Mid-term Evaluation

Evaluation of the Results-Based Financing for Low Carbon Energy Access Facility (RBFF) within Energising Development (EnDev)

Final Report

energising development

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GIZ Contract No. 81174801

Project No. 14.2275.7-901.01

October 2017

Consortium led by:

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List of Acronyms and Abbreviations

BMZ	German Federal Ministry for Economic Cooperation and Development
CLASP	Collaborative Labeling and Appliance Standards Program
DAC	Development Assistance Committee
DC	Direct Current
DFID	UK's Department for International Development
EQ	Evaluation Question
FI	Financial Intermediary
FMA	Fund Management Agent / Financial Management Agent
FPICS	Firewood Portable Improved Cooking Stoves
GHG	Green House Gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
Hivos	Humanist Institute for Development Cooperation
HQ	Headquarters
ICS	Improved Cookstoves
IDCOL	Infrastructure Development Company Limited
IVA	Independent Verification Agents
KPI	Key Performance Indicator
LA	Lighting Africa
MEVA	Monitoring, Evaluation, Verification and Audit
MFI	Micro Finance Institutions
MTE	Mid-term Evaluation
NGO	Non-Governmental Organisation
ODA	Official Development Assistance
OECD	Organisation For Economic Co-Operation and Development
PAYGO	Pay As You Go
PSL	Private Sector Leverage
PV	Photovoltaic
RBF	Results-Based Financing
RBFF	Results-Based Financing For Low Carbon Energy Access Facility
SACCOs	Savings and Credit Cooperatives
SHS	Solar Home Systems
SNV	Netherlands Development Organisation
SREP	Scaling Up Renewable Energy Program
SWH	Solar Water Heater

TA	Technical Assistance
UK	United Kingdom
VFM	Value For Money
WB	World Bank

Executive Summary

The Results-Based Financing for Low Carbon Energy Access (RBF) Facility is funded by the UK's Department for International Development (DfID). The Facility is part of the global Energising Development (EnDev) programme, a partnership between the Netherlands, Germany, Norway, the UK, Switzerland and Sweden. It aims to open up access to clean energy in low-income countries and gives incentives to private sector businesses that deliver and operate clean energy products, services or systems. The Facility has been implemented in three consecutive rounds of calls for RBF project proposals.

As part of the overall evaluation of the RBF Facility, this mid-term evaluation (MTE) assesses the performance of the Facility covering the period from its launch in July 2012 to December 2016 (its implementation period will end in December 2019). As main product of the MTE, this Report provides an initial understanding of what has worked in which circumstances and why. Moreover, it derives recommendations and lessons learnt for further RBF implementation and for future programmes, energy access support, climate finance and development assistance more broadly.

As an impact achieved with the Facility, almost 350,000 RBF end-users have gained access to modern energy services, with commensurate co-benefits. In most projects, there is no differentiation of the target groups according to poverty levels. All customers are treated the same, which means that the evaluated projects do not specifically target disadvantaged groups. More approaches should be tested to tailor the RBF to the poorest tiers. Pro-poor targeting can also be achieved through targeting of relatively poor regions which has been done with RBF for remote rural areas.

RBF projects are exposed to different policy environments in their respective countries. Overall, they are rather vulnerable to changing project contexts and policy risks, which are both challenging to mitigate. It was found that alignment and coordination with pre-existing national programmes are crucial for the effecttiveness of RBF and needs to be factored into project design and adaptive management.

RBF projects exhibit different levels of additionality. Some are driving market development in a new area or for a new product; others are continuing national programmes. In general, additional effects of RBF projects are strongest where market development was not ongoing when the RBF project was launched; new technologies could be introduced through RBF and no international or national programmes negatively affected their roll-out.

The private sector leverage of the whole RBF Facility is significant. It is particularly high when looking at the ratio of incentive payments over private sector investments. Yet, the Key Performance Indicator 'Private Sector Leverage', which compares the total RBF project budget (i.e. including non-incentive budget) with the private investments, is in most projects (with the exception of the Tanzania PV) still far lower than the target. This is an indication that so far, comparatively more needed to be invested in RBF management and technical assistance than in the incentive payments. Overall, it can be expected that both values will improve as more sales are recognised.

Overall, roughly 13% of the sales target of the Facility in terms of turnover has been reached by December 2016. This low uptake is mainly attributable to the inception periods that were longer than planned. Especially projects from Round 2 are lagging behind with respect to implementation successes. Moreover, the financial sector has not been as engaged as initially expected. These two aspects are closely interlinked, as Round 2 projects are on average more dependent on the financial sector than

Round 1 and 3 projects. Overall, it can be expected though that the sales uptake will rapidly grow in the future with RBF projects now being well established and running.

The effectiveness of the incentive design for the Facility strongly depends on what is incentivised and who receives the incentives. This is more important than the most appropriate incentive level. The key question is whether the right target group is given incentives to achieve the envisaged market transformation. Most projects, rightly, reward the sale to the target group. Generally, there is a risk that the incentives are too low to be effective. The risk that the incentive is too high, on the other hand, has proven to be negligible. It can be managed by rapid adjustments during the implementation phase. More sophisticated incentive structures are being tested for capital-intensive upstream activities like product development and certification. Such incentives bear the significant risk though of de-linking upstream activities from the sales and from the recipients; the risk is that incentives are paid out without a development result. The benefit of auctions in which market mechanisms determine the incentive may be outweighed by high administration and management costs for this type of incentive.

The phasing out the RBF incentives should no longer be neglected in project design and implementation. Projects, in particular from Round 1, should now be actively working on their phase-out strategies. A phasing out strategy needs to be developed for all projects now.

The implementation structures proposed in the projects' design phases have mostly been suitable for the interventions. Exceptions to this rule are the projects that tried to engage with the financial sector; getting banks and Micro Finance Institutions (MFIs) on board remains challenging. As a result, the assumptions formulated in the DfID business case regarding the efficiency and value for money of engaging EnDev as implementing partner have been confirmed. In general, the involved implementing organisations have significantly capitalised on their existing projects, contacts and already existing implementation structures. A long-term market exposure and technical expertise of the implementing organisations and their staff are the pillars for effective engagement within the wider renewable energy sector.

In all projects, there was a permanent challenge to cope with constrained management resources. Projects need to have sufficient human resources to be effective. For most RBF projects, the setup and inception required considerably more time and technical input than originally projected. One of the main challenges was that businesses overall, and the financial sector in particular, were not sufficiently prepared for and capable of launching and implementing this approach. Another difficulty was establishing and running effective and efficient verification structures.

Resulting from this, the originally envisaged 20% proportion of management and delivery costs (including verification) has clearly proven to be too low. A share between 20% and 40% is a more realistic assumption depending on the specific project and country context.

As strong point, RBF implementation has benefited from a high level of adaptive management. As a result, the final setup of the interventions varies significantly across the RBF portfolio. Individual tailoring has resulted in a rising level of complexity thereby also affecting transaction costs.

The monitoring, evaluation, verification and audit (MEVA) system is a specific requirement for all RBF projects. The specific objectives of MEVA systems need to be well defined to maximise their relevance and efficiency. Projects should choose from two strategy options, either rationalise data sampling, collection and management for verification, or enhance data collection at extra cost. Statistical evidence needs and deliberate decisions regarding verification methods and sampling methodologies should drive the setup and methodologies of MEVA.

