return. For the projects that DGIS did not consider eligible for the AEF (see 4.1), funding was provided by IDF. This demonstrates the complementarity of the two funds.

Findings from strategic interviews confirm that FMO is regarded a key deal originator and an active arranger of co-financing for RE projects via other funds (both privately and publicly funded). Typically, external investors would hardly be aware of the source of funding FMO applies in a deal. Their contract-partner is FMO and not AEF or other internal funds. However, most investors are aware that AEF is public funding and more risk-oriented for investments that regard 'access to energy'.

4.2.3 Assessment of overall additionality of AEF investments

In Table 4.3 below the main findings and scores of the 15 case studies on additionality are presented. The overall assessment is quite positive as illustrated in the positive scores.

Table 4-3 Assessment of additionality for selected case studies

Name	Assessment	Score
Africa EMS Nyamwamba	Financing for small (renewable) energy projects is scarce, especially for projects in the development or construction phase. The project sponsor was a relatively unknown player for outsiders but known to FMO from SAEMS and had a relatively small track record (therefore difficult to attract finance). Uganda is a high risky country and the AEF investment took a subordinated and risky position in the project, to catalyse additional finance into the project. From FMO's lead arrangement position for the senior debt, they learnt that other financing was not well available for this project. They namely had to push ICCF hard to invest in the project. This was eventually successful thanks to FMO's shareholder position in ICCF.	4
Africa Renewable Energy Fund	The AEF investment was additional to other sources of funding in the market as there were few parties that were willing to join as first investor because the fund focuses on development phases of RE projects – which are by definition not cash generating – and therefore only moderately attract DFIs or commercial investors. Also in the second close of the AREF, there is relatively few commercial finance attracted, which may be an indicator that its risk/return profile is (still) pre-commercial. However, since the second close was oversubscribed compared to initial hard-cap, overall availability of FDI finance for AREF seems high.	4
Aldwych Lake Turkana Wind Cenpower	AEF's share in the overall project is relatively small, but it has provided equity, thereby carrying a higher risk than lenders. This could not be provided by FMO-A – the project is the first of its kind in SSA. Thus small role but highly additional.	4
	With the US\$ 1.5m development equity, AEF was very additional to the market and played a crucial role in getting the project to financial close. Additionally, FMO brought knowledge and the network as international DFI involved early on in the project to help the project further, helping to attract additional private (Sumitomo) and public/private (AIIM) capital into the project. The follow-on equity investment was not strictly additional anymore these additional private and public shareholders also stepped in, but was desired to continue FMO's leading role and get a return on the large investment made.	3
Consortia Eolico Amayo	FMO played an essential role and catalysed other project finance. It was the second wind project in Nicaragua, after a financially poor performing first wind park (Amayo I). The AEF mezzanine finance was necessary to achieve a minimum debt-equity ratio.	4
Corporacion Polaris Energy NIC S.A.	AEF was highly catalytic: it covered a funding gap for phase 1, which also enabled the funding for phase 2, attracting other funding.	4
E+Co Inc.	With the high-risk nature of the investment portfolio of E+Co (SMEs and entrepreneurs in developing countries) and the not-for-profit nature of E+Co, commercial finance was absolutely not available. E+Co financing came from philanthropic individuals, donor money and some private impact investors. FMO was a first-mover among the DFIs to provide long term debt, which was hardly available for funds such as E+Co. FMO created a catalytic effect within DFI financing as later other European DFIs had invested in E+Co (which was a condition for later disbursements).	4
Gigawatt Global Rwanda	AEF was the only option for FMO to provide finance for Gigawatt, as FMO-A was considered too risky. FMO played an important role in the deal by arranging other senior debt from EAIF. Therefore, AEF played an important role in finalising the investment (it would not have made sense for	4

Name	Assessment	Score
	FMO to arrange other senior debt if it could not have provided debt itself, as this would involve costs without benefits).	
Global Innovative Consulting	The convertible grant was highly additional to the market as there are few DFIs (let alone commercial banks) that are willing to invest in the development phase of a first-of-a-kind solar project in Ghana. There was no other DFI project money involved in the project and helped ease risk for the private investors in the project. It also helped to catalyse a senior loan from DFIs. As there is no other DFI money involved, not much other finance was available and a private sponsor is supported, the additionality of the investment is high.	4
Inensus	At the time of the investment there were very few investors who took on small scale off-grid access to energy projects. It was a particularly risky investment as government policy for rural electrification was not fully developed in Senegal. The AEF investment was highly likely to be additional to the market and to other DFIs because of its concessional nature.	4
Kivu Watt Ltd	The perceived risk of this project was very high, due to the eruption risk and new unproven technology. FMO did not want to finance equity (liability risk) or FMO-A debt (reputation risk). AEF and IDF made it possible to finance the project. Various other lenders have also provided senior debt. Difficult to assess whether AEF was crucial.	3
Offgrid Solutions (Wakawaka)	AEF's grant enabled Wakawaka to test the market with a new business model (pilot project). This was their first activity in SSA.	4
Orb Energy	The solar off-grid market in Kenya is still relatively new and products sales require a quick and large uptake to become profitable, which means there is a need for finance to cover upfront costs. Competitor Mobisol (also financed by AEF) has attracted some private finance, but most players are still dependent on donor finance and impact investors.	4
Saems Capital BV	Due to absence of long term debt finance for small RE projects in Sri Lanka and (particularly) Uganda, AEF investment additional to the market as well as additional to other DFI investments by taking a subordinated debt position in the project. FMO experienced themselves that financing for small hydro projects at portfolio level was not attractive for many investors, despite the advantages, due to the risk/return profile of the investment (as FMO experienced themselves as they were trying to arrange a syndicate FMO-A loan). The AEF investment helped to catalyse additional DFI money into the project. Long term financing for hydro-projects in Uganda in 2008 act as reasonable demonstration project due to nascent stage of the hydro industry (and electricity generation market for that matter) in the country.	3
ToughStuff	ToughStuff was one of the first portable solar lighting companies in an emerging business field. Commercial banks were not investing yet due to the lack of track record. Moreover, the track record that existed was often negative. There were a few other donors active in the field (such as Norfund and Proparco), but supply of finance definitely less than demand. ToughStuff and similar companies had severe difficulties finding finance to expand their operations and therefore the AEF investment was highly additional to the market. The AEF grant was also highly likely to be additional to other DFI financing as an initial proposal from the IO from FMO for a revolving facility was rejected by the IC of FMO.	4
Mean score		3.8

The case studies indicate a wide range of projects and businesses (co-)financed with AEF funding, with strong variation in transaction size, instruments used and technologies supported. It seems fair to state that this wide variation reflects that access to energy, notably via renewable sources, is a sector with many solutions that are often not proven yet and certainly not one-size-fits-all. In such a diversified market and in the dire circumstances of emerging markets with little or no benchmarks, financiers tend to be reluctant. With a rating of 3.8 out of 4, the investments made by AEF therefore seem to underpin that AEF has been truly additional in addressing the need for risk-appreciative capital and that FMO has managed to position and utilise AEF to serve as such. We conclude that FMO has used the AEF to take appropriate (risky) positions in projects that lacked access to finance from the commercial market.

With regards to the catalytic role of AEF funding, it seems that the analysis of AEF's basic additionality also applies to its catalytic effect. Often, actual disbursement of AEF-funds in a specific deal may only be realised when the commitments of external co-financiers have become clear. Sometimes,

the contract for the finance stipulates even the name of the financier and the amount it has to bring into the project before FMO will disburse any funding. While this provides FMO with flexibility to engage external financiers, it also implies that exact measuring of the catalytic effect is somewhat problematic. From our analysis, however, it appears that AEF has materialised catalytic effects, which will be presented more specifically in the next section on effectiveness.

4.3 Effectiveness and sustainability

- AEF has realised its planned outputs: a sufficient number of relevant RE projects. The output target for CIO to develop at least three RE projects to be funded by CIO is barely met as two projects are being developed and one other is in the pipeline;
- It is likely that AEF has already provided three million people with access to energy based on calculations of the evaluation team regarding 15 case studies representing 60% of the portfolio. Still, there is uncertainty about the calculations around this indicator, particularly with respect to what to count as catalysed finance. In various calculations, FMO very significantly overestimated the number of people connected (approximately by a factor of 8) despite improvements in the monitoring system.
- There is insufficient insight in related outcome information such as the socio-economic characteristics of the people reached and connected households. In addition, information on the enabling environment of RE projects such as government policies and synergies is scattered.
- There are some indications of positive impacts at household level, but the first results of the impact evaluations will only become available end of 2017.
- So far, there is no evidence of learning based on Monitoring & Evaluation, although the M&E efforts are increasingly focused on learning. The Front-, Mid- and Back Offices have different learning needs, which require different efforts. The weak linkages between these FMO Offices explain to an important extent the monitoring measurement problems.

In the evaluation matrix (Annex II) there are four sub-questions on effectiveness and two on sustainability. Little information could be collected on sustainability, which is understandable given the early stage of most investments. Therefore, the two evaluation criteria effectiveness and sustainability have been regrouped in this section. In the inception report it was already explained that the main focus of this evaluation would be on outputs and main outcome indicators, i.e. the number and types of realised projects and the number of people provided with access to energy. Another important aspect is the catalysing effect of AEF. In the Theory of Change (Annex V), we placed this effect between the output and outcome level as additional finance attracted into a project creates more outcomes (more energy connections). In the previous section on additionality an overall analysis of the catalytic effect of AEF at the fund level was presented. The analysis in this section focuses on the calculation of catalytic effects of the case studies.

The findings in this section are based on a variety of sources and data collection methods: portfolio analysis and document review, case studies and strategic interviews. The sub-sections deal respectively with outputs (4.3.1), outcome (4.3.2), impact (4.3.3), sustainability (4.3.4) and explanatory factors (4.4.5)

4.3.1 Output indicators: number and type of realised projects

The number and type of realised projects constitute the main output indicator, in line with the AEF ToC developed for this evaluation (see Annex V) and the evaluation matrix (Annex II). The most important characteristics of the portfolio have already been presented in the sections 4.1 and 4.2 and will therefore not be repeated here.

In the addendum to the AEF grant decision regarding the € 7 million funding in CIO, it was specified that 3 to 4 projects should be developed. The CIO website⁴⁹ mentions development agreements signed on the following projects:

1. A 25MW fixed ground-mounted Solar PV RE project in the Philippines, which will be developed together with Sindicatum, a Singapore based RE developer, Capas Filipinas.
2. A combined 15MW Solar PV & 2 MW Pumped Storage Hydro (PSH) facility in Rwanda, for which CIO signed a development and cooperation agreement with French developers *Compagnie des Energie Nouvelles* (CDEN Rwanda).

In February 2017, at the time of the data collection and analysis, the CIO website mentioned a third project, which in the meantime has been put on hold.⁵⁰ Apparently, a third project is now in the pipeline by the name of CDEN Flamingo.

As the addendum to the grant decision specified that 3-4 new RE projects should be developed with the € 6 million made available,⁵¹ this output target is barely met according to the evidence.

4.3.2 Access to Energy: main AEF outcome indicator

As indicated in section 3.3 FMO reports in its quarterly and annual reports on AEF on the main developments regarding AEF and the achieved results. In addition, an annual results fiche is prepared. In all these documents, the main “impact results” (term used by FMO) reported are:

- Direct and indirect labour generated;
- Installed capacity;
- Finance catalysed;
- People reached;
- Estimated emissions avoidance.

The impact results are based on the Impact Card system of FMO that undergone constant changes as FMO aims for the use of harmonised definitions together with other DFIs. DGIS has also provided suggestions on measurement methods. The 2016 quarterly AEF reports indicate that in 2015 FMO and DGIS have agreed on a revised version of the definition of impact indicators, aiming to create more aligned and accurate data quality and reporting methodology.

This revised Indicator Set for AEF⁵² includes AEF indicators with definitions for the five abovementioned impacts. The document is a combination of definitions already used by FMO and some new definitions agreed upon by the two parties. Not all definitions are equally clear and it is not always clear how they should be measured: e.g. according to the working document on AEF rules and criteria (May 2015) jointly agreed between DGIS and FMO the catalytic effect should be measured as total amount invested by other parties with a higher security ranking than AEF’s financing divided by AEF’s financing. However, FMO informed the evaluation team that another definition was agreed in December 2015 namely “Amount of public financing in the project” and “Amount of commercial fi-

⁴⁹ Accessed on 6-2-2017.

A combined 75MW hydropower facility and 20MW solar PV facility in Zambia to be developed and financed together with the Africa Finance Corporation (AFC).

⁵¹ An additional € 1 million was meant to cover overhead costs.

⁵² FMO, Revised Indicator Set for AEF, letter signed by DIS on 14-12-2015.

nancing in the project". These definitions still do not take into account the role of FMO/AEF in the arrangement of the deal and the timing of the investment. The FMO Impact Card Manual stipulates that only the catalysed funds in the same investment round should be included. Recently, DGIS still proposed another definition focusing on catalysing of other public funding. In response, FMO indicated that the definition for catalytic effect for the State Funds differs from the definition used by FMO for FMO A-funds at the explicit request of DGIS: FMO only counts catalytic effect when FMO has a lead or arrangers role, but for the State Funds FMO should include all financing that is senior to the State Fund's role. There is a clear need for further harmonisation of definitions.

FMO calculates emission reductions (for AEF and FMO-A investments) as the total number of reduced greenhouse gas (GHG) or CO₂ emissions (relative to the baseline situation) international standards like the Clean Development Mechanism and the internationally harmonized IFI approach to GHG accounting for renewable energy projects, as well as the IFI approach to GHG accounting for energy efficiency projects. These methods have been described in the Impact Card Manuals.

As argued before in chapter 3, not all indicators are linked to an agreed ToC with clear policy objectives and priorities. While there is attention for the number of beneficiaries reached this is not made gender-specific nor is there a specification of socio-economic characteristics of the people reached. FMO does indicate that it pays attention to gender in relation to the number of direct and indirect jobs generated, reporting on direct and indirect jobs supported for women. This illustrates that DGIS policy priorities are only partially translated by FMO into operational objectives and indicators. Increased employment – as measured by the number of jobs – is not an objective of DGIS's RE and/or climate policies, but reduced emissions are part of the climate policy objectives.

As it is impossible to assess the validity of the outcome indicators presented by FMO for the entire AEF portfolio, the evaluation team has carefully assessed the reported figures on catalysed effects and beneficiaries reached/people connected against evidence found in documents and collected in interviews. The evaluation team has focused on the main outcome indicator of beneficiaries reached/people provided with access to energy as this is the main target agreed upon. Table 4-4 presents the analysis the number of people provided with access to energy in each of the 15 case studies based on:

1. The figures reported in the FMO project documents (FP and IMR);
2. The figures reported in the 2016 FMO AEF results fiche that should be in line with the new indicator set;
3. Figures based on the evaluation team's calculations not including any catalytic effect;
4. Figures based on the evaluation team's calculations including catalytic effect.

In section 4.3 it was indicated that exact measuring of the catalytic effect is difficult. In practice, for most investments - in RE and other infrastructure - every funder tends to claim a straight and simple catalytic effect of their investment, suggesting that without their contribution the total funding would not have been brought together. From the 15 case studies, it became clear that FMO typically counted a large share of finance that followed after AEF's investment as catalytic effect. It is difficult to assess whether all that finance is indeed realised fully due to the AEF investment. So far, there is no accepted practice amongst funders how to deal with the attribution issue regarding catalytic effects and what amounts to count to catalytic effects. In the absence of such agreements, there is a significant risk that catalytic amounts are double counted across the different funders. Still, despite

uncertainty about the precise volume of catalytic finance, the detailed analysis of the case studies revealed that AEF appears to be catalytic at the Fund level.