According to the prescriptions of DFID, a secondary output of RBF should be the production and dissemination of guidance and knowledge products. In spite of the management resource constraints, RBF has so far delivered on this. The dissemination of guidance and knowledge products was mainly secured through cross-subsidisation by other projects.

As a conclusion, the quality of project management is of utmost importance for effective RBF implementation. To support effective RBF management on-site, EnDev headquarters is called upon to be a strong and proactive facilitator of knowledge exchange and mutual learning. It needs to enhance the application of minimum standards, tools and methods. Projects should aim to improve further on process management and the transparency of operations.

An important goal of the evaluation exercise is to help further strengthening the adaptive management of ongoing and shaping future RBF approaches. The lessons and recommendations presented with this report mainly relate to RBF effectiveness, market transformation and management.

First, it is recommended that decision makers focus on the stakeholders and the barriers that they are facing when determining incentives. Different incentive designs should be tested and some degree of variation allowed in the existing projects as well as in new projects. It is important to strike a good balance between adjusting incentives quickly and offering a reliable and predictable support mechanism to the private sector. Incentive designs should also be informed by an appropriate phasing out strategy.

Related to a specific technology supported by the Facility, the Report concludes that RBF cannot solve all challenges that mini-grid projects are exposed to. Therefore, it is suggested to reconsider whether to keep mini-grids as part of the (future) RBF portfolio. Potentially long-term (and/or forgivable) loans, policy advice and technical assistance are more suitable instruments for the establishment of mini-grids.

A further lesson learnt relates to multi-country projects: bundling country projects into multiple country projects does not automatically lead to transnational synergies.

Overall, it has emerged that RBF projects can contribute to market transformation and remove market barriers, but the latter need to be clearly understood. Not all market barriers can be addressed by RBF. It was found that new technology businesses have greater interest in the incentive schemes than the retail mainstream or the financial sector. It has also been confirmed that RBF helps businesses grow. Doing so, enterprises first choose 'low-hanging fruit' while expanding their businesses. Therefore, it is recommended to test in the future more approaches that target the incentives towards poor and vulnerable groups as well as women. This should be done in future projects and in existing projects by revisiting the current incentive structures.

Further lessons and recommendations stem from the review of RBF management. Projects need to be well prepared and have sufficient resources for the required TA tasks. It is necessary to dedicate more resources to project preparation. Overambitious and unrealistic target setting during the project proposal stage should be avoided. Furthermore, stakeholder engagement planning should be more systematic and thorough. This is particularly necessary as expectations with respect to financial sector involvement have not been met. Sufficient time and resources should be spent on preparatory and accompanying market research. The implementation period should be made more flexible according to the maturity and development of the relevant market.

Moreover, process management and transparency at overall EnDev management and at RBF project level should be further enhanced. Since the quality of project management matters more than anything else for effective project

implementation, a focus on the quality of project management and the capitalisation on market intelligence within and across RBF projects are important. Last, but not least, RBF project management should capitalise on the convening power of RBF/EnDev.

1 Introduction

The Results-Based Financing for Low Carbon Energy Access Facility

The Results-Based Financing for Low Carbon Energy Access Facility (RBFF) has been put in place within the Energising Development (EnDev) programme[1] "to overcome market failures constraining private sector delivery of distributed renewable energy systems providing modern energy services to the poor."[2] The Results-Based Financing (RBF) funding is "intended to reduce or mitigate commercial market failures, however not in the sense of large scale capacity building or policy support to the strengthening of framework conditions, but by providing financial incentives to private sector to overcome typical, but temporary, market development risks."[3] The RBFF also supports the testing, learning from and showcasing of RBF to understand better "when, and under what circumstances, it can be a useful tool for improving access to modern energy services. This will help inform the future design and programming of climate finance, and development assistance more broadly."[4] Viable business models are to be developed and tested, with the key feature of *payment upon delivery*. "Private participants are expected to take the full risk until the moment of delivery of the contracted results, e.g. in terms of households provided with sustainable access to energy, of cubic metres of biogas produced, or of units of electricity delivered to a mini-grid or to individual households. It is further expected that after the RBF intervention, markets will have undergone acceleration in their development through which they can either operate at a higher level, or even are propelled to a sustainable and autonomous growth path." The overall Theory of Change for the RBFF is enclosed in Annex 8.8.

The RBF Facility initially had the following quantitative results targets[5]:

- 10 to 15 RBF instruments in at least five developing countries.
- 1.5 million people sustainably provided with modern energy by 2015, rising to 2.5 million by 2017.
- Mitigation of at least 900,000 tCO_2e.
- Creation and/or expansion of at least 50 viable enterprises providing energy products and services, leading to increased employment.
- The leverage of private sector investment at a ratio of at least 1:1.
- Proof of principle for RBF as a tool for development, and a set of lessons learned generated from a/o independent evaluations.

With the extension of the RBFF in 2014, the expected results were adjusted as follows[6]:

- 5.95 million people with improved access to clean energy.
- 2220 direct jobs created as a result of the International Climate Fund (ICF) support.
- Change in Greenhouse Gas (GHG): 8.5 million.
- 2.18 million low carbon technologies supported (units installed) through IFC support.
- 123 million € of private finance mobilised for climate change purposes.

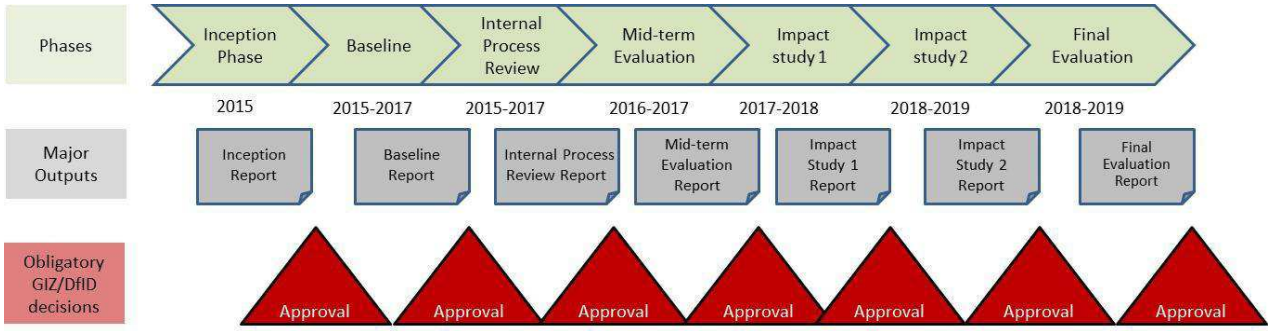
[1] For more information, see the EnDev website: https://endev.info.
[2] EnDev RBF selection guidelines 2012.
[3] EnDev RBF selection guidelines 2012.
[4] EnDev RBF selection guidelines 2012.
[5] EnDev RBF selection guidelines 2012.
[6] Amendment to the arrangement on delegated cooperation between BMZ and DfID regarding the Energising Development Programme (2014). Annex 2.