The evaluation team critically assessed the FMO AEF claim of the value of catalysed finance on the basis of document review and interviews per case study and adjusted the amount where possible on the basis of indicators such as the role of FMO as the deal arranger or joining later in the process, the type of finance provided in relation to the other types of funding applied. Often, though, no better estimate of the catalytic amount could be made as the real reasons for other investors joining the project of FMO were not known and therefore in most cases the value claimed by FMO as catalysed finance was left unaltered. On the basis of the document review and the interviews, though, the evaluation team often concluded that the catalysed finance in a project was likely overestimated. Despite the likely overestimations, in 11 of the 15 case studies there is evidence of a clear positive catalysing effect, in two cases this catalysing effect cannot be verified and in another two cases there is no information available. A very rough estimate points toward a catalysing effect of 6.5, which exceeds the target of 3.25 set for AEF. However, this number is a rough estimate and should be interpreted with extreme care as no exact calculation is possible and is likely overrepresented as explained above.

Table 4-4 shows that there are big differences between the figures reported by FMO in the project documents, in particular the FP and the Credit documents on the one hand, and the results fiches (reporting on results for new commitments since 2015) and progress reports on the other hand.⁵³ The project documents present a total number of people 2.2 million to be provided with access to energy. The results fiche 2016, however, presents for the same case studies a total number of 24.7 million people. The differences between the two FMO calculations are not directly apparent from the underlying calculation sheets provided by FMO. The document review points at the following measurement problems:

- The calculations in the results fiche appear to be made from a ‘demand-driven’ perspective, whereas the calculations in the AEF investment criteria sheet are ‘supply-based’. Demand-driven in this context means that the calculation of the number of people connected is based on the relation between the average yearly consumption of electricity in an average household in that particular country and the additional capacity that the electricity generation project provides. By dividing the total additional capacity provided by the average consumption of electricity in the household, one obtains an estimate of the number of additional people that can be connected as a result of the project. The supply-based calculation (which was used for most projects included in the case studies) calculates the contribution of the project to the country’s overall generation capacity (e.g. 10% more) and multiplies this number with the number of existing connections to households that are connected to the grid at the year of investment to obtain the estimate of the additional connections provided by the project. The second calculation always yields lower results, especially for relatively small energy projects. Besides, the AEF IC calculation method is very rough and does not take into account actual electrification, industrialisation and various other factors.
- The results fiche reports the total number of people with access to energy via the project as a result of AEF, i.e. all results are fully attributed to AEF;

⁵³ FMO reports in its Q3 2016 AEF report and the 2017 AEF Activity Plan an estimated number of 26.4 million people reached.

- There are differences between the planned capacity at the start of the project and the actually realised capacity;
- Most of the FMO project appraisal documents include an estimate of the number of people to be reached with a few exceptions such as Gigawatt and the funds such as AREF and E+Co.

After the detailed analysis of the results reported by FMO, the evaluation team made two of its own estimates of the number of people with access to energy per case study:

1. A minimum calculation taking into account only the AEF investment as proportion of the overall investment. The most recent figures on the project were taken into account such as actual capacity, information on the functioning of the plant or the company (in case of bankruptcy, no sales figures after the bankruptcy were taken into account). In addition, as the growth rates for off-grid sales were in various cases unrealistically high (ToughStuff, Orb Energy), growth figures were corrected and the highest realistic growth rate according to GOGLA⁵⁴ (40%) has been taken into account (see above for the calculation of number of additional connections).
2. A more positive calculation taking into account a 'realistic' estimate of the funds actually catalysed by AEF, which leads to a larger part of the results that can be contributed to AEF.

Applying these new calculation methods to the 15 case studies, AEF reached at least 384,348 people when the catalysing effect is not taken into account. When the catalysing effect is taken into account, which is in line with the agreements with DGIS, 2.3 million people were provided with access to energy via the 15 AEF investments. As the case studies represent approximately 60% of the entire AEF portfolio, so far 3.8 million people have been reached – including the catalytic effect – which exceeds the target of 3 million people, but is substantially lower than the approximately 27 million people reported by FMO.

On 15 February 2017, just before the submission of this draft final evaluation report, FMO made new calculations of the number of people provided with access to energy by AEF, based on new definitions agreed upon with DGIS. These calculations and measurement methods are beyond the scope of this evaluation. The estimates do not cover the entire portfolio but most AEF investments and add up to 5.3 million, which is substantially higher than the estimates made by the evaluation team.

⁵⁴ BNEF, Lighting Global and GOGLA (2016) 'Off-grid Solar Market Trends Report 2016', February 2016.

Table 4-4 Number of people connected for the selected case studies

Number of people provided with access to energy															
Project info					Finance			Country			People connected				Comments
#	Project	Country	Year	MW	AEF	Catalysed	Total project	MW installed	Connections ('000)	Avg. HH (pers.)	FMO (FP/IMR) ^A	FMO (Resultsfiche) ^B	Evaluators - AEF only ^C	Evaluators - AEF + catalysed ^D	
1	Kivuwatt	Rwanda	2011	25	11.3	80	127	80	110	6	148,191	6,230,440			
				26.2	11.3	80	142	80	110	6			17,125	138,899	
2	Gigawatt	Rwanda	2014	8.5	8.9		23.7	87.3	350	6	-	495,316			No calculation details provided in FP (own calculations using FP data added, with full amount catalysed)
				8.5	8.9	8.9	23.7	87.3	350	6	204,467		76,783	153,566	
3	Lake Turkana	Kenya	2013	300	7.5	450	450	1,465	880	5	916,041	7,328,778			Changed total transaction amount from EUR 450 m to 622 m to include equity
				310	10	450	622	1465	880	5			14,969	688,564	
4	Orb Energy	Kenya	2015	N.A.	2		4.41	N.A.	124	4.6	258,685	258,684			Changed forecasted sales using more realistic 40% annual growth target (ambitious growth according to
				N.A.	2		4.41	N.A.	12.78	4.6			26,659	26,659	
5	Amayo	Nicaragua	2010	23.1							66,500	180,649			No calculation details provided in FP, only rough estimate was given (own calculations using FP data added)
				23.1	3	45	60	695	750	5	99,712		6,232	99,712	
6	Polaris	Nicaragua	2009	24	7	50	77	692	725.6	6	111,776	565,281			Changed catalyzed from 50 m to 78 m (senior debt and sub. debt for phase I) and total transaction amount from 77 m to 85 m (phase I). MW is also based
				24	7	78	85	692	725.6	6			12,435	150,996	
7	WakaWaka *	Rwanda	2014	N.A.	0.6	0.91	1.51	N.A.	9	3	27,000	N.A.			Only rough estimation given in FP based on sales target of 9,000
					0.6	0.91	1.51	N.A.	3.625	6			8,642	21,750	
8	Nyamwamba	Uganda	2015	9.2							17,284	475,224			Changed 14MW to 9.2MW (realised). Resultsfiche calculation seems based on demand-based formula.
				9.2	5	16	28.3	827	405.5	5			3,985	16,735	

A = Number of people connected as presented in FMO Financial Proposal

B = Number of people connected as recorded in FMO's Results Monitoring System/Results fiche

C = Evaluator's calculation of number of people connected using information used in FMO FP and on basis of the definition of 'Number of people connected in AEF investment criteria document, but excluding the amount of catalysed finance from the calculation ((AEF facility/total project finance)*(MW project/MW installed in country)*Connections in country*average persons per household)

Number of people provided with access to energy															
Project info					Finance			Country			People connected				Comments
#	Project	Country	Year	MW	AEF	Catalysed	Total project	MW installed	Connections ('000)	Avg. HH (pers.)	FMO (FP/IMR) ^A	FMO (Resultsfiche) ^B	Evaluators - AEF only ^C	Evaluators - AEF + catalysed ^D	
9	AREF	SSA	2014	N.A.	10	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	6,828,482	No information available		Fund-investment, with insufficient information available at project level. No connections estimation provided in the FP. Unclear where data from resultsfiche come from.
10	Cenpower	Ghana	2013	340	13	223	892	2,412	2,300	5	428,891	7,536,231			
				325	13	223	892	2,412	2,300	5			22,583	409,969	
11	Inensus	Senegal	2012	N.A.	1.62	0	4	N.A.	2.3	11	10,247	N.A.			Project faced substantial delays and got terminated in 2015. According to latest CCR (2014), 6/30 villages were Fund-level investment (written-off in 2014), with investments across three continents in more than 15 countries. No information available on connections in FP or CCRs.
					1.67	0	4	N.A.	0.5	11			2,113	2,113	
12	E+Co	LA/Asia/SSA	2008	N.A.	14.6	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	No information available		Fund-level investment (written-off in 2014), with investments across three continents in more than 15 countries. No information available on connections in FP or CCRs.
13	GIC	Ghana	2015	25	20	15	35	2,179	2,300	5	131,941	26,659			FP calculation based on wrong MW, AEF financing amount and project size. Connection information updated based
				20	0.85	34	48	2,179	2,961	5			2,407	98,673	
14	Saems Capital	Sri Lanka / Uganda	2009	58	11	N.A.	N.A.	N.A.	N.A.	N.A.	132,000	1,070,862			Fund-investment, with multiple projects in portfolio. Estimations based on FP information for both countries.
				58	11	44	83.5	see details in case study (two countries)					49,155	251,990	
15	ToughStuff*	SSA	2012	N.A.	2.5	1.9	4.4	N.A.	280	5.3	1,498,840	-			FP calculations based on unknown information of catalysed and total project finance. Realised connections
				N.A.	2.5	2.5	15.1	N.A.	120	5.3			105,298	210,596	
Totals											2,221,556	24,168,124	348,384	2,270,222	
Differences ^E (compared to FP for those where both entries available)												1071%	8%	57%	

D = Evaluator's calculation of number of people connected using author's adjusted information based on most realistic estimates known at time of FP, including estimated volume of catalysed finance (though often unadjusted as it is unclear how much catalysed finance can actually be attributed to AEF). Other changes applied explained in comments cell. Calculation: (((AEF facility + Catalysed finance)/total project finance)*(MW project/MW installed in country)*Connections in country*average persons per household)

E = For the calculation of the differences between estimations, only projects where information for both FP and the other calculation are known have been taken into account to allow a good comparison

As indicated above, DGIS has become aware of the measurement problems and that the figures reported by FMO on the number of people reached might not be realistic. New definitions and measurement methods were in principle agreed in January 2017. FMO is definitely aware of various up-to-date measurement methods such as the ESMAP tier system, but many of these methods are difficult to apply in the FMO practice. DGIS and FMO agreed that FMO would provide DGIS with new figures on the key KPIs mid-February 2017. It is, however, beyond the scope of this evaluation to assess whether the most up-to-date, sound and tested measurement and verification methods can and will now be used.

4.3.3 Sustainability

In the case studies the sustainability of results has been assessed to the extent possible. As quite some plants are still being constructed and are not yet operational, there is limited information on sustainability of the potential results to be achieved.

In general, financial sustainability indicators of projects are good indicators for the continuation of operations in the future. Repayments of the loans or conversion of the grants into equity are the first set of indicators to take into account. Other financial sustainability indicators are the generation of cash income when electricity will start to be delivered. The continuation of the funding of the projects after the construction phase by institutional and other commercial investors is another indicator. The loan tenor periods also provide information on financial sustainability. For grid-connected projects, the presence of a signed Purchasing Power Agreement (PPA) and its characteristics is also a good sign of the sustainability of the project, such as the PPA for Cenpower that guarantees the off-take of the electricity including agreed payments from the Government of Ghana for 20 years. However, for a first-of-kind solar project in Ghana, Global Innovative Consulting, the Government of Ghana was not able to provide a guarantee on the off-taker anymore, because of an economic downturn in the country and no prioritisation of small RE projects. As a result, the project was put on hold, an indication that the sustainability of the project was not assured.

The technical sustainability can also be assessed. The quality of the design and the equipment are good indicators for the sustainability of operations. The sustainability can be negatively affected by a lower energy generation than expected as was the case for the geothermal plant Polaris in Nicaragua. Technical measures, requiring additional investments, were taken to address the problem. Also natural exhaustion may reduce the supply over the years and thus negatively affect technical sustainability. There is hardly any information available on the technical sustainability of off-grid projects as the life span of the products is relatively short and market developments including ambitious electrification programs of some governments in SSA such as Kenya and Rwanda might affect the sustainability of off-grid investments.

As argued in the effect evaluation of Polaris and Amayo in Nicaragua, the sustainability of the results is dependent on the institutional energy actors' ability to create an enabling environment and improve other parts of the supply chain as well (i.e. transmission, distribution and pricing policies). These issues require synergies between various actors, but little information has been collected so far on these issues.

For funds such as AREF the revolving nature is an indicator for sustainability, but this still has to be proven. The planning is that a commercial party would step in after the FMO-AEF exit. Finally, the

sustainability of AEF as a fund also depends to large extent on the revolvability, which is dealt with in section 4.4.

4.3.4 Impacts

As mentioned in the inception report and illustrated in the evaluation matrix, this evaluation cannot be expected to collect evidence on the impacts of AEF-investments at the level of beneficiaries due to the lack of information available. In 2013, FMO started with an evaluation plan for its government funds (see section 4.3.5 for more details) aiming to shed more light on the higher level outcomes, impacts and sustainability. The following table shows the number of impact and effectiveness evaluations of AEF investments that have been initiated so far and what their status is.

Table 4-5 Overview of AEF effect and impact evaluations

Title	Type of study	Status
Evaluation of POLARIS Energy S.A. and Consorcio Eólico AMAYO S.A, Nicaragua	Effectiveness evaluation	Finalised December 2013
Evaluability assessment INENSUS West Africa SARL, Senegal	Evaluability assessment	Report October 2013, no impact evaluation
Evaluability assessment of Bokpoort (Solafrica), South Africa	Evaluability assessment	Report October 2014, no impact evaluation, effect evaluation will take place towards the end of the project
Impact evaluation of KivuWatt	Impact evaluation	Baseline report, August 2015
Evaluability Study Orb Energy PTE Ltd, Kenya	Evaluability assessment	Report November 2016 and proposal for impact evaluation in 2017
Evaluability assessment Lake Turkana, Kenya	Evaluability assessment	ToR November 2016

There is only one finalised effect evaluation for two projects, Polaris and Amayo in Nicaragua. The effect evaluation points at some positive impacts:

- A significant reduction in GHG emissions and an improved quality of environmental management;
- Improved reliability of the electricity system;
- Reduced spending on electricity subsidies by the Government of Nicaragua;
- Signs of higher economic development as shown in a positive correlation between GDP per capita and electricity consumption.

It is interesting that these impacts are macro-level impacts and not household-level impacts. The impact evaluations mentioned in the table above all focus primarily on impacts at household level, such as economic impacts (changes in productive time, economic activities and productivity caused by improved affordable access to energy, social impacts (changes in study time, security, access to information, gender effects) and environmental impacts (reduced emissions). At present, only one baseline study for KivuWatt is available, so the actual available information on impacts is still very limited.

The baseline report of the KivuWatt Impact Evaluation⁵⁵ points at some interesting findings at outcome level (impacts can only be measured when the end-line survey will be completed):

- A relatively low electrification rate in grid catchment areas (59%);
- Heads of grid-connected households are clearly more educated and slightly younger than heads of non-connected households within grid catchment areas;
- Large disparities in electricity consumptions among connected households;
- High connection rate of formal businesses to the grid;
- A relative poor quality of electricity supply;
- The inability to pay for connection fees is the single most important reason households are not connected;
- New connections are likely to depend on the reduction of household costs or the increase of household wealth, because non-connected households tend to be poorer than connected households.

So this baseline points at common issues that are also present in other African countries such as a low access rate to electricity accompanied with poor quantity and quality of supply. The latter is mainly outside the scope of the projects funded by AEF.

Also some of the evaluability studies such as the one for Bokpoort⁵⁶ point at interesting findings, making an impact evaluation somewhat problematic given the attribution gap as most benefits are mainly indirect and not direct. This is because of the importance of the South African Renewable Energy Independent Power Producer Procurement Programme, the high electrification rate in South Africa and the very limited capacity that Bokpoort is likely to add to the current installed capacity (0,1%). This study explores the link between availability/reliability of supply and actual consumption and use by the poor, which is a rather complex link. In addition to affordability issues, the evaluability study points at behavioural issues to be addressed in order to increase actual consumption by poorer households.

4.3.5 Explanatory factors

In 2013, FMO developed an Evaluation Plan at the request of DGIS, which prepared a 'Protocol Results Achievement and Evaluability in PSD', in response to a critical evaluation of IOB of a large variety of PSD programmes, including FMO government funds. IOB concluded that the PSD programmes provided little insight into the outcomes and impacts of PSD activities. In this FMO Evaluation Plan for its government funds including AEF, FMO indicated that it will strengthen its monitoring and carry out a series of impact evaluations, in particular for new projects and also conduct effectiveness studies (see Table 4-5 for an overview of AEF effect and impact evaluations).

A budget of € 5 mln was made available by DGIS to implement this Evaluation Plan, but costs are paid from the government funds and affect the revolvability. As a result of this plan and additional budget, the M&E activities of FMO were stepped up and more attention was paid to monitoring. The first impact evaluation is expected to be available end 2017.

⁵⁵ DataStorm (2015) KivuWatt Impact Evaluation, Statistical Reference Report for the Baseline Survey, June 2015; and ENEA Consulting, DataStorm, KIMIS (2015) Impact Evaluation of KivuWatt – Baseline Report, August 2015.

⁵⁶ ENEA Consulting (2014) BURGEAP Evaluability assessment of Bokpoort Project in South Africa, October 2014.

The monitoring efforts and effect evaluations were dealt with in the previous sections, but the main focus of the Evaluation Plan is on impact evaluations at the explicit request of DGIS. The interviews and the document review indicated that the focus was initially on accountability with rather limited attention for the learning effects of the evaluations. The rigorous impact evaluations should be based on a robust design, focus on the ultimate beneficiaries (i.e. households), include a counterfactual and always foresee a baseline (midline) and endline survey. In practice, it became clear that this was not always possible and that more attention should be paid to learning and a somewhat more pragmatic rather than a pure academic approach. On the basis of two evaluability studies (Inensus and Bokpoort) it was decided that no impact evaluation would be conducted.

The mid-term review of the FMO Evaluation Programme⁵⁷ also points at learning on the basis of the experiences with implementing this Evaluation Plan and the necessity for more attention to learning, the need for different types of project evaluations, more selective effectiveness studies and better selection of investments suitable for rigorous impact evaluations.

The analysis presented above in section 4.3.4 shows the importance of sufficient and additional analysis at outcome level addressing issues of inclusive growth and the pro-poor focus in line with government priorities.

None of the impact evaluations has been finalised, so there has been limited learning from the conducted evaluations so far. Based on the interviews with FMO staff in the Front and Mid Office, the external impact evaluations and effectiveness studies also do not directly provide useful results that help them sourcing new deals or shaping their strategy. According to FMO, the annual sector evaluations are believed to address the needs of the Front Office more directly.

FMO took the implementation of the Evaluation Plan very seriously and for AEF, monitoring, effect evaluation and impact evaluations all received due attention based on strengthened M&E capacity within FMO's back office. However, the links between the Back Office and the Front Office are relatively weak, which explains to some extent the measurement problems, but also limited learning so far. The analysis of the case studies showed that data on the number of connections from the Front Office can vary from investment officer to investment officer and are not systematically checked by the Back Office during the FP preparation. The calculations therefore often need to be streamlined during the monitoring phase, at which point the Front Office is not significantly involved anymore to provide updated data and information about the project.

Additionally, due to ongoing discussions between DGIS and FMO about the definition to measure 'access to energy', the Integrated Reporting department has been re-calculating the progress of the FMO AEF portfolio towards the 'access to energy' indicator several times in the past two years. In general, new definitions and measurement methods have been agreed upon relatively often, but new definition and measurement problems have emerged.

⁵⁷ FMO, IOB and DGIS (2015) FMO Government Funds Evaluation Program, Mid-term review of program implementation, November 2015.

4.4 Efficiency

- There is an apparent proportionality between the AEF management costs and the combination of the AEF pipeline and its net outstanding portfolio.
- FMO applies an integrated management model for AEF, with Front -, Mid and Back Offices all involved in AEF. One dedicated person acts as Fund Manager for two government funds: AEF and IDF. There are no specific incentives for Investment Officers to arrange AEF deals, but they are typically quite labour-intensive as clients are often new to FMO and are young companies which require careful analysis due to their high-risk nature, while the involved amounts are generally low. Therefore they are in principle less attractive to arrange than the typically larger and lower risk FMO-A deals.
- Overall, the utilisation of the Fund's available capacity can be considered somewhat low as the available room in the Fund has consistently been above 20%. The value of committed and outstanding AEF investments was 80% of the total AEF funds available in 2011, then dropped to 42% (also due to the addition of AEFII) and has since then been steadily increasing to 73% as at Q3-2016. This implies, assuming a full disbursement of all contracted amounts, that there is still € 28 mln capacity available. The drop in utilisation rate around the time of the AEF II expansion was due to some repayments and sales, but also because only a small fraction of the large pipeline materialised into commitments.
- Revolvability of the AEF is above the agreed 50% target mentioned in the Grant Decision for AEF I. Therefore, more money has flowed back from the AEF investments than initially expected and targeted for. In the absence of a clear agreed definition for revolvability of AEF, however, the extent to which the target has been exceeded cannot be assessed. Four different definitions can be applied according to which revolvability varies between 59% and 112%.

The analysis of efficiency in the context of the evaluation of the AEF implies analysing whether the financial resources and other inputs for the Fund were used efficiently to achieve the expected outputs (investments in line with AEF criteria). The most important inputs that we considered include the € 102 mln made available by the Ministry of Foreign Affairs, the labour input of FMO staff and other expenses made by FMO for the management of the Fund.

The analysis of efficiency is structured in three parts related to the questions in the evaluation matrix⁵⁸ to cover the various aspects relevant to the efficiency of the Fund:

1. What have been the investments of FMO in terms labour and other costs and what are FMO's working methods (4.4.1)?
2. What has been the utilisation of the resources made available for the Fund (4.4.2) ?
3. To what extent is the Fund revolving (4.4.3)?

4.4.1 FMO working methods and procedures

The inputs required to realise the achieved results described in Section 4.3 are primarily based on the costs and efforts from FMO, the AEF Manager. FMO has embedded the activities for the realisa-

⁵⁸ The MTR (2012) included some recommendations to improve the functioning of the AEF, which would make the AEF function more efficiently. The discussion about these recommendations and how they have been implemented is included in Chapter 3, while the evaluation matrix included this question under efficiency.

tion of the investments within its existing organisation and appointed an AEF Fund Manager, who is responsible for the management of the AEF together with the IDF (another government fund) within FMO. As a result, most FMO employees that work on AEF deals spent only a part of their time on AEF related deals. In turn, the costs related to the management of the AEF are allocations of existing costs that FMO already incurs for its daily operations. Table 4-6 summarises these estimated costs as presented by FMO in the AEF annual reports.

Table 4-6 Costs related to management AEF

€ '000	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Front Office										
Direct costs	568	646	604	658	770	671	656	775	742	6,090
Other allocated costs										
Allocations for ICT, Facility services and HR	261	350	334	437	470	283	319	342	326	3,122
Corporate & Board	141	217	122	103	180	155	169	244	198	1,529
Mid-Office and Finance & Risk	100	300	294	308	416	207	219	234	222	2,300
Fixed fee for CIO	-	-	-	-	-	-	-	-	147	147
Sub-total costs	1,070	1,513	1,354	1,506	1,836	1,316	1,363	1,595	1,635	13,188
Evaluation costs							58	257	244	559
Total costs FMO	1,070	1,513	1,354	1,506	1,836	1,316	1,421	1,852	1,879	13,747
Fee received by FMO	1,300	1,300	526	1,506	1,836	1,316	1,363	1,595	1,635	12,377

Source: AEF Annual Reports 2007-2015

The overall costs for managing the AEF have steadily increased from 2007 to 2011, in line with the growing pipeline and outstanding portfolio. The number of engaged FTEs also grew from 3.14 to 5.8 in 2011. After 2011, the number of engaged FTEs was not reported anymore. Initially, FMO was reimbursed for a fixed amount (€ 1.3 mln), but after 2009 the compensation for FMO was changed in consultation with DGIS to a different fixed-fee system that changes from year to year. This fee system is based on total costs of FMO shared pro-rata among FMO-A investments and Fund investments, based on the number of investments (not the amount), where loans and equity have a different weighting. No further details are disclosed in the annual reports. Despite the apparent proportionality between costs and the combination of the AEF pipeline and its net outstanding portfolio, it is difficult to judge the relation between costs and output.

FMO's Front Office (Investment Officers), Mid Office (IT, finance and risk) and Back Office (strategy and reporting) are all involved in realising and managing AEF investments. The highest costs relate to the Investment Officers that identify bankable projects and tailor a project's financing structure to be made it eligible for AEF funding. They are also responsible for the work related to the AEF investment criteria (such as the number of connections calculations). FMO does not have local offices in the field and FMO's Investment Officers work from The Hague and rely on their network for local information. In the process of arranging a new facility, FMO staff will travel to the country for their due diligence. Due to the absence of local presence, FMO's Investment Officers also rely to a large

extent on financing requests for AEF financing via the website of FMO, where information about the AEF is presented and eligibility criteria for the Fund are published.

Together with portfolio analysts, Investment Officers are also responsible for monitoring active investments and/or transferring an investment to the Special Operations department (Mid Office) in case the investment does not perform well. Apart from some deviations, costs for the Front Office have been increasing in line with the net portfolio and show a peak in 2011 when the pipeline of the AEF was the largest to date. Interviews with Investment Officers revealed that it is typically not very efficient for them to arrange AEF deals since the involved amounts are generally low and clients are often new and require careful analysis due to their high risk nature. This time-investment can be offset by possible catalysed investments with FMO-A funds. Therefore, if a future catalytic effect with FMO-A funds seems possible, which is also the aim of the AEF, it is more interesting for the investment officer to invest resources into the deal. AEF and investment officer interests are aligned in this case. In other cases, though, AEF deals might not be the preferred option for Investment Officers in the absence of incentives.

The Mid Office (finance & risk) is primarily involved through work directly related to the preparations of AEF facilities, such as associated finance risk work. The Mid Officers is also highly involved in the FP-approval process and also includes the Special Operations department in case of transfer of AEF deals. Mid Office treats AEF deals largely similar to deals from other FMO funds.

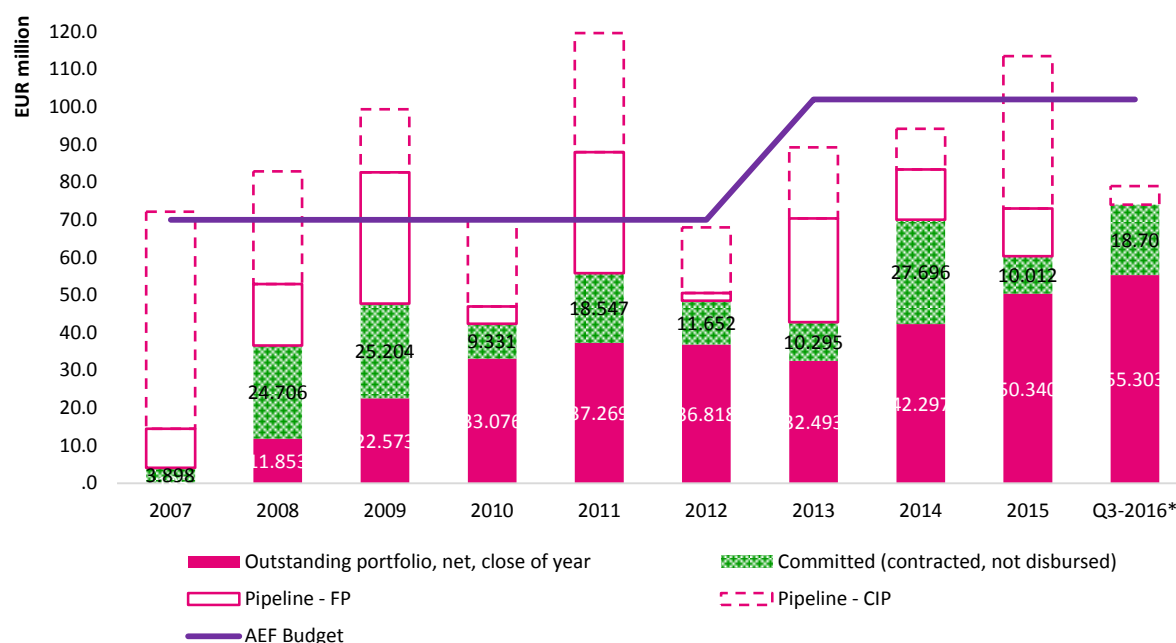
Costs related to the back-office largely comprise allocations for ICT, HR and facility services along with corporate and board services. The latter includes the strategy department that consists of three units: 1) Corporate Communication responsible for relations management (including with DGIS); 2) Integrated Reporting responsible for monitoring of the AEF performance and results; 3) Development impact and sustainability team responsible for evaluations. These three units operate relatively independent from each other. The links between the Back Office and the Front Office are relatively weak. On the one hand, this is good from an impartiality perspective, but on the other hand it is sometimes not very efficient as was illustrated in section 4.3.5 regarding data management. The analysis of the case studies showed that data on the number of connections from the Front Office can vary from investment officer to investment officer and is not systematically checked by the back-office during the FP preparation. The calculations therefore often need to be streamlined during the monitoring phase. This process can be made more efficient when the Front- and Back Office cooperate more closely together, for example during the FP stage, to improve data quality. Additionally, due to ongoing discussions between DGIS and FMO about the definition to measure 'access to energy', the Integrated Reporting department has been re-calculating the progress of the FMO AEF portfolio towards the 'access to energy' indicator several times in the past two years, which is also not very efficient.

The development impact and sustainability team also operates at a larger distance from the Front Office and mainly coordinates the external detailed impact evaluations and effectiveness studies. As Table 4-6 showed, these studies have been commissioned only from 2013 onwards, when the AEF portfolio matured. The costs of the evaluations so far represent a fraction of the total costs related to the management of the Fund (4%).