2 Approach and methodology

Overview of this multi-phase evaluation

This report constitutes the key output of the Mid-term Evaluation (MTE) of the EnDev RBF Facility. It is embedded in a multi-phase evaluation exercise, consisting of seven phases (from the inception to the final evaluation) with seven key outputs (see Figure 1), which is conducted by a Particip led consortium.[7]

Figure 1: Overview of multi-phase evaluation



Source: Particip

Objectives, scope and purpose of the evaluation

According to the Terms of Reference (ToR)[8], the purpose of this evaluation is threefold:

1. To assess the performance of the RBF Facility over the entire implementation period against the five key evaluation criteria (relevance, impact, sustainability, effectiveness and efficiency) of the Development Assistance Committee (DAC) of the Organisation for Economic Co-operation and Development (OECD);
2. To understand and disseminate what has worked in which circumstances and why; and
3. To derive recommendations where possible for future programmes in RBF, energy access support, climate finance and development assistance more broadly.

The scope of the MTE encompasses 12 different RBF projects (from all three rounds) from a total of 17 RBF projects within the EnDev programme. The decision on which projects to select was made together with EnDev headquarters (HQ) and DfID staff. Reasons for the selection of the evaluation portfolio included the advanced implementation progress and the representative coverage of technologies and regions.

Apart from the EnDev Governing Board, the primary target audiences for this report are other organisations currently implementing RBF projects or those who are considering to launch RBF projects themselves.

The overall multi-phase evaluation process serves both accountability as well as learning purposes. However, this MTE puts less focus on measuring what has been achieved (summative elements), and more focus on the future by identifying useful lessons and recommendations. The reason for this is that most projects in the portfolio only began picking up momentum after a period of slow progress in the establishment phase, so at this point in time it is not fully possible to assess their impacts or successes.

[7] The Particip consortium consists of Particip GmbH and XS-Axis. It was agreed that the involvement of XS-Axis was focused on the inception phase and the internal process review.

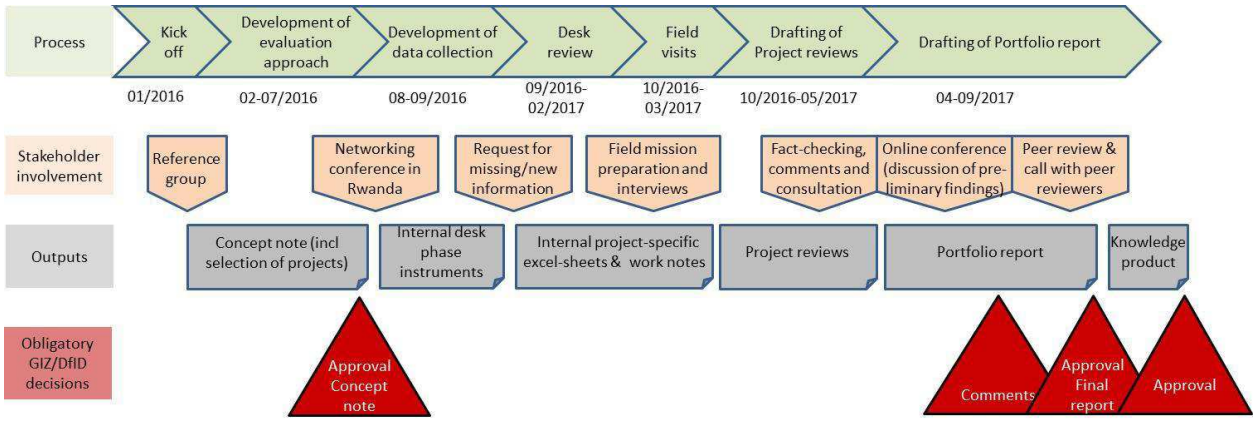
[8] The Terms of Reference (ToR) as well as the Addendum to the ToR can be found in the Annex 8.9.

This MTE rather aims at helping EnDev and the RBF projects to improve their operations as early in programme implementation as possible, while at the same time presenting an opportunity to test some intermediate hypotheses (see Annex 8.7).

Overall approach and consultation process of this mid-term evaluation

The evaluation process for this MTE was divided into seven, partly overlapping steps (see Figure 2) in which 12 RBF projects were selected for in-depth review by a research team consisting of five senior experts (the evaluation team).[9]

Figure 2: Overview of evaluation and consultation process



Source: Particip

Based on the ToR and the discussions with the reference group during the kick-off meeting in January, 2016 at GIZ HQ, the evaluation team drafted a Concept Note, which presented the evaluation framework, methodology, data-related issues and the evaluation timeline. It was finalised in July 2016 after consultations with GIZ, DfID and other stakeholders. Communications and consultations with evaluation stakeholders were strongly facilitated by the participation of the evaluation's team leader and quality manager at the EnDev RBF workshop in Rwanda in July, 2016.

In preparation of the desk review, data collection and analysis instruments were developed which helped translate the evaluation questions and information needs into questionnaires and structure the various data sources.[10] The RBF projects selected for this MTE were then requested to send missing and new documentation to the evaluation team.

The desk review ran from September 2016 to February 2017 and included the review of project-related documentation of the selected RBF projects. Internal project-specific spreadsheets and internal work notes were prepared in the course of this review process. This process highlighted gaps in the documentation which were then discussed with the local RBF project managers before and during the respective country visits.

[9] The initial Team Leader Wolfgang Mostert (Particip) who had the overall responsibility for the inception phase as well as partly for the Baseline Report and the Internal Process Review was replaced by Dr. Christine Wörlen (Arepo Consult) for the MTE, the Impact Studies and the Final Evaluation. The other members of the core MTE team are Dr. Meller (Particip), Dr. Gunther Bensch (Ecol), Dr. Greib (Arepo Consult) and Thomas Keck (Particip) while Thomas Keck also holds the position of the overall quality manager. The team is supported by junior consultants from both Particip and Arepo Consult.

[10] The data collected before the desk review of this MTE was limited to the information needs of the Baseline Report. Data for the Baseline Report were collected by July 2015 for all RBF projects launched or in preparation by this time. In addition, data was collected for the preparation of the Internal Process Review for the RBF projects Benin PV, Tanzania picoPV and Vietnam biogas.

The desk reviews were complemented by field visits conducted between October 2016 and March 2017 to verify documented information on the setup and progress of the respective RBF project and to fill the information gaps that remained following the desk review. The field visits were prepared with the help of the local RBF project managers who were asked to identify stakeholders and approach them for interviews after agreement on the selection of interview partners with the evaluation team. Normally, at a minimum, the RBF implementing agency, representatives of the benefitting RBF recipients and of the financial institution (if applicable) as well as political stakeholders were interviewed. In some cases, interviews were conducted with RBF recipients, relevant Civil Society Organisations, relevant business associations and/or other official development assistance (ODA) institutions that are also active in the field of energy access and/or promotion of the specific technologies.[11]

Based on the project-specific information collected during the desk and field studies, project reviews for the selected projects were written between October 2016 and May 2017 (see Executive Summaries in Annex 8.1). Those reports followed a standardised format in order to enhance information retrieval and comparability and to support the portfolio review. The draft project reviews were shared with the respective RBF project managers for fact-checking, commenting and consultation on the findings.