4.4.2 Utilisation of the AEF

As explained in section 4.3, the direct result of the FMO AEF fund management are investments into AEF-compliant projects. An analysis of the utilisation of the available AEF funds in combination with the working methods and costs related to the AEF fund management therefore presents an insight into the efficiency of the Fund management. Figure 4-6 shows the utilisation of the available AEF funds for the years 2008-2015 (2007 was the start-up year and 2015 was the last audited annual report).

Figure 4-6 Utilisation of available AEF funds



Source: Author's calculations based on AEF annual reports 2007-2016

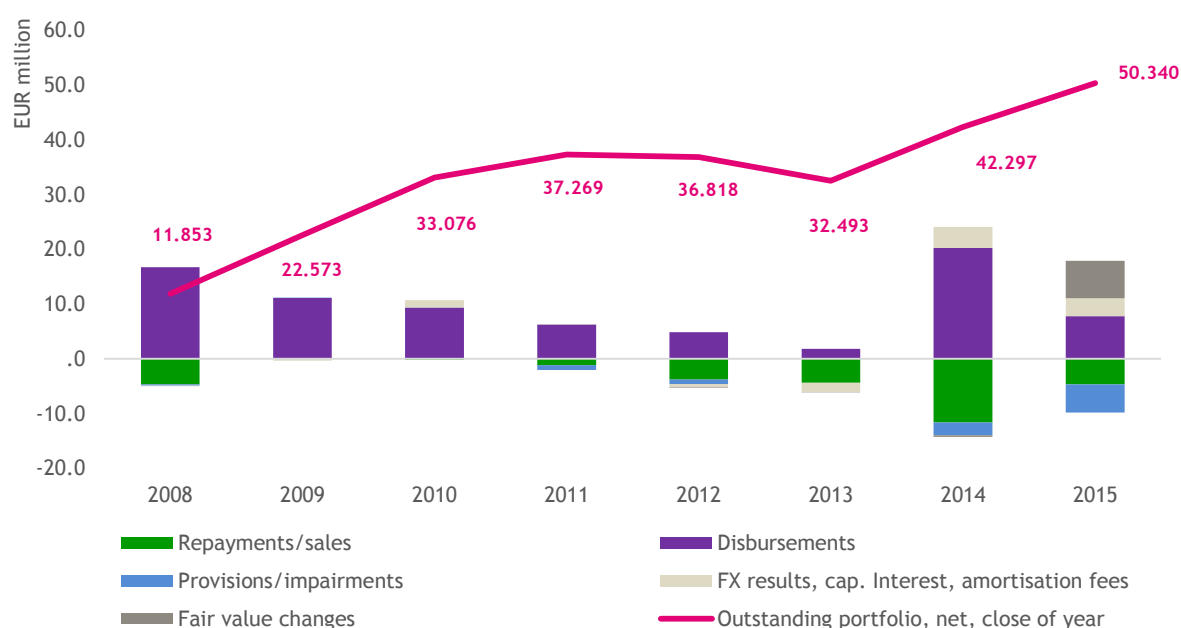
Note: Figures represent cumulative totals for the 31st of December each year. Figures for 2016 are incomplete, unaudited and cumulative until October 2016.

As at Q3-2016, the net outstanding portfolio of active AEF investments amounted to € 55.3 million⁵⁹, excluding the € 7 mln investment into CIO. The outstanding net portfolio has been steadily growing since the start of AEF, but is not close to the ceiling of available funds. Rather, the value of the net outstanding portfolio has in these years been in the range of 17% (2008) to 53% (2011 and 2012).

Figure 4-7 shows the drivers of the growth in the net outstanding portfolio. It is worthwhile to note the decline of the outstanding portfolio in 2012 based on the large value of the pipeline in 2011. The value of commitments even decreased in 2012 (Figure 4-7). In part, this is due to some repayments and sales, but it is also noteworthy that only a small fraction of the large pipeline materialised into commitments. Among this portfolio were two projects (Tema Osonor and Lereko Metier Sustainable Capital Fund, combined proposed facility value of US\$ 23.1 mln) that got cancelled and are analysed in more detail in Section 4.1.1.

⁵⁹ This represents the fair value of all disbursed investments, thereby taking into account value changes in equity and provisions/impairments on loans.

Figure 4-7 Growth of the net outstanding AEF portfolio (AEF I in 2007-2012 and AEF I and II in 2013-2015)



Source: Audited financial statements AEF from AEF Annual Reports 2011-2015

After an increase of business development efforts in 2012 and 2013, the committed and net outstanding portfolio grew strongly in 2014. There was a steady decline of disbursements from 2008 to 2013. Nevertheless, given the expected increased awareness about the availability of AEF funding within and outside FMO and a more developed pipeline that should materialise into disbursements, one would rather expect a steady increase in disbursements in the starting years of a fund rather than a decline. Of course, external factors can have an important influence on the value of disbursements. Impairments and provisions for bad loans have been moderate. Only in 2015, two larger provisions for Kivu Watt and Polaris Energy were taken due to setbacks in those projects. The quality of equity participants has been high as only significant upward value adjustments were recorded in this period (e.g. in 2015).

The combined value of the pipeline sometimes outstripped the capacity of the Fund in five of the nine years (see Figure 4-7). In 2011, the combined value of the pipeline, committed amounts and the net portfolio was particularly high. In turn, FMO decided to request an additional € 32 mln (which became AEF-II) and, according to the annual report for 2011, decided to slow business development efforts for new contracts. According to FMO, this explains the drop in the pipeline in 2012. The pipeline recovered over the period 2013 to 2015 and, according to the AEF Fund Manager, appears to be substantial. Yet the formal figures as presented in the AEF Q3-2016 report present a small pipeline and only a € 5 mln approved CIP facility.

The value of committed and outstanding AEF investments was 80% of the total AEF funds available in 2011, then dropped to 42% (also due to the addition of AEFII) and has since then been steadily increasing to 73% as at Q3-2016. This implies, assuming a full disbursement of all contracted amounts, that there is still € 28 mln capacity available as at Q3-2016. In case the additional AEF-investment of

€ 25 mln would be made (see section 3.3), utilisation of the present AEF would increase to 97% with a mere € 3 mln available for additional AEF investments.

4.4.3 Revolvability

In addition to the (significant) nominal value of funds still available in the AEF for additional investments, interests and dividends have been flowing back as cash earnings from the investments made to date. The AEF is set up with the intention to be a 'revolving' fund, implying that the money earned from the investments made (through sale of equity or interest payments) should flow back into the fund and be used for new investments again.

The Grant Decision for AEF-I includes a target for revolvability of 50%, based on the Proposal for the setup of the AEF (Annex I to the Grant Decision). As a clear definition of revolvability is missing, it is difficult to analyse and assess this target of 50%, as revolvability can be interpreted from different perspectives (see more below). Additional exchanges with FMO and the Ministry indicated that both parties agreed on a 75% revolvability target for AEF-II. This target is not formally included in the Grant Decision for AEF II nor in the informal AEF investment criteria guidelines, but it is mentioned in the FMO proposal for AEF II and therefore forms part of the Grant Decision.⁶⁰ In addition, no precise definition neither of the 50% nor of the 75% revolvability target has been agreed. For the remainder, we will therefore assume a revolvability target of minimum 50%. Table 4-7 shows the cash balance of the AEF since 2010⁶¹, presenting the cash in and cash out balance for the audited years. The last column (total) shows the sum of the transactions since the start of the AEF (2007).

Table 4-7 Cash balance AEF (2010 onwards)

€ '000	2010	2011	2012	2013	2014	2015	Total (2007-2015)
Received from DGIS	14,362	4,534	0	-501	-3,000	0	45,819
Fee FMO	-1,506	-1,836	-1,316	-1,363	-1,450	-1,466	-12,063
Disbursements	-9,406	-6,216	-6,063	-1,899	-14,661	-8,084	-75,187
Repayments and sales	197	1,188	3,810	4,513	11,882	5,159	31,502
Interest and dividends	1,446	1,953	2,879	2,650	3,926	3,840	17,659
Other income	116	107	-466	0	0	0	171
Other received and paid	-5	504	-220	-235	1,461	790	2,032
Balance cash	9,511	9,746	8,370	11,535	9,693	9,932	

Source: Audited AEF annual reports 2007-2015

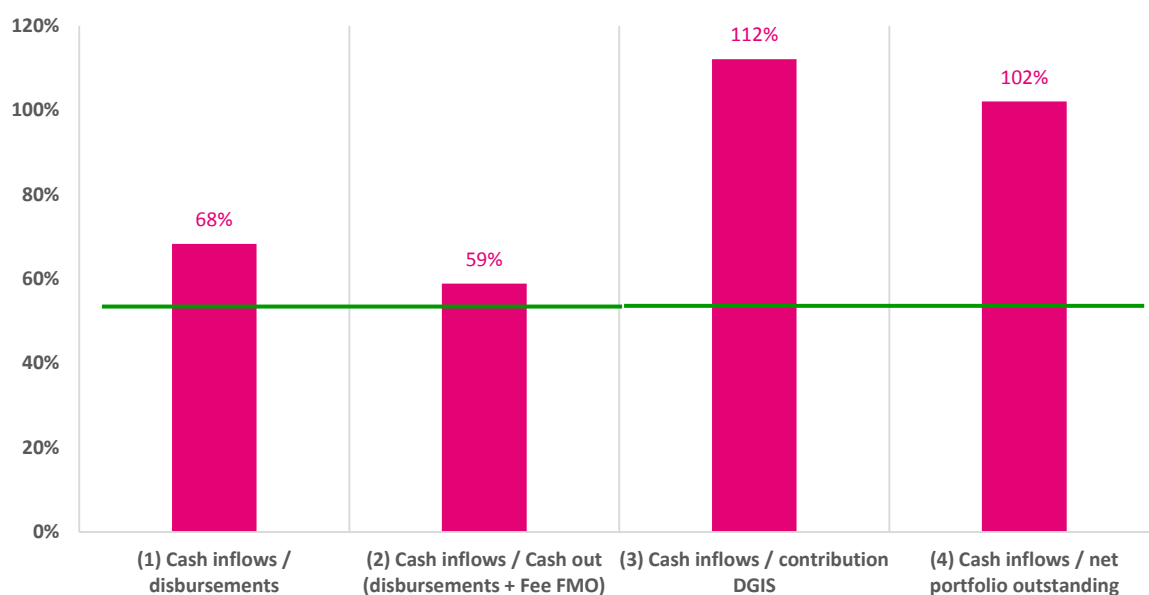
Using the AEF cash balance, revolvability can be assessed from a 'short-term' perspective and from a 'long term' perspective. From a short-term perspective, we can define revolvability as all cash in-

⁶⁰ Apparently this 75% resolvability target is agreed upon in the FMO Proposal for AEF II, which is annexed to the Grant Decision. However, the evaluation team did not receive this proposal.

⁶¹ Years 2007-2009 not presented for clarity purposes. Those years are included in the "total" column and the subsequent revolvability calculations.

flows from AEF investments (repayments and sales, interests and dividends, other income and other received and paid) compared with the total value of disbursements that have been made since the start of the Fund (definition-1 in Figure 4-8 below). This illustrates the ratio between all money that has revolved back into the Fund compared to what has been going out. Definition-2 in Figure 4-8 also shows this ratio adjusted for the fee for the FMO Fund Management, which can also be interpreted as cash out for the Fund, affecting the revolvability of the Fund. The revolvability of the AEF is according to both definitions higher than 50% (68% vs 59%), but lower than 75%.

Figure 4-8 Revolvability AEF 2007-2015 (four definitions)



Source: Author's calculations using AEF annual report data 2007-2015

Judged from a more long-term perspective, we can interpret revolvability also as all cash inflows that have revolved into the Fund in relation to the current net value of the outstanding investment portfolio as that represents the precise value of all investments made to date that can be recovered (Definition-4). FMO uses this definition to determine the revolvability of a fund (including for the AEF). In order for a Fund to have a fully revolving nature, the value of cash inflows should equal the value of the net portfolio. Since AEF does not have to be fully revolving, the performance of AEF so far well exceeds the target. With 102%, it has a fully revolving nature thus far. Lastly, revolvability can also be defined from the perspective of the Ministry and the contributions it has made into the Fund, compared with the money that the Fund has earned on the investments. Using this definition (3), the AEF has so far also earned more than the Ministry made available (earnings of € 51 mln and a contribution of DGIS of € 46 mln). According to FMO, definition (4) is the most common definition for revolvability. Therefore, the Grant Decisions or related policy documents on AEF could be clarified to include this definition for revolvability.

Therefore, whatever definition is used to define revolvability, it can be concluded that the Fund has been sufficiently revolving with respect to the 50% target mentioned in the Grant Decision for AEF-I and revised to 75% under the AEF II grant decision. On a longer-term perspective, the Fund may even be able to recover more than what has been made available so far. Whereas this is in principle a favourable situation, from a revolvability point-of-view, the AEF has been designed to take more

higher risk positions in investments and take more risks overall. The high degree of revolvability of the Fund in combination with the relative low utilisation of the Fund (see previous section) signals that FMO could theoretically take some more risks with AEF than it has done to date of the evaluation. Yet, in section 4.2 we explained that the additionality of the Fund is high and that it has taken risky positions in projects. FMO should therefore not be held back by underperformance of low investment returns in the investment instruments it uses. In fact, from a revolvability point of view, AEF has room to consider more risk in widening its investment pipeline with more innovative business models, more early stage projects and more investment instruments with a higher risk profile.

5 Conclusions and recommendations

5.1 Conclusions

In this section, the main conclusions are formulated based on the findings presented in the previous chapters. This means that answers will be provided to the five main evaluation questions.

1. *AEF has responded adequately to the rapidly evolving context regarding funding of renewable energy in Sub-Saharan Africa.*

AEF is a relevant and useful tool that has responded well to the rapidly changing conditions in RE financing in emerging markets. AEF has clearly addressed the needs for differentiated capital in an early stage of project development. RE is becoming more cost-competitive and is more prioritised by African governments. At the same time, energy demand is increasing strong, especially in Sub-Saharan Africa, whereas supply still lags behind. Therefore, the AE- investments made by FMO have responded adequately to the changes in demand for the financing of RE.

FMO has also adequately addressed the capital needs of risky new business models, both grid-connected and off-grid. Mini-grids are the newcomer in the market with few viable plans to date. This is reflected in the overall AEF-portfolio, where grid-connected projects dominate (18 out of 30 projects and 75% of commitments), followed by off-grid projects (7 projects and 12% of commitments). Via AEF, FMO has utilised opportunities that come along with an increasingly active private sector by mitigating financial risks in public-private partnerships. Given the fact that there are still no mature markets or low-risk segments in AEF's focus markets, there is a continuous need for risk-appreciative capital that can be provided via AEF.

2. *The evolving policy priorities of the Ministry of Foreign Affairs on RE and climate change are only reflected to a limited extent in the AEF operational and strategic objectives*

The policy framework for AEF is not elaborated in detail. Since the start of AEF in 2007, the focus has been on access to energy for households. This did not change with the top-up and set-up of AEF II in 2013. Since that time the focus has been exclusively on RE in sub-Saharan Africa, which is very well reflected in the portfolio.