The portfolio review was drafted in April and May 2017 based on the project-specific information provided by the project reviewers and on documentation related to the overarching intervention provided by GIZ EnDev. In May 2017, a virtual networking conference with the local RBF project managers, DfID and GIZ EnDev HQ was initiated by the evaluation team. The purpose was to present and discuss the preliminary findings of the MTE review process and to check if additional information needs had arisen which could be addressed in the portfolio report, provided that the database was sufficiently robust. The draft portfolio report was submitted to GIZ HQ for fact-checking at the beginning of June 2017. After integrating feedback from GIZ, the second draft was circulated at the end of June 2016 to peer reviewers from DfID, the World Bank and other informed stakeholders. A call with the peer reviewers and GIZ HQ took place at the end of July 2017. The evaluation team addressed all comments by the reviewers and submitted this version in September 2017.

It was agreed that a knowledge product will be produced by the evaluation team which summarises the main findings and recommendations, thereby providing the intended users of the evaluation with an easily accessible overview of the most important elements to take away.

Involvement of stakeholders in the evaluation process and triangulation

As illustrated in the figure above, multiple feedback loops with key stakeholders were included in the MTE process. At an early stage of this mid-term evaluation, the evaluation team introduced the MTE objectives, scope and process to the key stakeholders. A regular exchange was established between the RBF project teams and the evaluation team while conducting the MTE project reviews. The project reviews were subject of an intense internal peer review process as well as of a feedback process with the EnDev RBF project teams and the GIZ EnDev HQ team. Preliminary findings were discussed at a virtual conference with key stakeholders. Those various triangulation steps served to validate data and statements, to minimise biases and to check for plausibility. This report was extensively peer-reviewed by GIZ EnDev HQ as well as several persons chosen by DfID and GIZ EnDev HQ, including a conference call with all peer reviewers, GIZ EnDev HQ and DfID, and their comments were incorporated in the report.

[11] The lists of consultees are included in the respective project reviews.

Evaluation framework and methods

In the framework of this MTE, a range of methods and tools for data collection and analysis, both qualitative and quantitative, was used (see figure below). During the desk phase, methods for data collection were mirrored against the evaluation questions and justification criteria to assess in detail the availability of data and the extent to which information gaps would need to be filled during the field phase.

Figure 3: Overview of methods for data collection and analysis used

Source: Derived from Concept Note on which this MTE report is based and which was also prepared by Particip.

Further information on the evaluation framework applied, the methods used and the methodological limitations can be found in the Concept Note for this MTE.

Data sources, limitations and mitigation techniques

The evaluation team was provided with both project-related documentation of the selected RBF projects (such as project proposals, baseline studies, operational guidelines, calls for proposals, progress reports and monitoring data) as well as documentation related to the overall intervention. However, the MTE had to deal with data limitations in various aspects that were already addressed in the Baseline Report and the Concept Note for this MTE. Moreover, data availability varied substantially across projects. Information was often unavailable for all projects in the RBF portfolio for a given evaluation question/ judgement criterion. Therefore, a synthesis response to a specific evaluation question or judgement criterion is sometimes based on a selection of projects and/or quantitative assessments for parts of the portfolio. It is complemented with qualitative assessments, including weaker evidence.

Detailed information on households (socioeconomic characteristics, consumer characteristics, etc.) and/or RBF recipients (financing, costs, profit margins, marketing activities, etc.) are scarce for most projects. The collection of systematic data from households and RBF recipients as well as an in-depth analysis of these data is planned for in the two foreseen Impact Studies.

In the frame of this MTE, it is not possible to disaggregate much data because of the diversified portfolio of RBF projects and because the MTE relies on secondary data provided by the projects. However, two RBF projects have been selected for analysis in detail by conducting in-depth impact studies. For those two projects, the impact study team will collect and analyse disaggregated data to show differences between groups. Impact and outcomes on the different stakeholder groups will then be shown more clearly.

A specific form of consumer data disaggregation concerns the question whether the poor and vulnerable as well as women have been sufficiently considered in the process of market transformation.[12] Due to the data constraints outlined above, those questions have only been dealt with to a limited extent in this MTE report. Rather, they are foreseen to be covered by the two Impact Studies where primary data from RBF recipients and households will be collected. Further information on the data sources, limitations and on mitigation measures employed can be found in the Concept Note of this MTE. The bibliography, list of sources and list of consultees are included in the respective project reviews.

[12] It should be noted that an analysis of cross-cutting issues such as HIV/AIDS or human rights was not requested in the ToR.

Portfolio review

This report describes patterns of findings across the whole portfolio or subsets thereof, and derives lessons and recommendations for the RBF portfolio as a whole. The portfolio review aggregates the experiences of individual RBF projects to arrive at portfolio-wide indicators and measures for success. RBF projects are compared and contrasted with each other with respect to decisions and strategies and to the degree possible at this early stage in implementation, to results. The comparison between the RBF projects can feed back to the level of the individual RBF projects where the review will be able to highlight opportunities for the transfer of best practices and other forms of cross-learning. Hypotheses have been formulated in the Concept Note for this MTE (see Annex 8.7). These form the starting points for discussions and are then compared with the empirical evidence. A detailed analysis of the individual projects can be found in the individual project reviews where findings reflect diverse views and interests.

Evaluation by clusters

The RBF portfolio is very diverse. Looking at it from various angles different groups of projects can be created such as technology clusters or geographical clusters, potentially subject to homogeneous framework conditions, or internal or market dynamics. Looking at projects in such smaller groups ("clusters") can provide deeper level insights about key factors that influence the success of RBF. However, when designing this MTE the evaluation team doubted that these ways of grouping the projects would be sufficient to see all relevant patterns. It was therefore proposed to use Qualitative Comparative Analysis to identify clusters. As the data were too limited to allow for this method, the evaluation team eventually identified clusters by grouping projects with similar obvious characteristics in clusters with the aim to understand in a more heuristic fashion whether these similar characteristics also influence the success or impact of the clusters.

An overview of the clusters, cluster characteristics and their utility for decision making and potential learning is provided in Annex 8.2.[13] For many of them underlying data are presented in chapter 3 of the report. The cluster-specific analyses are integrated into the analytical chapters 4, 5 and 6 of the report and provide useful insights for a deeper glance into the portfolio.

Independence and biases

The evaluation manager and contracting agent is EnDev/GIZ. At the same time, GIZ is implementing a large number of the RBF projects, while concurrently being the subject of the evaluation. This presents a potential conflict of interest. However, the evaluation team would like to state at this point that the EnDev/GIZ team was open and genuinely interested in the results of this evaluation. They provided access to data in an unbiased and unselective way. Where interpretation of data diverged, their comments and suggestions for changes in the text were accepted by the evaluation team when these were judged to improve the text. For strategic decisions, the EnDev/GIZ team referred back to DfID, which minimised the impact of the contractual situation on the evaluation results. The evaluation team was therefore able to work freely and without interference on the evaluation.

[13] The Concept Note reviewed the option of defining these groups by using the so-called qualitative comparative analysis approach (QCA). While this remains a sound approach, it was found that the effort necessary to provide the data would have been high, and it is very likely that the result would be very similar to the more intuitive clusters identified and described in the text. If by the final evaluation, the added value of this – very demanding – technique becomes clearer; it can still be considered.

Usefulness and communication strategy

This report addresses the evaluation questions and information needs outlined in the Terms of Reference (see Annex 8.9); though some are addressed more comprehensively than others due to the early stage of project implementation and due to data limitations. Annex 8.6 contains the evaluation matrix, thereby providing an overview of which evaluation questions were addressed fully and which will be carried over to the final evaluation and/or the impact studies.

The evaluation was designed and managed to meet the information and decision-making needs of the EnDev governing board and other intended users. Important stakeholders of this evaluation have been given opportunities to comment on the draft findings, recommendations and lessons. The evaluation report reflects those comments.

A communication plan was not foreseen by the ToR / the evaluation commissioning team. It was discussed with the stakeholders on various instances how dissemination of evaluation results could lead to improved accountability. It was decided that a short version of this report (knowledge product) will be published with the key audience being practitioners, such as other implementing organisations who would like to launch a RBF project themselves and are eager to learn more about the findings, lessons and recommendations derived from the implementation of the EnDev RBF Facility. Both this report and the knowledge product will be published on EnDev's and DfID's websites and actively shared with potentially interested parties.

Cut-off date for quantitative results-related data and terminology

The cut-off date for quantitative project results in this review is 31 December 2016 to allow for comparability of results-related data. Developments after that date are not systematically included in the MTE. Regarding terminology, the evaluation team would like to clarify that in its understanding, the term 'participants' of the RBF refers to the private sector market actors that were selected for the RBFF. It does however not imply that all of them have received financial incentives through RBFF. The term 'recipients' of the RBF is used to describe the groups that were selected for the RBFF and have received RBF incentives. The term 'beneficiaries' refers to the households or end users that benefit from the improved energy access. Nevertheless, we are in full agreement that people with no or insufficient access to energy constitute the target group that ultimately benefits from this programme and indirectly, from its evaluation.

3 RBF portfolio description

3.1 RBF portfolio overview

The RBFF is a component of the global Energising Development (EnDev) programme which is an energy access partnership financed by several donor countries.[14] EnDev promotes sustainable access to modern energy services that meet the needs of the poor. On the global programme level, EnDev is managed by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the Netherlands Enterprise Agency (RVO).

The RBFF was initially provided with 30 million £ by DfID.[15] Originally, it was foreseen that the RBFF would consist of 10 to 15 RBF projects in at least five developing countries which should be selected in two competitive calls for proposals ("Rounds").[16] In 2014, DfID enhanced its contribution to the RBFF by another 10 million £ and a third Round was launched.[17]

Table 1 provides an overview of all RBF projects and indicates which were covered by this MTE. The RBF projects that were analysed in detail ('the MTE portfolio') are highlighted in blue. The projects that were not covered by this MTE are highlighted in grey and italics. The table presents the project status at the end of 2016. This date was chosen for reasons of consistency. The project reviews done in the frame of this mid-term evaluation form a considerable basis of this report and had the reporting date of 31/12/2016. This helps to better understand the evidence base of our analysis, our conclusions, recommendations and lessons learnt.

By the time this report is written, some of the information presented in Table 1 has changed. The project duration of several RBF projects were extended by a year.[18] The RBF biogas project in Vietnam was extended to 2018 and the RBF projects in Benin (picoPV[19], solar water pumps), Nepal (hood stoves), Kenya (improved cookstoves and mini-grids), Peru (solar water heaters) and Rwanda (PV) were extended to mid-2019. The budgets and targets of the following RBF projects also changed.[20] The budget of Rwanda PV was downscaled to 2.24 million € and the target was reduced to 90,000 picoPV. The budget of Bangladesh picoPV was downscaled to 577,500 € and the target reduced to 15,000 picoPV. The target of Benin was reduced to 68,872 technologies deployed.[21] The target of the RBF project in Nepal (hood stoves) was increased to 31,200 hood stoves; for the solar water heaters (SWH) component in Peru the target was increased to 7,000 solar water heaters. Furthermore, an expansion of the geographical scope of one Round 3 RBF project (Bangladesh appliances) was approved.[22]

[14] EnDev is currently active in 25 countries in Africa, Asia and Latin America (cf. http://endev.info/content/Main_Page).
[15] BMZ & DfID (2012): Arrangement on Delegated Cooperation between the German Federal Minister for Economic Cooperation and Development (BMZ) and the UK Department for International Development (DfID) regarding the Energising Development Programme (page 3).
[16] DfID (2012): RBF business case. Section B. Impact and Outcome.
[17] Government of UK (2014): FLAG A – Second Promissory Note to the Energising Development (EnDev) Programme.
[18] GIZ (2017): EnDev Annual Planning 2017 Update.
[19] PV: Photovoltaic.
[20] GIZ (2017): EnDev Annual Planning 2017 Update.
[21] To be precise, the new targets of the three components of the RBF project in Benin are to incentivise the import and sale of 68,000 household solar systems, the sale and instalment of 747 solar street lights and of 125 solar water pumps.
[22] GIZ (2017): EnDev Annual Planning 2017 Update.

Table 1: Detailed overview of all RBF projects in a table (as of 12/2016)

									Budget			Targets in terms of systems	
Round	Country / ies	Technology / ies	Implementing organisation (IO)	Management of RBF payments	RBF recipient(s)	Builds on EnDev	Project start	Project end (in brackets: initially planned)	Overall budget in € (project proposal)	Overall budget in € (by 12/2016)	Budget spent in € (by 12/2016)	Targets currently planned	Targets (project proposal)
Round 1	Benin	PicoPV, Solar Water Pumps, Solar Street Lights	GIZ	IO	Importers/ Distributors	Yes	2013	2018 (2017)	€ 3,060,000	€ 3,060,000	€ 692,783	189,762	444,094
	Bangladesh	*PicoPV*	*GIZ*	*Third Party*	*Distributors*	*Yes*	*2013*	*2018 (2017)*	*€ 3,214,000*	*€ 1,758,485*	*€ 78,553*	*75,000*	*255,000*
	Ethiopia	*Improved Cook Stoves*	*GIZ*	*IO*	*Distributors*	*Yes*	*2013*	*2018 (2017)*	*€ 1,542,000*	*€ 880,000*	*€ 133,090*	*150,000*	*206,000*
	Rwanda	PicoPV	GIZ	Third Party	Importers/ Distributors	Yes	2013	2018 (2017)	€ 3,400,000	€ 2,240,000	€ 343,872	220,000	352,000
	Rwanda	Mini grids	GIZ	Third Party	Manufacturers(*)	Yes	2013	2019 (2017)	€ 1,891,000	€ 1,891,000	€ 243,899	30	35
	Tanzania	PicoPV	SNV	Third Party	Importers, Distributors	No	2013	2018 (2017)	€ 1,541,000	€ 3,599,000	€ 538,363	105,000	115,000
	Vietnam	Biogas	SNV	Third Party	Manufacturers	No	2013	2017	€ 3,740,000	€ 3,740,000	€ 1,753,906	55,000	55,000
Round 2	Kenya	Improved Cookstoves	SNV	Third Party	MFIs, Manufacturers	Yes	2014	2018	€ 2,060,000	€ 2,060,000	€ 136,696	100,000	100,000
	Kenya	Mini grids	GIZ	Third Party	Manufacturers(*)	No	2014	2018	€ 2,075,000	€ 2,075,000	€ 83,642	20	20
	Kenya	PicoPV	GIZ	Third Party	MFIs/ Distributors	Yes	2014	2018	€ 2,800,000	€ 2,800,000	€ 106,094	120,000	120,000
	Nepal	*Hood-stoves*	*Practical Action*	*Third Party*	*MFIs, Distributors*	*No*	*2014*	*2018*	*€ 1,675,000*	*€ 1,675,000*	*€ 493,969*	*31,200*	*30,000*
	Peru	Solar Water Heaters (component 1)	GIZ	Third Party	Importers/ Distributors, MFIs	Yes	2014	2018	€ 1,077,994	€ 1,183,556	€ 153,847	6,000	6,000
	Peru	Improved Cookstoves (component 2)	Practical Action	IO	Manufacturers	Yes	2014	2018	€ 962,006	€ 856,444	€ 426,929	2,000	2,000
Round 3	Kenya, Uganda, Tanzania	Biogas	Hivos	IO	MFIs, Manufacturers	No	2015	2019	€ 3,870,000	€ 3,870,000	€ 213,016	16,880	40,350
	Cambodia, Vietnam, Laos	Improved Cookstoves	SNV	IO	Importers/ Manufacturers, Distributors	No	2015	2019	€ 4,096,000	€ 4,096,000	€ 198,153	120,225	120,225
	Bangladesh, Kenya, Tanzania, Uganda, Rwanda	Off-Grid Appliance	CLASP	IO	Manufacturers/ Distributors	No	2015	2019	€ 4,110,000	€ 4,110,000	€ 155,388	240,000	240,000
	Malawi, Mozambique	*Improved Cookstoves*	*GIZ*	*Third Party*	*Importers/ Distributor / Manufacturers (indirect)*	*Yes*	*2015*	*2019*	*€ 1,258,000*	*€ 1,258,000*	*€ 34,866*	*128,000*	*128,000*
	Sub-Saharan Africa (Uganda, Mozambique)	*Mini grids*	*GIZ*	*IO*	*Distributors*	*Yes*	*2015*	*2019*	*€ 4,421,000*	*€ 4,421,000*	*€ 0*	*40,000*	*40,000*