Nevertheless, the evolving DGIS policy priorities on RE and climate change are only reflected to a limited extent in the AEF operational and strategic objectives and, in fact, AEF has only partially addressed the changing policy priorities. Despite the focus on access to energy for households, especially the grid-connected projects cannot be exclusively focused on households in practice as this is beyond the reach of most projects. The scope of grid-connection power generation projects is limited to a contract with an off-taker that is responsible for distribution. Grid-connection power gener-

ation projects therefore do not directly create new grid-connections, but can indirectly (through increased capacity on the grid) contribute to improved energy access for already connected people, expansion of the grid and new connections.

The link between RE and inclusive green growth that is stressed in DGIS policies (access for poorer households and specifically for women) is not at all articulated in the AEF policy frameworks. This also applies to new policy goals such as the climate goals and improved knowledge on the links between climate, energy and development that are not reflected in AEF.

In practice, the set-up of AEF and the relationship with DGIS has left ample room for FMO as trusted partner and manager of AEF to operate in the market in a flexible manner. There has been a continuous dialogue between DGIS and AEF mainly on rather operational issues. Nevertheless, DGIS provided little guidance to FMO regarding the (evolving) policy framework in which AEF should be functioning. The MTR recommendation in 2011 to further detail the arrangements between DGIS and FMO on the objectives of AEF was not given any formal follow-up in either the grant decision regarding the top-up for AEF II or in the addendum of the grant decision regarding the € 7 million funding for CIO. This last decision partially broadened the scope of AEF again, but without clear changes in AEF's objectives and investment criteria. Also reporting lines were not clearly defined.

While some investment criteria, such as the focus on RE and sub-Saharan Africa, are clearly defined by DGIS and understood by FMO, other investment criteria such as the criterion to provide access to energy for at least 50,000 people are difficult to assess. This may explain why the AEF criteria do not appear to play a prominent role in the FMO written investment decisions, which generally focus on the risks and financial aspects of the investment.

3. AEF is largely additional to other funding sources for renewable energy in Sub-Saharan Africa, and has catalysed other funding.

FMO makes good use of AEF with different types of finance (equity, loans, grants) and is complementary to other FMO-A funding. On the other hand, the 15 case studies showed that there is a certain substitution between IDF and AEF. Especially grid-connected projects can often be financed from both sources of money. Across the portfolio, AEF is used as a risk-appreciative source of funding in e.g. early stage of RE-project financing or as seed capital in early stage business models. In such cases, AEF provides funding that is scarcely available and may be considered additional.

All the 15 case studies showed a positive score on additionality, including the written-off investments or those with an early exit. Early exits (both premature end of projects and FMO buy-outs) and some written-off investments underline the high-risk nature of investments and the need for this fund.

AEF has mostly invested in the riskier part of project financing structures or provided seed capital for early stages of business development. FMO has also often acted as deal arranger, which meant that thanks to the AEF investment other investors were attracted in a direct or indirect way. In 11 of the 15 case studies evidence was found on –sometimes- substantial catalytic effects. This image of FMO as deal arranger and catalysing other funding was confirmed in strategic interviews with five other funds investing in RE.

4. *There is clear evidence that the planned outputs have been realised. It is also likely that AEF has already exceeded the target of 3 million people to be provided with access to energy by now, assuming catalysing effects are taken into account and if all projects proceed according to plan*

AEF has realised its planned outputs: FMO invested in a sufficient number of relevant (renewable) energy projects that directly or indirectly provided additional energy connections. The output target for CIO to develop at least three RE projects to be funded by CIO is barely met as two projects are being developed and one other is in the pipeline.

In addition, it is likely that AEF has already provided more than 3 million people with access to energy. Given the inconsistent and sometimes unreliable data that were made available by FMO on this indicator, the evaluation team has made its own calculations of the number of people reached for the 15 case studies representing 60% of the overall portfolio in order to provide an estimate on the expected progress towards the goal. This analysis at case study level is based on an in-depth analysis of the base numbers provided by FMO, clear and consistent assumptions and careful triangulation of the information. Depending on whether or not catalysed finance is included in the share of AEF in an overall project (the source of most inconsistencies in FMO calculations), the estimate of people reached lies between 348,000 and 2.3 million people reached for the 15 case studies. Extrapolated to portfolio level, this implies between 0.6 - 3.8 million people have been provided with access to energy. As there is no clear justification for the height of the 3 million target, it is difficult to judge whether this target is set at the right level. On the basis of the case studies and with the benefit of hindsight, the evaluation team concludes that when catalysed finance is included in the calculations, the target is set at a rather unambitious level. There is still very limited information available on the socio-economic characteristics of the people reached.

5. *FMO very seriously overestimated the number of people provided with access to energy (approximately with a factor 10), which points at weaknesses in the monitoring system despite some recent improvements.*

The evidence basis at outcome level presented by FMO has so far been relatively weak, in particular for the key target the number of people provided with access to energy as illustrated in point 4. This is due to definition problems, measurement problems and weak linkages between the FMO Front Office responsible for the investments, the Mid Office in charge of fund management and the Back Office in charge of M&E. Furthermore, there is insufficient insight in related outcome information such as the socio-economic characteristics of the people reached and connected households. FMO has definitely made good attempts at improving its monitoring system over the last year, but this could not prevent the gross overestimation of outcomes. This overestimation is not limited to the people reached, but also relates to the number of supported jobs and reduced emissions, which are FMO, but not AEF, impact indicators. There are no incentives for good monitoring of results. Apparently, DGIS started paying attention to the monitoring information only recently, but there is a risk of micro-steering the AEF (which should be done by the Fund Manager) rather than focusing on the overall level.

6. So far, there is limited evidence on the realisation of sustainable impact, but it is likely that the ongoing impact studies of AEF will demonstrate positive impacts at household level.

There are some indications of positive impacts at household level, but the first results of the impact evaluations will only become available towards the end of 2017. Some studies provide some evidence on positive environmental, economic and social impacts such as reduced GHG emissions, but this is not yet based on robust impact evaluations. Also, the technical and financial sustainability of the AEF investments are positively assessed.

7. The new M&E approach developed at the explicit request of DGIS was primarily focused on accountability and there is a risk that learning will remain very limited.

The FMO M&E approach was rolled out from 2014 onwards at the explicit request of DGIS. Moreover, additional budget was provided for this purpose. Improvement of monitoring, effectiveness studies and impact evaluations were foreseen in the FMO evaluation plan. In practice, most attention was given to monitoring and to in-depth impact evaluations at household level. None of the impact evaluations has been finalised, so there has been limited learning from the conducted evaluations so far.

For accountability reasons, DGIS wanted FMO to focus on sound impact evaluations based on scientific methods and with a very limited focus on learning and timely available results. Since 2014, the approach is gradually changing as it starts to pay more attention to the learning purpose and the needs of primary stakeholders in FMO. In fact, the AEF impact evaluations study impacts at the household level, while these impacts are not directly related to specific objectives mentioned in the grant decisions with FMO or in the agreements between FMO and the AEF client. Given their set-up and focus on the household level, the impact evaluations might not provide useful results that can help the Investment Officers in the Front Office to help them sourcing new deals or shape their strategy. The length of the impact evaluations – between 1 and 3 years - may also limit the learning.

8. FMO appears to manage AEF efficiently by integrating the Fund's related activities in the other energy sector investments of the bank.

There is an apparent proportionality between the AEF management costs and the height of the combination of the AEF pipeline and its net outstanding portfolio. Both have been steadily increasing since the start of the Fund.

The integrated management model of AEF implies that the Front-, Mid- and Back Offices are all involved in AEF. This set-up has advantages and disadvantages. The advantages are that AEF deals are prepared and made by the Investment Officers who have specific skills and expertise for arranging these deals and do not have to deal with Mid and Back Office tasks such as M&E and reporting.

The disadvantages, however, are the weak linkages between the three parts of the bank. The Front Office, which is responsible for the investment decisions does not check systematically whether the investments comply with the specific AEF investment criteria. The Back Office, which is responsible for monitoring of KPIs does not check at FP stage the accuracy of calculations regarding the number

of people to be provided with access to energy. Especially for the access to energy KPI there are no integrated tools and templates as appears to be the case for other FMO-wide KPIs such as GHG emissions. Another issue is the lack of specific incentives for Investment Officers to arrange AEF deals as they are typically quite labour-intensive as the clients are often new and require careful analysis due to their high-risk nature, while the involved amounts are generally low.

9. The utilisation of AEF funds was somewhat low, but is picking up. No definition for revolving-ity has been defined, but according to all possible definitions, the revolving-ity of the fund exceeds the original 50% target. Only for some definitions, revolving-ity of the Fund meets the new 75% target set in 2012.

There has been a drop in utilisation rate around the time of the AEF II expansion, which was due to some repayments and sales of equity stakes, but also because only a small fraction of the large pipeline materialised into commitments. This resulted in a relatively low utilisation rate as the net outstanding portfolio was only growing slowly (but steadily) over time. In recent years, the utilisation rate improved to 73% as at Q3-2016. This implies, assuming a full disbursement of all contracted amounts, that there is still € 28 mln capacity available, which would be reduced to € 3 million if an additional € 25 million from AEF would be made available to CIO. The net utilisation of DGIS funds was also lower as the value of revolving cash into the Fund has been rather high.

Even though there is no clear agreed definition for revolving-ity of AEF, it varies between 59% and 112% depending on the definition of revolving-ity that is applied. Since the documentation related to the Fund do not specify the definition for revolving-ity, the current status with respect to the 50% target mentioned in the Grant Decision for AEF-I cannot be assessed accurately. However, since the revolving-ity is higher than 50% according to all four definitions that the evaluation team developed, the conclusion is that this initial AEF revolving-ity target has been met so far. However, a new target of 75% revolving-ity has been set in December 2012 and depending on the type of definition applied, this target is not always met.

After the creation of AEF-II, the same overall investment criteria were applied, but administratively AEF-I and AEF-II have been split as the DGIS systems did not allow for full integration since the funds came from two different IGG budgets. This creates inefficiencies in the management of the Fund as there are two separate financial accounting systems, which also creates challenges for the revolving-ity. At the same time, DGIS has formulated expected outcomes and impacts at AEF-overall level, which creates some inconsistencies.

5.2 Recommendations

In addition to the five evaluation questions related to the evaluation criteria, there is a sixth more forward looking question: How can AEF further improve its performance and functioning in the years until 2023 to achieve its targets and to be recognized as a key funder in the field of RE in SSA? This question is answered in this section in relation to the conclusions presented above.

1. *AEF should continue its operations in the years to come, given AEF's good performance in terms of relevance, additionality and effectiveness and in the absence of mature markets for financing of renewable energy projects in Sub-Saharan Africa and the continued demand for risk-appreciative capital.*

The conclusions of this evaluation show that there are many good arguments for the continuation of AEF along the same lines as were agreed upon in 2013, with a focus on funding RE projects, both on-grid and off-grid projects in Sub-Saharan Africa. The year 2023 is mentioned as the end date in the grant decision, which appears to be a good time to reconsider the time frame. However, the intended top-up of AEF for the € 50 million commitment to CIO, would broaden the scope of AEF to other continents and would focus AEF primarily on the funding of large scale, mostly grid-connected projects. It risks to limit AEF's flexibility to support new developments in the years to come, such as possibly mini-grids, and 'smart' investments in electricity distribution.

2. *In view of the evolving government policy priorities including increasing attention for climate goals and given the substantial differences between AEF (I and II) on the one hand and CIO on the other, DGIS should define a new overall policy umbrella framework for AEF and CIO.*

Given the weak and outdated strategic framework for AEF and the possible substantial commitment to CIO, a new overall umbrella policy framework for AEF and CIO should be elaborated. Preferably, AEF-I and AEF-II should be integrated in a new (overall) AEF for the period 2017-2023, while CIO could be funded under the same umbrella but with distinct policy priorities –going beyond household electrification-, targets and scope.

As a first step, DGIS needs to define clear overall policy objectives. These overall policy objectives could include both access to energy for households and climate policy goals. Under this umbrella framework, specific AEF and CIO objectives could be defined. The specific AEF objectives should continue to focus on access to energy for households and address the issue of inclusive green growth. CIO-objectives on the other hand should especially be linked to the climate policy goals given its focus.

In addition, for AEF and CIO operational definitions are needed for each specific objective and clear targets should be set and (when possible) quantified. For the revised AEF a new realistic target of people to be provided with access to energy should be set. AEF could more specifically focus on off-grid and mini-grid investments, for which specific targets could be set. CIO with its much wider mandate than just household electrification will focus primarily on on-grid investments, for which other targets need to be set.

The new overall policy framework should allow for sufficient flexibility and calibration of changing policy priorities in view of international events and changing investment practice.

While DGIS is primarily responsible for setting the new AEF policy framework, DGIS should consult FMO to ensure that the technically complex financing ‘reality’ is sufficiently reflected and realistic targets are set for the number of people to be provided with access to energy and other targets.

3. The arrangements between DGIS and FMO and roles and responsibilities should be further defined.

The MTR recommendation of 2011 to further specify the arrangements between DGIS and FMO is repeated here and follow-up is strongly recommended. AEF is a Fund managed at arm’s length of the funder (DGIS). Based on an improved policy and reporting framework and on FMO’s respected reputation as leading financier, the new FMO-DGIS relationship regarding the management of AEF would imply adequate responsiveness to future developments. In addition, the inconsistency of having two funds AEF-I and AEF-II with the same objectives but different administrative agreements should be addressed in the future for an efficient functioning of the fund as a whole, in particular when CIO will be added to AEF. This can be done in the framework that could be developed for the ‘umbrella’ AEF as described in recommendation 2.

FMO should put in place clear and measurable criteria and incentives for AEF deliverables, such as when to exit deals and engage private sector investors in refinancing. Jointly FMO and DGIS need to revisit the tension between positioning AEF as ‘risk-appreciative capital’ in a changing market, and the ‘risk-avoiding’ target on higher revolvability. This requires a clear definition of and realistic revolvability target. While DGIS may not provide new funding to AEF after 2023, there might be enough of a portfolio built up by then that the AEF and CIO funds may continue independently using revolving cash, although with a revolvability target of 75%, AEF will decrease and eventually cease to exist. Therefore, the revolvability of both AEF and CIO need to be defined for each of the commitments made. Therefore, the Ministry should formulate clear definitions and targets for revolvability, both from a short term and a long term perspective, both for AEF and for CIO. The short term definition can be used to monitor and manage the cash situation of the Fund, whereas the long term definition can be used to monitor the sustainability of the Fund.

Due attention needs to be given in the reporting framework to FMO’s double responsibility as manager of AEF and FMO’s shareholder role in CIO (independently managed fund with multiple investors with limited direct influence by AEF). The governance risks of this arrangement (DGIS-FMO-AEF-CIO) need to be carefully assessed and risk mitigation needs to be elaborated. AEF’s Fund Manager at FMO has no control over CIO (explicitly and for good reasons) and can therefore not be held accountable in its fiduciary responsibility for DGIS’ policy guidelines and contractual arrangements. This exception should be reflected in a tailor-made arrangement for the relationship DGIS-FMO-CIO. The new arrangements should also continue to allow sufficient flexibility for FMO as the AEF Fund Manager to operate flexibly in a rapidly evolving market to keep adjusting to changing RE funding needs.

4. DGIS and FMO should increase cooperation on knowledge management regarding the evolving funding context of renewable energy, but also to learning from M&E.