Notes: The table presents the status of all RBF projects as of 31/12/2016. Newer developments were not included in this table. The RBF projects highlighted in grey and italic were not part of this mid-term evaluation.
(*) In the case of mini-grids and grids, 'manufacturers' include project developers, operators and utilities.
By 'targets' we mean the number of technologies that are currently planned / were initially planned to be directly incentivised by the RBF project. In case different technologies are incentivised by one RBF project (such as in Benin), the target numbers of the different technologies were aggregated. The column "Targets (project proposal)" shows the initially set targets according to the project proposal while the column "Targets currently planned" indicates the adjusted targets (if applicable) approved by the EnDev board by end of 2016. More recent updates were not included in this table but in the text (see above).
By 'builds on EnDev', we refer to RBF projects that build on pre-existing EnDev programme activities in the respective country.
The RBF recipients were categorised in four groups: importers, manufacturers, distributers and micro finance institutions (MFIs). If several of those RBF recipient groups are eligible to apply for an incentive, they were listed in the table using a slash "/". If the RBF project offers (an) incentive(s) for certain RBF recipient groups and (an)other incentive(s) for other RBF recipient groups, they were listed using a comma (",").
Source: Project proposals of all RBF projects, project reviews of all projects, EnDev Annual Planning 2014-2017, information on budget spent by 12/2016 provided by GIZ headquarters.

Overview of the three RBF Rounds

Table 2: Overview of the three RBF Rounds

	Round 1	Round 2	Round 3
Call for proposals	2012	2013	2014
Concept notes received	32	10	9
Projects selected	7	5	5
Project approval & start of implementation	2013	2014	2015
Technologies	6	4	4
Number of countries	6	3	10
Regions covered	Sub-Sahara-Africa, South Asia	Sub-Sahara-Africa, South Asia, South America	Sub-Sahara-Africa, South Asia
Budget acc. to project proposal (total)	18,388,000 €	10,650,000 €	17,755,000 €
Average project budget	2,626,857 €	2,130,000 €	3,551,000 €

Source: RBF guidelines for Round 1 projects (12/2012), RBF guidelines for Round 2 projects (10/2013), Outline to EnDev RBF 3rd tranche, energypedia.info.

A first round of proposal was launched in 2012, when EnDev country offices were asked to submit concept notes. It was open with respect to specific technologies, countries/regions or types of incentives. Multiple RBF projects could be carried out in one country/region; this was even encouraged if clustering effects were possible. Initially, Round 1 RBF projects were planned to have a duration of four years and a budget between 1 million € (minimum) and 3.5 million €.[23] 32 project ideas were eventually submitted to GIZ EnDev headquarters. Of these, seven projects were chosen by a selection committee (team of EnDev HQ staff, DfID staff and independent consultants) and approved for the RBFF in 2013 by the EnDev governing board. These seven RBF projects cover six technologies (picoPV, solar street lights, solar water pumps, biogas, mini-grids, improved cookstoves) and six countries from Sub-Sahara Africa and South Asia (see detailed list of projects in Table 1). Their average budget was 2.6 million €.[24] The initial budget of all Round 1 RBF projects added up to 18.39 million €.[25]

A second call for proposals was launched in 2013. The main objective of this Round was to increase the diversity of the RBF project portfolio in terms of technologies incentivised, type of RBF incentive and project countries. The duration of the RBF projects should be four years and the budget between 1 million € (minimum) and 4 million €.[26] Ten project ideas were submitted to the selection committee of which five were selected and approved for the RBFF in 2014 (see detailed list of projects in Table 1). These five RBF projects cover four technologies (picoPV, solar water heaters, mini-grids, hood stoves) and three countries (from Sub-Sahara Africa, South Asia and South America). Their average budget is 2.1 million €. The initial budget of all Round 2 RBF projects adds up to 10.650 million €.[27]

A third call for proposals was launched in 2014. There, projects were required to follow a regional/multi-country approach (at least three countries) in Sub-Sahara Africa and/or South Asia. Projects of interest were those that target a specific technology/sector (i.e. improved cookstoves (ICS), biogas, DC

[23] To support the RBF ideas generation, a list of brief examples was prepared (cf. GIZ (2012): Draft RBF guidelines and GIZ (2012): Final RBF guidelines).
[24] By the end of 2016, the aggregated budget of all Round 1 RBF projects was reduced to 17.168 million €, thereby reducing the average budget of a Round 1 project to 2.45 million € (cf. GIZ (2016): EnDev Annual Planning 2017).
[25] Cf. http://endev-rbf.energypedia.info/wiki/Archive_1st_Round_Proposals.
[26] GIZ (2013): Guidelines Document RBF EnDev. Call for Round II Project Ideas (PI) and Project Concept Documents (PCD).
[27] http://endev-rbf.energypedia.info/wiki/Archive_2nd_Round_Proposals.

appliances,[28] street lights, water pumps, solar home systems) and/or that help to advance an innovative technology to scale or trigger technical innovation. The Round 3 RBF projects were to have a duration of four years and a budget between 3.5 million € and 5 million €.[29] Nine project ideas were submitted to the selection committee of which five were selected and approved for the RBFF in 2015 (see detailed list of projects in Table 1).[30] Those five RBF projects cover four technologies (off-grid appliances, biogas, mini-grids, ICS), ten countries (from Sub-Sahara Africa and South Asia) and their average budget is 3.6 million €. The initial budget of all Round 3 RBF projects equates to 17.755 million €.[31]