While FMO has clearly improved its M&E framework in recent years, there remains ample room for further improvements. This requires good collaboration between DGIS and FMO on the basis of clearly defined roles and responsibilities. The policy dialogue and steering should take place on the basis of the revised overall policy framework by DGIS as indicated above.

DGIS should pay due attention to internal knowledge management regarding its knowledge of the technically complex financing reality that AEF is operating in. This can be done through consultation of FMO, more internal knowledge sharing with other DGIS departments dealing with this type of finance issues and finally through external advice.

FMO is responsible for monitoring on the basis of agreed KPIs that are related to the overall and specific objectives to be defined. The definitions for KPIs have been redefined various times over the past years. Once the new objectives and targets for AEF and CIO have been set, the definition and measurement methods for the AEF and CIO KPIs need to be reconsidered once again. It is recommended to involve external expertise advice in that process and to avoid micro-management by DGIS. In addition, roles and responsibilities for CIO reporting to AEF and in turn to DGIS need to be detailed.

In the further refinement of the M&E-system, learning needs of different groups of stakeholders within FMO and DGIS, but also of external stakeholders need to be identified and addressed. In line with the MTR of FMO's Evaluation Plan, a larger variation of evaluation studies should be planned. In the new planning of AEF evaluation studies, more attention should be given to careful assessment of outcomes and differentiation of the factors affecting electrification, socio-economic characteristics of connected households, R&D issues, industrialisation, etc.

5. FMO as the AEF Fund Manager should continue to adjust its working methods and investment policy in line with the evolving market by for instance actively exploring new renewable energy market segments.

FMO should continue its current investment strategy given the additionality of AEF and the evidence that higher risk positions in projects to innovate the financing of 'access to energy', are in line with the public mandate of the AEF funding. This recommendation is only addressed to FMO in its role as AEF Fund Manager as the arrangement regarding CIO should be detailed in a separate agreement as indicated above. In order to continue adjusting the working methods in line with the evolving market, the following suggestions for the management of the future AEF should be considered:

- Improvement of the integrated AEF management through stronger linkages between the Front-, Mid- and Back offices. This may include involving the Back Office in the calculation of number of people to be reached during the FP stage and involvement of the Front Office in the monitoring of investments after commitment. In addition, the efficiency of the deals can be improved by planning for FMO-A follow-on investments at an early stage, which also helps to create the desired catalysed effect;
- Definition of clear criteria for exiting AEF investments once projects have been derisked, also in view of the almost complete utilisation of AEF. These criteria may be needed for AEF to seek re-financing by private capital or FMO-A funds,. With more risk capital and more private financing coming available in the next years, such criteria would stimulate refinancing of AEF and would

further increase its additionality and relevance. As gradually older and more successful AEF-investments may be ripe for exiting or refinancing, this is a good time to set such criteria;

- Investments in mini-grids;
Start considering Transmission & Distribution (T&D) projects as with more on-grid renewables coming 'on-line', the weak spot moves from RE generation capacity to 'smart' distribution grids. Distribution is still often a public sector responsibility and has a high risk profile. Meanwhile state utilities are gradually being privatized, and private grid-operators are entering the market. Nevertheless, on the short term this may imply (partial) co-financing of public utilities. Moreover, due to long lead times for investing in distribution (e.g. legal and institutional), this investment focus has to be urgently developed to set examples before it limits the growth of RE generation capacity. FMO with AEF and other funds could play a potential niche role in providing early-stage risk capital.
- Support for local project developers in SSA as they need easily accessible support for mid-size projects (< US\$ 50m);
- Facilitating investors that are new to this sector, which have specific needs that can be addressed with public funding such as shorter contract period, and floating interest rates to cover long-term currency risks;
- Engage larger industrial investors that can test business models as the present financial investors (e.g. AREF) cannot 'test' – they need to exit and generate a return.

Annex I Terms of Reference

Terms of Reference Evaluation FMO Access to Energy Fund

1. Background

In 2004, the former minister of Development Co-operation Agnes van Ardenne committed the Netherlands to providing 10 million people in developing countries with modern forms of sustainable energy by the year 2015. To reach part of these 10 million people, FMO has managed the Access to Energy Fund (AEF) on behalf of the Dutch government since the 1st of November 2006. The AEF will be managed till 31 December 2022. At the outset, the AEF had the aim of providing access to energy to 2.1 million people by 2015 through private sector development (FMO itself got the aim to provide access to energy to 3.5 million people). The initial amount of EUR 70 million was topped-up with EUR 32 million on 4 December 2012, bringing total commitment to EUR 102 million. The new output target was set at 3 million people with access to energy. Outstanding commitment as per 30 June 2016 is EUR **72.3** million. At least 75% of the outcomes should be achieved in Sub Sahara Africa or LDC's and based on RE Technologies.

The main purpose of the AEF is to promote the creation of a sustainable form of Access to Energy in developing countries through private sector investments. This should be done by providing risk-bearing capital, including equity, senior and subordinated debt, and up to a limited extent grants. The AEF is designed to have a Catalytic effect and leverage other investments. FMO manages the fund. All returning assets are to return to and be reinvested by the fund.

FMO is the Netherlands Development Finance Company, and supports the private sector in developing countries and emerging markets in Asia, Africa, Latin America and Central and Eastern Europe. FMO does this with loans, participations, guarantees and other investment promotion activities. The goal is to contribute to the structural and sustainable development in these countries and, together with the private sector, obtain healthy returns.

2. Purpose and scope of the evaluation

A midterm review (MTR) of the AEF took place in 2011. It was concluded that AEF is well on track to reach its objectives. Its portfolio is balanced, diverse and geographically well spread. Following this review the fund has been scaled up, extended to end in 2022 and committed up to **over 70 %**. The fund is therefore mature enough for an evaluation of its performance and impacts in line with the OECD-DAC criteria of relevance, effectiveness, efficiency, impact and the prospects of sustainability after project completion. This evaluation may build on the results and recommendations of the mid-term evaluation, including the recommendation to play a more pro-active role in the development stage of projects.

In addition, since the establishment of the fund, the Netherlands development policy in general and with respect to climate and energy access in particular has further developed. The original output goals as set by Minister van Ardenne have been achieved, and even surpassed in 2015. New output

targets have been set for 2030. International developments have surged as well, under the agendas of SE4All, SDG and Climate Change. As a result, more finance is available in the sector than before. The evaluators are requested to identify the AEF's added value in the sector and provide recommendations for further improvement.

Evaluation questions:

The evaluation is expected to assess the financial and non-financial results of the Access to Energy Fund and its management by FMO in accordance with the OECD-DAC criteria of *relevance, effectiveness, efficiency, impact, and sustainability*.

The following list suggests a number of key questions under the OECD-DAC evaluation criteria. Please note that the list is incomplete. The evaluators are expected to draw up a full list of evaluation questions in their evaluation proposal, and to include the evaluation questions listed in the implementation agreement.

Relevance

- To what extent are the objectives of the Fund still valid with respect to Dutch policy and international developments?
 - Is there a need for the types of financing the AEF offers in developing markets, and particularly in Sub-Sahara Africa?
 - To what extent is AEF additional to existing financing structures such as:
 - Commercial finance;
 - Finance from FMO's own balance;
 - Other funds FMO manages (like the Infrastructure Development Fund);
 - Other comparable instruments from development finance institutions and funds.
 - Is the relevance and additionality different in different subsectors (geothermal, solar, wind, off-grid, etc.)?
- Has the relevance of the AEF changed as a result of the increased investments in renewable energy, the sharply declining prices of particularly solar energy, the "greening" of portfolios of commercial investors and the increased interest from institutional investors?
- How does AEF relate to other initiatives of FMO and others, such as IFC Scaling Solar, Climate Investor One, Electrifi and the Africa Renewable Energy Initiative?
- Are the activities and outcomes consistent with the overall goals of the fund?
- Are the activities and outcomes consistent with the intended impacts and effects of the fund?

Efficiency

- How are inputs (fund money and staffing) transformed in outputs (viable energy investments)?
- Is the fund implemented in a cost efficient way compared to alternatives, i.e. comparable funds within or outside FMO?
- What are reasonable benchmarks to compare with?
- Are results achieved cost-efficiently compared to other energy access activities?
- To what extent have AEF investments mobilised/catalysed other sources of finance?

Effectiveness

- How successfully do outputs (investment projects) produce the desired outcomes (providing increased access to affordable and renewable energy)?
- To what extent do AEF investments contribute to increased access to energy, in accordance with the Fund's criteria?
- Does the result measurement coincide with newly established policy goals, such as the results indicators of the Global Tracking Framework, ESMAP Beyond connections?
- What were/are the key success factors in achieving these results?

Impacts

- What can be said about the effects of the fund and of the investments that it enabled on:
 - Poverty alleviation, economic growth and the reduction of negative impacts on the environment and climate
 - Catalysing private finance to the energy access markets in the target areas of the fund
 - The number of people gaining energy access in (peri-) urban and rural areas
 - The actual use of the gained energy access
 - Energy access through grid, mini-grid and off-grid solutions (inc cooking) respectively
 - Reaching the poor, especially in Sub-Sahara Africa and Least Developed Countries (LDCs), where at least 75% of the outcome should be reached.

Sustainability

- To what extent is sustainable (i.e. long lasting) energy access achieved through the fund? This includes technical, economic/commercial, environmental and social sustainability.
- What factors influence the sustainability of the achieved energy access?
- Is the Fund in itself sustainable?
- What is the optimal size of the AEF?

In addition, paragraph 3.5.1 of the “gewijzigde beschikking” (revised Grant decision) dated 26 June 2014 mentions the following evaluation questions:

<u>A</u>	<u>Number of new connections realised and the number of “pro-poor” connections.</u>
<u>B</u>	<u>Are the conditions for sustainability (social, technical, economic, environment) for the connections fulfilled or are corrective measures required?</u>
<u>C</u>	<u>What conclusions can be drawn about regional and national differences in the success of financing, or the nature of the financing, or the type of project like production, transmission or distribution?</u>
<u>D</u>	<u>What is the output of the capacity development program and other activities to safeguard sustainability?</u>
<u>E</u>	<u>What is the contribution of FMO (inc AEF) to the investment?</u>
<u>F</u>	<u>To what extent have renewable energy sources and technologies been used?</u>
<u>G</u>	<u>Have the AEF supported investments fulfilled the expectations of increased development impact in FMO's portfolio? To which aspects of the development impact can</u>

that be contributed? And is this growth sustainable and a direct effect of the AEF?

Finally, the evaluation consultant is expected to evaluate the implementation of the recommendations of the Mid Term Review.

3. Methodology

The evaluator will propose the concrete methodology to be applied in the evaluation. This methodology is to be approved by the Ministry of Foreign Affairs (MFA), after due consultation with FMO.

The following should be included in the evaluation methodology:

- **Method:** The evaluators describe how the review will be carried out, bringing refinements, specificity and elaboration to this ToR. This will include an indicative proposal on methodology / evaluation method per evaluation question and for the recommendations from the MTR. Methodology/evaluation matrix is to be worked out subsequently in an inception report which includes a framework of analyses, methodology, work plan, timing of projects to be visited, and reporting outline. This description will include the limitations of the proposed methodology and will be approved by the Steering Committee and act as the agreement between the parties for how the evaluation will be conducted.
- **Desk Study:** The evaluators will review and analyse relevant documents related to the program, including project documents and client files.
- **Interviews:** The evaluators will interview FMO staff, a sample of clients, and the people involved with the AEF from MFA.
- **Case studies:** The evaluators will review a selection of projects. As part of that, a field mission to three selected projects will be carried out, of which a minimum of two in LDCs, preferably in Africa. Selection criteria are the size of the total investment, the foreseen impact on energy access and diversity in type of renewable energy.

4. Organisation

The evaluator is selected by a Steering Committee, which includes FMO and MFA staff. This selection is based on the quality of the proposal and on the knowledge and experience of the consultants. The evaluator needs to be able to demonstrate knowledge of and proven experience with the following:

- Knowledge of the finance sector;
- Knowledge of development co-operation;
- Knowledge of the energy sector in developing countries, including knowledge of funding services for energy access in developing countries;
- Knowledge of the private sector in developing countries;
- Experience with evaluating energy projects in developing countries;
- Experience with at least 3 similar evaluation tasks, including an explanation of the assignment, the value of the contract and the specific role of the consultant;
- A relevant network of local consultants in potential Case Study countries, who may assist in part of the assignment.

Furthermore, the evaluator should be independent of FMO and MFA.

The proposal should at least include:

- A technical proposal of the execution of the evaluation;
- An explanation of the experience of the consultant with similar assignments
- A specification of the knowledge and experience of the consultants who will be working on the assignment;
- A detailed budget including a specification of tariffs (by members of the study team), a specification of hours needed (by members of the study team), and a specification of other costs.

MFA is responsible for the realisation of the evaluation and will, in consultation with FMO, select the evaluator. Key contact person for the review at FMO is Rosemarijn van der Meij (Sr PA AEF). The steering committee of the review will also consist of Ronald Goldberg (policy advisor at DGIS, responsible for the AEF), and Stan Stavenuiter (evaluation officer at FMO) and may include (external) experts and IOB. The steering committee will coordinate with the contact persons on achievement and submission of their deliverables as well as direct to them questions and requests for input.

5. Planning

What	When
Deadline receiving expression of interest	23 September 2016
Deadline receiving Concept Notes (optional)	28 September 2016
Selection of maximum three candidates to submit full proposals	30 September 2016
Deadline receiving proposals	14 October 2016
Choice of consultant	21 October 2016
Start evaluation	24 October 2016
Deadline inception report	4 November 2016
Deadline draft report	30 November 2016
Deadline final report	15 December 2016

Availability of the consultant is a crucial aspect. Inclusion of local expertise is recommended.

6. Deliverables

- A Concept Note (of maximum 1000 words) is only needed if more than three framework contractors express an interest.
- An inception report outlining the proposed methodology, including a framework of analyses, reporting outline, work plan, final choice of projects to visit and budget. To be submitted to the Steering Committee by 4 November 2016.
- A draft report to be submitted for commenting 30 November 2016.
- A final report to be submitted to MFA and FMO 15 December 2016.

The main deliverable expected from this evaluation is an analytical report in English that puts forward the evaluator's findings, conclusions, recommendations and lessons learned. This report should not be more than fifty pages (excluding annexes) with a two-page executive summary.

Table 1

Overview of outstanding investments, participations and grants from the AEF as per June 2016.

Project	Country	Investment committed
AFRICA EMS NYAMWAMBA LTD	UGANDA	4,536,587.58
AFRICA RENEWABLE ENERGY FUND LP	AFRICA	9,073,175.16
Aldwych Turkana Investments Limited	KENYA	10,000,000.00
AMRET CO. LTD	CAMBODIA	226,829.38
Cenpower Generation Company Ltd.	GHANA	11,506,979.09
CONSORCIO EOLICO AMAYO	NICARAGUA	1,894,099.66
E-Power S.A.	HAITI	2,639,470.13
Gigawatt Global Rwanda Ltd	RWANDA	7,365,322.32
Gigawatt Global Rwanda Ltd	RWANDA	500,227.09
KIVU WATT LIMITED	RWANDA	6,850,247.25
KIVU WATT LIMITED	RWANDA	3,357,074.81
LEREKO METIER SOLAFRICA FUND I	SOUTH AFRICA	4,977,217.74
NMB BANK LTD NEPAL	NEPAL	921,423.52
NORTHWESTERN ENERGY CORPORATION LTD	ZAMBIA	612,557.88
Orb Energy Pte.Ltd.	KENYA	1,814,635.03
POLARIS ENERGY NICARAGUA S.A	NICARAGUA	5,507,307.20
PRASAC MICROFINANCE INSTITUTION LIMITED	CAMBODIA	540,323.91
RABAI POWER HOLDINGS LTD	KENYA	39,200.00
RABAI POWER HOLDINGS LTD	KENYA	200.00
Total		72,362,877.75

Table 2: List of products by fund and FMO-A

	(LCY) Loans		(Subordinated) Loans		Guaranties		Mezzanine		Equity		Grants	
	Fin	Infra	Fin	Infra	Fin	Infra	Fin	Infra	Fin	Infra	Fin	Infra
FMO-A			X	X	X	X	X	X	X	X		
MASSIF	X		X		X		X		X			
IDF		X		X		X		X		X		X
AEF			X	X			X	X	X	X		

Note to Table 2: the table shows that there may be overlap between the products offered by the various funds and FMO-A. There is however a clear difference between the target groups of customers and industries. For all funds applies that projects must be commercially viable or become commercially viable.

- **AEF:** focuses on renewable energy; the fund can provide almost all products with the exception of grants and local currency loans (unless - in terms of local currency - these are structured through TCX);
- **MASSIF:** focuses on the financial sector, product participations, loans in both hard and local currency, fund investments and (exceptionally) guarantees. MASSIF only offers grants in the context of capacity building;
- **IDF:** focuses on the infrastructure sector in the least developed countries

Annexes:

- 1) AEF Annual report 2015;
- 2) Activity plan 2016;
- 3) Amendment Agreement;
- 4) 2011 mid-term review

Annex II Evaluation matrix

The evaluation questions presented in the ToR in Annex I are elaborated on in detail in the evaluation matrix below. The questions have been regrouped to some extent in order to present a logical structure. Additionality has become a separate evaluation criterion and questions presented under relevance and efficiency have been moved to additionality. In addition, the sub-question on the extent to which AEF investments have mobilised/catalysed other sources of finance will be addressed under additionality, while it was originally in the ToR under the heading of efficiency. Also, some of the questions in the ToR under impacts are related to outcomes, and therefore have been moved under effectiveness. As it will be impossible to measure intermediate and overall impacts, we have merged the questions on effectiveness and impacts. The sustainability questions are focused on sustainable energy access and specific questions regarding the sustainability and revolving nature of the Fund and its optimal size have been moved to efficiency.

Table A-I Evaluation matrix

Relevance			
To what extent has AEF responded adequately to the rapidly evolving context regarding funding of renewable energy in SSA and has it addressed the changing policy priorities?			
(Sub) Evaluation question	Indicators	Method	Information source
How have the needs for (development) financing of RE changed in the past ten years? Do the funding needs differ across different energy subsectors?	<ul style="list-style-type: none"> Trends in funding needs in SSA per sub-sector Demand for funding of RE projects in various phases of development 	<ul style="list-style-type: none"> Document review Interviews 	<ul style="list-style-type: none"> SE4ALL, World Bank, IMF, academic literature, see Annex II) Interviews with FMO staff, independent funding experts, other funds (incl. DFIs), RE companies in SSA
How has the supply of RE funding changed over the past ten years (following uptake of RE in emerging markets and, greening of commercial investors, etc.)?	<ul style="list-style-type: none"> Actual RE investments realised in SSA per sub-sector Overview of key players and their characteristics 		
Is there an ongoing need for the recent and current types of RE financing the AEF offers in developing markets (particularly SSA)?	<ul style="list-style-type: none"> Funding provided by AEF compared to trends in RE funding Perceptions of FMO on its position in the RE funding market Perceptions of other actors on the position of AEF in the RE funding market 		
Are the AEF-investments demand-driven?	<ul style="list-style-type: none"> Initiative for AEF investment Involvement of local governments Roles of various actors in the negotiation process 	<ul style="list-style-type: none"> Case studies Interviews 	<ul style="list-style-type: none"> FMO files Interviews with stakeholders
To what extent are the AEF investments in line with the AEF investment criteria and targets set for the Fund?	<ul style="list-style-type: none"> Degree to which the AEF investments are in line with the AEF criteria 	<ul style="list-style-type: none"> Case studies 	<ul style="list-style-type: none"> FMO files Interviews with stakeholders
Are the operational and strategic objectives for the AEF clear and do they allow responding	<ul style="list-style-type: none"> DGIS policy priorities AEF strategic objectives over time 	<ul style="list-style-type: none"> Document review Interviews 	<ul style="list-style-type: none"> Policy documents, Grant Decisions and

to developments in supply of funding and business models (demand)? Do they adequately reflect the policy priorities of the Dutch government?	<ul style="list-style-type: none"> • AEF operational objectives and targets • AEF funding criteria • Match between AEF criteria and policy intentions 		<p>addenda, correspondence</p> <ul style="list-style-type: none"> • Interviews with DGIS and FMO
<u>Additionality</u>			
To what extent is AEF support additional to other funding sources for RE in developing countries?			
(Sub) Evaluation question	Indicators	Method	Information source
How essential was the AEF-investment for the realisation of the total investment? What is the likelihood that the total investment would have taken place without AEF-support? Were there other feasible funding options? What is the catalytic effect of AEF-investments?	<ul style="list-style-type: none"> • Role of FMO in the deal (type of other investors, share of AEF finance, seniority, grace period, length of tenor etc.) • Date of realisation of the various investments in relation to the AEF-investment • Other funding opportunities • Number of syndicated deals realised • The extent to which commercial funding has been attracted (value of private finance vs. AEF investment) 	<ul style="list-style-type: none"> • Case studies • Interviews 	<ul style="list-style-type: none"> • FMO files • Interviews with stakeholders
Does the role of AEF differ across different energy subsectors, across different countries, across different types of projects (off-grid - on-grid, large scale - small scale, rural - urban)?	<ul style="list-style-type: none"> • The role of FMO compared to other investors in the total facility (see above) by region, country, type of RE project; • The role of FMO compared to other investors in the total project (see above) by region, country, type of RE project; 	<ul style="list-style-type: none"> • Document review • Interviews • Case studies 	<ul style="list-style-type: none"> • AEF portfolio
How does the AEF relate to other initiatives of FMO?	<ul style="list-style-type: none"> • Type and volume of other FMO financing (FMO-A, IDF, MASSIF) catalysed after/as a result of AEF • Type of AEF-cancelled deals taken over by FMO-A or other FMO-funds • Compatibility of multiple FMO funds in one project (incl. AEF) 	<ul style="list-style-type: none"> • Portfolio analysis • Document review • Interviews 	<ul style="list-style-type: none"> • AEF portfolio • FMO information on energy funding through different funds and FMO-A • Interviews
How has the role of the AEF versus existing financing for RE in developing markets, in particular in SSA, developed in the past ten years?	<ul style="list-style-type: none"> • Trends in AEF funding over time versus total funding (private vs. public) in the sector, by region. • Specific funding role of AEF compared to other funders 	<ul style="list-style-type: none"> • Document review • Interviews • Portfolio analysis • Case studies 	<ul style="list-style-type: none"> • AEF portfolio • FMO files of selected case studies • General literature (Annex II) • Interviews FMO, independent experts and funded compa-

			nies
Effectiveness and impact			
To what extent have the planned outputs, outcomes and impacts of AEF been realised?			
(Sub) Evaluation question	Indicators	Methods	Information source
<p><i>Outputs</i> - What are the type of investments that have been realised (<i>outputs</i>)?</p> <p>What are the CIO (CDDF) outputs?</p> <p>What is the output of the capacity development program?</p>	<ul style="list-style-type: none"> No. and volume of investments per country (classified by Income status) No. and volume of investments per type of RE project Volume of support regarding improvements in the enabling environment (capacity building) Number, type and stage of development of CIO projects 	<ul style="list-style-type: none"> Portfolio analysis Case studies 	<ul style="list-style-type: none"> AEF portfolio information and results system FMO AEF Annual Reports 2011-2016 AEF MTR 2011 Interviews FMO AEF Additional Investment and project documentation on selected case studies plus interviews
<p><i>Outcomes</i> :</p> <p>To what extent did AEF investments contribute to increased access to energy?</p> <p>What are the socio-economic characteristics of the beneficiaries (pro-poor, urban/non-urban, men/women, etc.)?</p>	<ul style="list-style-type: none"> No. of households/ people connected /provided with access to energy classified per type of energy source and per type of use (compared with their prior situation – if known); Characteristics of households and people connected 	<ul style="list-style-type: none"> Portfolio analysis Case studies 	<ul style="list-style-type: none"> AEF portfolio information and results system Additional Investment and project documentation on selected case studies plus interviews
<p><i>Impacts*</i> – What is the actual use of the gained energy access from AEF investments?</p> <p>What other economic, social and environmental impacts are created by AEF investments (e.g. poverty alleviation, economic growth, climate)?</p> <p>To what extent did AEF contribute to inclusive green growth or what is the expected contribution in the years to come?</p>	<ul style="list-style-type: none"> Evidence on use of electricity by beneficiaries Evidence on reduction of Greenhouse Emissions (climate change); Evidence on economic impact (increased production and/or productivity; reduced costs) Evidence on social impact (effects on leisure/comfort, education, gender, health and security) 	<ul style="list-style-type: none"> Portfolio analysis Case studies 	<ul style="list-style-type: none"> Investment documentation (FMO) Additional investment and project documentation and interview input from case studies
<p><i>Explanatory factors, M&E and contribution:</i></p> <p>To what extent can the results at the various levels (outputs, outcomes and impacts) be contributed to AEF?</p> <p>How have monitoring data been collected and what is the quality of the monitoring information?</p> <p>What additional insight into effectiveness and</p>	<ul style="list-style-type: none"> Completeness and quality of monitoring data Use of monitoring data in FMO for reporting, for learning, etc. Objectives and coverage of AEF evaluation plan Expected results of realised, ongoing and planned evaluations 	<ul style="list-style-type: none"> Document review Interviews Contribution analysis Triangulation 	<ul style="list-style-type: none"> Monitoring data AEF evaluation plan Evaluation ToR and reports Interviews FMO Strategy department (incl M&E) Multiple (from above)

development impact of AEF will be provided by the ongoing and planned effect and impact evaluations commissioned by FMO?			
What have been the critical (success) factors in achieving these results?			
Efficiency			
Were the financial resources and other inputs efficiently used to achieve the expected results?			
(Sub) Evaluation question	Indicators	Method	Information source
How are inputs (fund money and staffing) transformed in viable investments?	<ul style="list-style-type: none"> • Breakdown of AEF costs per year in different categories (staffing, M&E, reimbursables) • FMO organisational structure for AEF with breakdown of roles and responsibilities • Skills and expertise of the AEF team • Presence on the ground of the AEF team • Number of AEF investment opportunities identified and realised • Cost-effectiveness of the AEF investments 	<ul style="list-style-type: none"> • Document review • Interviews • Case studies 	<ul style="list-style-type: none"> • FMO documents • Interviews FMO staff and funded companies
What is the extent of underspending of AEF in recent years and what are the reasons for this underspending?	<ul style="list-style-type: none"> • Number and volume of identified potential investments that were not realised • Reasons for non-approval 	<ul style="list-style-type: none"> • Document review • Interviews • Portfolio analysis 	<ul style="list-style-type: none"> • FMO documents • Interviews
To what extent has FMO contributed via other government funds (IDF, MASSIF) and other FMO means such as FMO-A to AEF supported investments?	<ul style="list-style-type: none"> • Number of projects that are co-funded via other FMO funds or means • Relative and absolute amounts of funding from the various FMO sources 	<ul style="list-style-type: none"> • Portfolio analysis • Interviews 	<ul style="list-style-type: none"> • FMO documents • Interviews
To what extent is the Fund revolving in line with the expectations? What are the reasons for impaired transactions?	<ul style="list-style-type: none"> • Revolvability overall and per year • Number of impaired transactions • Reasons for impaired transactions • Expenditures affecting the cash flow of the AEF, such as overhead costs, and additional M&E, 	<ul style="list-style-type: none"> • Portfolio analysis • Interviews 	<ul style="list-style-type: none"> • FMO documents • Interviews
To what extent have the recommendations of the MTR to improve the functioning of AEF been implemented?	<ul style="list-style-type: none"> • Changes in project development involvement • Changed calculation methods for Hydro and Wind projects to reflect production capacity instead of installed capacity • Section on the quality of the trans- 	<ul style="list-style-type: none"> • Document review • Interviews 	<ul style="list-style-type: none"> • Reaction of DGIS and FMO to the MTR • Reporting on implementation of MTR recommendations in progress

	action for the recipient country in the documentation for credit approval <ul style="list-style-type: none"> • Post-mortem analysis of failed transaction, including lessons learned 		reports
What is the optimal size of AEF taking into account the planned reallocation of € 32 million to CIO?	<ul style="list-style-type: none"> • Expected number of investments based on portfolio trends • Demand for project finance of the type AEF in the market 	<ul style="list-style-type: none"> • Portfolio analysis • Interviews • Triangulation 	<ul style="list-style-type: none"> • FMO documents • Interviews FMO and DGIS
To what extent does AEF and FMO as fund manager learn from its investments, other funds, discussions with DGIs, etc?	<ul style="list-style-type: none"> • Concrete examples of learning 	<ul style="list-style-type: none"> • Document review • Interviews 	<ul style="list-style-type: none"> • FMO documents • Interviews FMO and DGIS
Sustainability			
To what extent is sustainable energy access achieved through the AEF?			
(Sub) Evaluation question	Indicators	Method	Information source
To what extent is sustainable (i.e. long lasting) energy access achieved through the Fund, even after the completion of projects?	<ul style="list-style-type: none"> • Financial viability of the companies in which was invested; • Type of finance provided • Type of RE technology supported • Income status of the population served; 	<ul style="list-style-type: none"> • Portfolio analysis • Case studies 	<ul style="list-style-type: none"> • Project documentation • Documentation and interviews from case studies
What are the factors that influence the sustainability of results (achieved energy access, such as social, technical, economic, environment) and to what extent are they fulfilled or are corrective measures required?	<ul style="list-style-type: none"> • Social conditions • Environmental conditions • Technical conditions • Economic conditions • Governance conditions 	<ul style="list-style-type: none"> • Interviews • Case studies • Triangulation 	<ul style="list-style-type: none"> • Interviews with FMO, independent experts; • Triangulation

- The sub-questions on impact and related indicators are highlighted in grey because most of these questions cannot be answered as the evaluation is primarily based on secondary sources

Annex III List of people interviewed

Table A-II People interviewed

Name	Position
Gerrit-Jan Brunink	Senior Investment Officer - Triodos Renewable Energy For Development Fund
Roelof Buffinga	Head of Climate Team - Department for Inclusive Green Growth (IGG), MFA
Joao Cunha	Chief Climate Finance Officer - African Development Bank (AfDB)
Marc Davis	Investment Director Renewable Energy -Norfund
Elvira Eurlings	Director Energy - FMO
Ronald Goldberg	Senior policy adviser - Climate Mitigation and Renewable Energy, Department for Inclusive Green Growth (IGG), MFA
Patrik Huber	Regional Manager Africa - ResponsAbility
Irma Keijzer	Senior advisor monitoring & evaluation for results – Department for Sustainable Economic Development, MFA
Björn Kuil	Sr. Policy Advisor Financial Sector Development – Department for Sustainable Economic Development, MFA
Floor van Oppen	FMO, AEF manager, NL business fund manager
Joep Schenk	Research Officer - Operations and Evaluation Department (IOB), MFA
Jorim Schraven	Director Strategy department - FMO
Anne Soichot Berger	Senior Infrastructure Investment Officer - The Belgian Investment Company for Developing Countries (BIO)
Leonie Sonawaala-de Haan	Senior Planning and Control Officer - FMO
Miriam Valstar	Evaluation Officer - FMO
Frank van der Vleuten	Energy expert in Climate team of Ministry of Foreign Affairs , RVO.nl - Climate Investment Funds