Table 3: Overview of objectives / selection criteria of the three RBF Rounds

Objective/ selection criteria	Round 1 RBF projects	Round 2 RBF projects	Round 3 RBF projects
1 country/ multiple countries	Single-country approach	Single-country approach	Multi-country approach (min. 3 countries)
Sectors / technologies of specific interest	Technology innovation	Increase of portfolio diversity (technology/ sector, RBF type, country)	Preferred: stoves, biogas, DC fans, street lights, water pumps, solar home systems; advance innovative technology/trigger technical innovation
Geographic focus	Multiple RBF projects in one country/ region encouraged		Sub-Sahara Africa and South Asia
Project period	4 years	4 years	4 years
Project budget	1 - 3.5 million €	1 - 4 million €	3.5 - 5 million £

Source: RBF guidelines for Round 1 projects (12/2012), RBF guidelines for Round 2 projects (10/2013), Outline to EnDev RBF 3rd tranche, energypedia.info.

At present, the RBFF encompasses 17 RBF projects in 14 countries, supporting a wide variety of technologies. In the frame of this evaluation not all projects were included in the detailed analysis. This MTE covers 12 RBF projects from all three rounds.

Technologies and geographic coverage

The 17 RBF projects cover 14 countries (mostly in Sub-Sahara Africa and South Asia) and support a diverse portfolio of technologies, i.e. ICS (cookstoves, gasifier stoves), biogas, mini-grids (and grid connection) and solar products (picoPV, off-grid appliances, solar water heaters, solar street lights and solar water pumps). The 12 RBF projects from Round 1 and Round 2 are implemented in single countries and two of those 12 RBF projects incentivise more than one technology. The five Round 3 projects are implemented in more than one country because of the multi-country requirement. These Round 3 projects incentivise the same technology in several countries.

[28] DC (direct current) is the unidirectional flow of electric charge carriers which is produced by electrochemical and photovoltaic cells and batteries.
[29] GIZ (2014): Outline to EnDev RBF 3rd tranche.
[30] Three projects that were selected for RBFF fulfilled only partially the requirements of the Round 3. The most noticeable is the RBF project in Malawi and Mozambique (improved cookstoves) which did not fulfil the budget criteria of at least 3.5 million € (1.26 million €) and was not implemented in at least three countries (only two countries). It was nevertheless selected because of the geographical scope, the innovative RBF modality and the specific poverty targeting elements (cf. GIZ (2014): Proposal for a RBF measure in Africa (Mozambique, Malawi) "Access to modern cooking energy for poor and vulnerable groups in Mozambique and Malawi". The other two projects (off-grid appliance; mini-grids) did not fulfil the criteria of being implemented in three countries (only two countries proposed). In the course of project implementation however, one project expanded its geographical scope (off-grid appliance).
[31] http://endev-rbf.energypedia.info/wiki/Archive_3rd_Round_Proposals.

In some countries several technologies are incentivised either through one or several parallel projects. In Kenya, five different technologies are incentivised by RBF projects (biogas, grids, ICS, picoPV and off-grid appliances). In Benin, Rwanda, Tanzania and Uganda three different technologies are incentivised; in Bangladesh, Peru and Vietnam two different technologies. In the other RBF countries just one technology is incentivised.

Improved cookstoves (ICS) are incentivised through six RBF projects in nine countries; biogas and grids (including mini-grids) are incentivised in four countries each; picoPV products are incentivised in five countries and off-grid appliances are incentivised in five countries. Solar street lights, solar water pumps and solar water heaters are incentivised in one country each.

Table 4: Overview of countries in which RBF projects incentive technologies (in total vs. MTE portfolio)

Country	Improved cookstoves	Biogas	(Mini-)grids	Solar lanterns/ pumps, home systems & appliances	Total number of technologies per country
	Total (MTE)	Total (MTE)	Total (MTE)	Total (MTE)	Total (MTE)
Bangladesh				2 (1)	2 (1)
Benin				3 (3)	3 (3)
Cambodia	1 (1)				1 (1)
Ethiopia	1 (0)				1 (0)
Kenya	1 (1)	1 (1)	1 (1)	2 (2)	5 (5)
Laos	1 (1)				1 (1)
Malawi	1 (0)				1 (0)
Mozambique	1 (0)		1 (0)		2 (0)
Nepal	1 (0)				1 (0)
Peru	1 (1)			1 (1)	2 (2)
Rwanda			1 (1)	1 (1)	2 (2)
Tanzania		1 (1)		2 (2)	3 (3)
Uganda		1 (1)	1 (0)	1 (1)	3 (2)
Vietnam	1 (1)	1 (1)			2 (2)
Total	**9 (5)**	**4 (4)**	**4 (4)**	**12 (11)**	**29 (22)**

Notes: The cells highlighted in grey indicate that those projects are not (or partly in the case of Round 3 projects) included in this mid-term evaluation.

Source: Project proposals and EnDev Annual Planning.

Implementing organisations

The RBF projects are implemented by five different organisations. One project (Peru) is split in two components which are implemented by different organisations, incentivise different technologies and pay incentives to different RBF recipient groups.[32] Ten RBF projects (56%) are implemented by GIZ, four are implemented by Netherlands Development Organisation SNV (22%) and the remaining four (22%) are implemented by other organisations (i.e. two by Practical Action, one by the non-governmental organisation (NGO) "Collaborative Labeling And Appliance Standards Program" (CLASP) and one by the NGO "Humanist Institute for Cooperation" (Hivos)).[33] While Round 1 RBF projects are only implemented by GIZ (5) and SNV (2), some Round 2 and Round 3 RBF projects are implemented by other organisations.

[32] One component of the RBF project in Peru is implemented by GIZ (solar water heaters) and the other component is implemented by Practical Action (improved cookstoves) supervised by GIZ.

[33] The Hivos project is a multi-country project supported by SNV and national organisations in the participating countries.

Out of the 12 RBF projects reviewed with this mid-term evaluation, six are implemented by GIZ, four by SNV and one RBF project per other organisation (Practical Action, CLASP and Hivos).

Table 5: Number of RBF projects implemented by the respective organisation per Round (total)

Rounds	GIZ	SNV	Practical Action	CLASP	Hivos	Total
Round 1	5	2				7
Round 2	3	1	2			6*
Round 3	2	1		1	1	5
Total	**10**	**4**	**2**	**1**	**1**	**18**
in %	**55.6%**	**22.2%**	**11.1%**	**5.6%**	**5.6%**	**100%**

Table 6: Number of RBF projects implemented by the respective organisation per Round (MTE portfolio)

Rounds	GIZ	SNV	Practical Action	CLASP	Hivos	Total
Round 1	3	2				5
Round 2	3	1	1			5*
Round 3		1		1	1	3
Total	**6**	**4**	**1**	**1**	**1**	**13**
in %	**46.2%**	**30.8%**	**7.7%**	**7.7%**	**7.7%**	**100%**

Notes: The total number of RBF projects in Table 5 is 18 (instead of 17) and the number of RBF projects in the MTE portfolio in Table 6 is 13 (instead of 12) because one RBF project of Round 2 (Peru, see (*)) has two distinct components which are implemented by different organisations. One component is implemented by GIZ and the other component is implemented by Practical Action.