Annex IV List of documents

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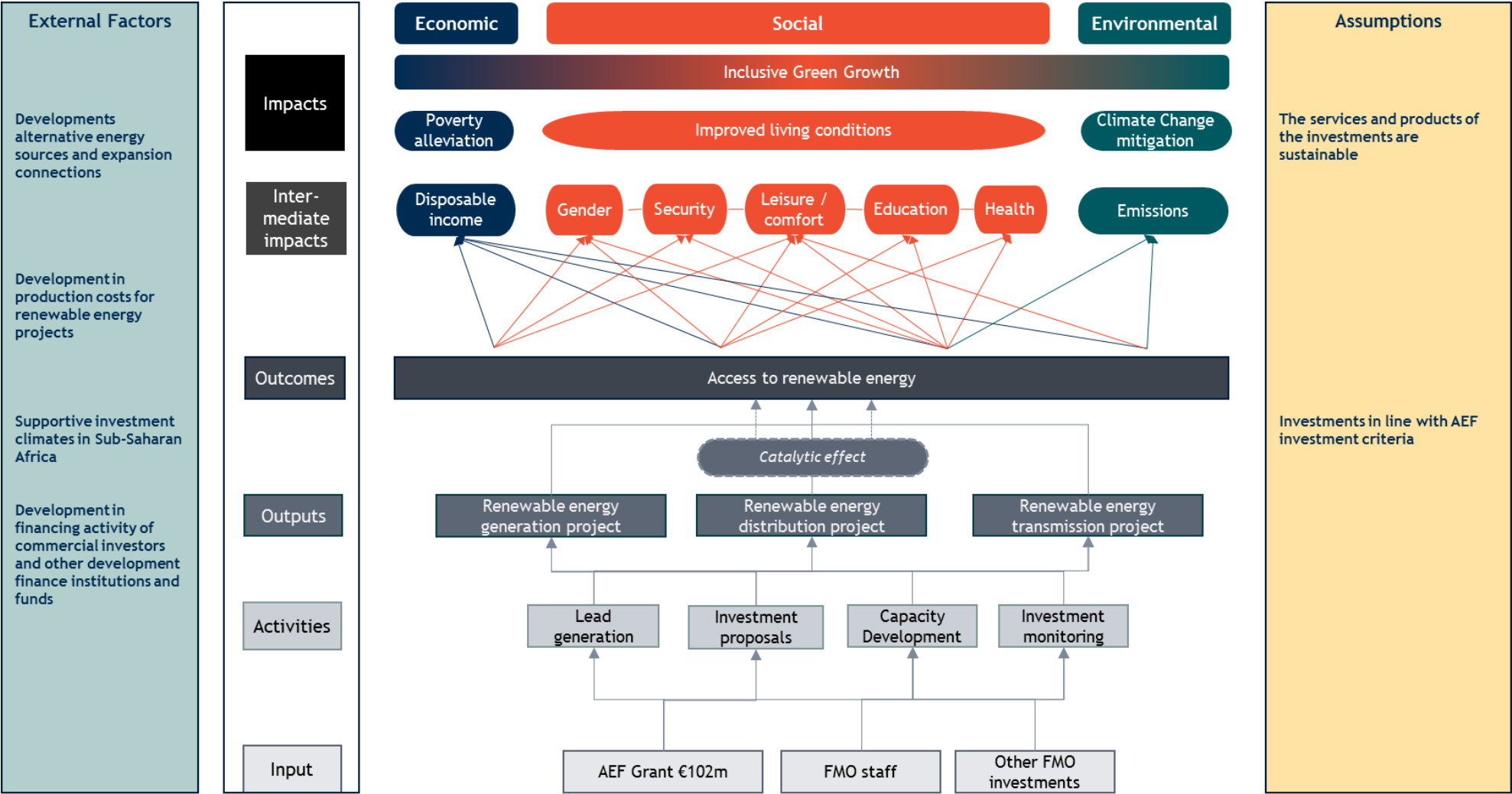
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Annex V Reconstructed Theory of Change AEF

Figure A-I Theory of Change AEF



Annex VI Detailed portfolio information

The AE portfolio presented below was reconstructed by the evaluators based on the following information sources:

- Annual reports 2007-2015;
- FMO-dashboard of the current (October 2016) portfolio;
- FMO project documentation (FP, IMR, IC and CCR) obtained for the case studies;
- Additional information gathered from the internet.

Table A-III Active AEF projects 2007-2016

Name	Country	Type	Year granted	Technology	Connection	Finance type	Committed (US\$ mln)	Disbursed (US\$ mln)	Total project (US\$ mln)
Prasac Microfinance Inst. Ltd	Cambodia	Bank	2007	Biogas	Off-grid	Loan	2.0	2.0	N.A.
Clean Energy Development Bank Ltd.	Nepal	Bank	2008	Hydro	Grid-connected & off-grid	Loan	5.0	5.0	N.A.
Northwestern Energy Corp Ltd	Zambia	Project	2008	Fossil	Grid-connected	Loan	3.8	3.8	4.6
Rabai Power Holdings Ltd	Kenya	Project	2008	Heavy Fuel Oil	Grid-connected	Equity	7.8	7.8	166.9
AMRET Co. LTD	Cambodia	Bank	2009	Biogas	Off-grid	Loan	1.0	1.0	N.A.
E-Power S. A.	Haiti	Project	2009	Heavy Fuel Oil	Grid-connected	Loan	10.5	10.5	56.7
Corporacion Polaris Energy NIC S.A.	Nicaragua	Project	2009	Geothermal	Grid-connected	Loan	7.0	7.0	376.4
Xacbank LLC	Mongolia	Bank	2009	Solar	Off-grid	Loan & Grant	2.2	2.2	N.A.
Consortia Eolico Amayo	Nicaragua	Project	2010	Wind	Grid-connected	Loan	3.0	3.0	60.0
African Finance Corporation	Ghana	Bank	2011	Light Crude/Gas	Grid-connected	Grant	1.5	1.5	
Kivu Watt Ltd	Rwanda	Project	2011	Methane	Grid-connected	Loan	11.3	11.3	141.7
Solafrica Fund - Lereko Metier	South Africa	Fund	2012	Solar	Grid-connected	Equity	10.3	10.3	N.A.
Aldwych Lake Turkana Wind	Kenya	Project	2013	Wind	Grid-connected	Equity	10.0	10.0	622.0
Gigawatt Global Rwanda	Rwanda	Project	2014	Solar	Grid-connected	Loan	8.9	8.9	23.7
JCM Greenquest	Cameroon	Project	2014	Solar	Grid-connected	Equity	1.0	1.0	2.7
Africa Renewable Energy Fund	-	Fund	2014	Various renewables	Grid-connected & off-grid	Equity	10.0	10.0	205.4
Cenpower	Ghana	Project	2014	Light Crude/Gas	Grid-connected	Equity	12.7	12.7	891.6
AFC-FMO project development	Cote d'Ivoire	Project	2015	Hydro	Grid-connected	Grant	1.4	1.4	N.A.
Africa EMS Nyamwamba	Uganda	Project	2015	Hydro	Grid-connected	Loan	5.0	5.0	28.7
Orb Energy	Kenya	Project	2015	Solar	Off-grid	Equity	2.0	2.0	4.4
Global Innovative Consulting	Ghana	Project	2015	Solar	Grid-connected	Grant	0.8	0.8	2.2
Mobisol	Tanzania, Rwanda, Kenya	Project	2016	Solar	Off-grid	Equity	8.3	8.3	50.4

Table A-IV Closed* and written-off** projects 2007-2016

Name	Country	Type	Year granted	Technology	Connection	Finance type	Committed (US\$ mln)	Disbursed (US\$ mln)	Total project (US\$ mln)
Saems Capital I BV*	Sri Lanka/ Uganda	SPV	2009	Hydro	Grid-connected	Loan	11.0	11.0	83.6
Buchanan*	Liberia	Project	2011	Biomass	Grid-connected	Grant	0.2	0.2	N.A.
Offgrid Solutions (Wakawaka)*	Rwanda	Project	2014	Solar	Off-grid	Grant	0.6	0.6	1.5
Sunlabob**	Laos	Project	2007	Solar	Off-grid	Loan & Grant	2.7	0.5	3.4
IPP Greater Banjul**	Gambia	Project	2009	Heavy Fuel Oil	Grid-connected	Grant	0.8	0.1	N.A.
E+co Inc.**	Worldwide	Fund	2009	Various renewables	Grid-connected & off-grid	Loan	14.6	3.5	44.5
Inensus**	Senegal	Project	2012	Various renewables	Mini-grid	Loan & Grant	2.1	0.0	5.2
ToughStuff**	East-Africa	Project	2012	Solar	Off-grid	Grant	2.5	1.0	12.6

Table A-V Cancelled projects 2007-2016

Name	Country	Type	Year granted	Technology	Connection	Finance type	Committed (US\$ mln)	Disbursed (US\$ mln)	Total project (US\$ mln)
Banque Populaire du Rwanda S.A.	Rwanda	Bank	2009	Biogas	Off-grid	Loan	5.6	-	N.A.
Tema Osonor Plant Ltd.	Ghana	Project	2010	Gas	Grid-connected	Loan	10.0	-	127.1
Lereko Metier Sustainable Capital Fund	South Africa	Fund	2011	Wind	Grid-connected	Equity	13.1	-	N.A.

Annex VII Overview of case studies

Table A-VI Selected case studies

Project	Year granted	Status
Corporacion Polaris Energy NIC S.A.	2009	Active
Consortia Eolico Amayo	2010	Active
African Finance Corporation	2011	Active
Kivu Watt Ltd	2011	Active
Aldwych Lake Turkana Wind	2013	Active
Gigawatt Global Rwanda	2014	Active
Africa Renewable Energy Fund	2014	Active
Cenpower	2014	Active
Africa EMS Nyamwamba	2015	Active
Orb Energy	2015	Active
Global Innovative Consulting	2015	Active
Saems Capital I BV	2009	Closed
Offgrid Solutions (Wakawaka)	2014	Closed
E+co Inc.	2009	Written-off
Inensus	2012	Written-off
ToughStuff	2012	Written-off
Tema Osonor Plant Ltd.	2010	Cancelled
Lereko Metier Sustainable Capital Fund	2011	Cancelled

Annex VIII Publicly Funded Access-to-Energy Programmes

Table A- VII Selected Initiatives similar in scope to Access to Energy Fund

Name	Description
Energising Development (EnDev)	An initiative of Australia, Germany, the Netherlands, Norway, Switzerland, and the United Kingdom that aims to provide sustainable access to modern energy services to at least 15 million people by the end of 2018.
Energy Access Ventures	Private equity fund for financing SMEs active in the generation and/or distribution of electricity in sub-Saharan Africa. Focus on off-grid rural electrification, starting in East Africa. Majority of the investments will be in off-grid solar technology, in particular solar home systems, micro-grid infrastructure, and other small/micro-scale RE and hybrid technologies. Partners are Schneider Electric, EIB, UK's CDC and DFID and France's FFEM and Proparco.
Global Lighting and Energy Access Partnership (Global LEAP)	Energy access initiative by the Clean Energy Ministerial (CEM) that includes more than ten governments and development partners. The initiative is led by the US Department of Energy. Works to catalyse the development of commercial markets for energy access solutions.
IRENA – Abu Dhabi Fund for Development (ADFD)	Project Facility to finance transformative and replicable RE projects in developing countries. IRENA selects and recommends promising RE projects in developing countries. ADFD then offers soft (concessional) loans to these projects worth US\$ 350 million over seven annual cycles (started in 2012). Large-scale RE generation plants in West Africa.
Lighting Africa	Since 2007, the programme has already enabled more than 17.3 million people across Africa to access clean energy. Active in 11 countries in Sub-Saharan Africa. Part of the World Bank Group's contribution to Sustainable Energy for All (SE4All). It is implemented in partnership with the Energy Sector Management Assistance Program (ES-MAP), the Global Environment Facility (GEF), and many donor countries.
Power Africa	US government initiative that aims to add 30,000 MW of new and clean power generation capacity and provide 60 million new electricity connections by 2030. Six focus countries (Ethiopia, Ghana, Kenya, Liberia, Nigeria, Tanzania). Also looking at mini-grids and off-grid solutions. The US\$ 7 billion initiative was launched in 2013. After three years, it has helped to facilitate the financial close of private sector power transactions that are expected to generate over 4,600 MW. In 2016, President Obama signed the Electrify Africa Act, signalling that expanding electricity access in sub-Saharan Africa is a long-term foreign policy priority of the US. ⁶² The Overseas Private Investment Corporation (OPIC), the US finance institution, has committed more than US\$ 1.7 billion in debt financing and insurance in support of 19 Power Africa projects, expecting to create 1,500 MW of new generation capacity. It agreed to provide Kenya and Nigeria with more than US\$ 20 million in loans to promote solar energy in 90,000 households.
Sustainable Energy	UN programme on catalysing private-sector activities in many different parts of the

⁶² Power Africa Annual Report 2016 https://www.usaid.gov/sites/default/files/documents/1860/Power_Africa_AR2016-optimized.pdf

for All (SE4ALL)	value chain.
	A partnership that invests in clean energy markets in developing countries. REEEP has formed partnerships with more than 120 governments, banks, businesses, NGOs, and inter-governmental organisations, and has invested about US\$ 20 million (€ 16.4 million) in more than 145 projects.
Sustainable Energy Fund for Africa (SEFA)	Fund administered by the African Development Bank and anchored by a Danish government commitment of US\$ 57 million to support small and medium-scale clean energy and energy efficiency projects in Africa through grants for technical assistance and capacity building, investment capital and guidance.

Table A- VIII Examples of private bank initiatives funded by public sector

Name	Description
Green Investment Bank (GIB)	UK government has given over GBP 4 billion to finance a pilot programme that would allow it to internationalise its lending activities. One of the programme's focal areas is renewable and energy efficiency projects in East Africa and South Africa.
Deutsche Bank AG	Proposed a US\$ 3.5 billion debt fund for decentralised renewables to the Green Climate Fund (GCF). GCF has approved funding of US\$ 80 million. ⁶³ The Universal Green Energy Access Program (UGEAP) will initially focus on Nigeria, Benin, Namibia, Tanzania and Kenya. It intends to mobilise investments from both the public and private sector. ⁶⁴ The program will focus on solar home systems, mini- and micro-grids and clean energy supply to businesses. It is expected to create 1,500 MW of renewable electricity in 15 years' time.

⁶³ <http://www.greenclimate.fund/-/gcf-board-approves-usd-745-million-in-funding-proposal-1?inheritRedirect=true&redirect=%2Fhome>

⁶⁴ <http://www.powerforall.org/blog/2016/10/11/new-fund-to-propel-decentralized-renewables-into-mainstream>