Source: Project proposals.

All RBF projects related to (mini)grids, solar street lights, solar water pumps and solar water heaters are implemented by GIZ; CLASP is the only organisation implementing an RBF project with a focus on off-grid appliances. The two RBF projects focusing on biogas are implemented by Hivos and SNV. PicoPV is covered by GIZ and SNV as implementers. RBF projects targeting ICS are implemented by three organisations (GIZ, SNV and Practical Action).

Table 7: Technologies incentivised by RBF projects of the respective implementing organisation (in total vs. MTE portfolio)

Implementing organisations	Improved cookstoves	Biogas	Mini-grids	Solar lanterns/ pumps, home systems & appliances
	Total (MTE)	Total (MTE)	Total (MTE)	Total (MTE)
GIZ	2 (0)	0	3 (2)	7 (6)
SNV	2 (2)	1 (1)	0	1 (1)
Practical Action	2 (1)	0	0	0
CLASP	0	0	0	1 (1)
HIVOS	0	1 (1)	0	0
Total	**6 (3)**	**2 (2)**	**3 (2)**	**9 (8)**

Source: Project proposals.

All five organisations are implementing RBF projects in at least two countries. GIZ is implementing RBF projects in 12 countries, SNV in six countries, CLASP in five countries, Hivos in three countries, and Practical Action in two countries.

Table 8: Overview of countries in which the RBF projects of the respective implementing organisation are in (in total vs. MTE portfolio)

	GIZ	SNV	Practical Action	CLASP	Hivos
	Total (MTE)	Total (MTE)	Total (MTE)	Total (MTE)	Total (MTE)
# of RBF projects*	**10 (6)**	**4 (4)**	**2 (1)**	**1 (1)**	**1 (1)**
of which round 3 projects	2 (0)	1 (1)	0	1 (1)	1 (1)
Country					
Bangladesh	1 (0)			1 (1)	
Benin	1 (1)				
Cambodia		1 (1)			
Ethiopia	1 (0)				
Kenya	2 (2)	1 (1)		1 (1)	1 (1)
Laos		1 (1)			
Malawi	1 (0)				
Mozambique	2 (0)				
Nepal			1 (0)		
Peru	1 (1)		1 (1)		
Rwanda	2 (2)			1 (1)	
Tanzania		1 (1)		1 (1)	1 (1)
Uganda	1 (0)			1 (1)	1 (1)
Vietnam		2 (2)			
Total	**12 (6)**	**6 (6)**	**2 (1)**	**5 (5)**	**3 (3)**

*Notes: * The total number of RBF projects as presented in this table amounts to 18 (instead of 17) (and the number of RBF projects in the MTE portfolio to 13 instead of 12) because one RBF project of Round 2 (Peru) has two distinct components which are implemented by different organisations.*
Source: Project proposals and EnDev Annual Planning.

Approaches

The majority (ten out of 17 RBF projects) of RBF projects build on pre-existing EnDev programme activities in the country. The majority of RBF projects outsource the management of RBF incentive payments to a third party.

Table 9: Outsourcing of the management of RBF payments by implementing organisation and by pre-existing EnDev activities in the country

		Outsource the management of RBF payments		
		Yes	No	Total
Implementing organisation	GIZ	7	3	10
	SNV	3	1	4
	Practical Action	1	1	2
	CLASP	0	1	1
	Hivos	0	1	1
	Total	**11**	**7**	**18**
Build on EnDev	Yes	7	4	11
	No	4	3	7
	Total	**11**	**7**	**18**

Notes: The total number of RBF projects in the table above is 18 (instead of 17) because one RBF project of Round 2 (Peru) has two distinct components. Both components build on the EnDev programme. The component implemented by GIZ outsources the management of RBF payments to a third party and the other component implemented by Practical Action does not.

Source: Project proposals, project reviews and EnDev Annual Planning.

The 17 RBF projects targeted four different RBF recipient groups, i.e. distributors/retailers, importers, manufacturers and micro finance institutions (MFIs). The category of 'manufacturers' include project developers and grid operators.

The RBF project in Benin incentivises three different technologies (picoPV, solar street lights and solar water pumps) and the Peru RBF project incentivises two different technologies (ICS and solar water heaters), each with a particular incentive structure targeting different RBF recipient groups. Nine out of the 20 project components in total pay incentives to one specific RBF recipient group and another nine target two RBF recipient groups. The remaining two project components pay incentives to three RBF recipient groups. All mini-grid projects target no more than one RBF recipient group. None of the RBF projects pay incentives to all four RBF recipient groups.

Table 10: Technologies and number of incentivised RBF recipient groups per project component

	Number of incentivised RBF recipient groups per project set-up				
Technologies	**1**	**2**	**3**	**4**	**Total**
Biogas	1	1			2
Mini grids	3				3
Improved cookstoves	2	3	1		6
Solar products	3	5	1		9
Total	**9**	**9**	**2**	**0**	**20**

Notes: In this table, each component of the Benin RBF project (picoPV, solar street lights, solar water pumps) and each component of the Peru RBF project (solar water heaters, improved cookstoves) are seen as separate entities because of the different recipient groups those components incentivise. This eventually adds up to 20 different project components.

Source: Project proposals, EnDev Annual Planning and information from field visits.

14 out of 20 project components incentivise distributors, eight incentivise manufacturers and six incentivise importers and five incentivise MFIs. The two biogas projects incentivise only manufacturers and MFIs. The mini-grid projects incentivise only manufacturers and distributors. The RBF recipients of ICS and solar products project components (picoPV, solar street lights, solar water heaters, solar water pumps, off-grid appliance) range over all four categories. However, with regards to solar products, only two project components (picoPV project in Kenya and solar water heater component of the RBF project in Peru) incentivise MFIs and only one (off-grid appliance) incentivises manufacturers. The Kenya picoPV project incentivises lending agents (e.g. MFIs, solar companies) to offer affordable and flexible credit schemes for picoPV products. In the solar water heater component of the Peru RBF project, MFIs are direct RBF recipients by incentivising each solar water heater sold through a microcredit. The off-grid appliance project pays incentives to off-grid appliance manufacturers for products which are among the finalists of a global competition.

Table 11: Technologies and RBF recipient groups incentivised (all RBF projects)

	RBF recipient groups				
Technologies	**Distributors**	**Importers**	**Manufacturers**	**MFIs**	**Total**
Biogas	0	0	2	1	3
Mini grids	1	0	2	0	3
Improved cookstoves	4	2	3	2	11
Solar products	9	4	1	2	16
Total	**14**	**6**	**8**	**5**	**33**

Notes: In this table, each component of the Benin RBF project (picoPV, solar street lights, solar water pumps) and each component of the Peru RBF project (solar water heaters, improved cookstoves) are seen as separate entities because of the different recipient groups those components incentivise.

Source: Project proposals, EnDev Annual Planning and information from field visits.

Budgets

The initially proposed budget of all RBF projects was 29 million € of which 18.39 million € were initially allocated to Round 1 projects and 10.65 million € to Round 2 projects. In the course of project implementation, the overall budget of some Round 1 projects was lowered (and one was increased) and shifted to Round 3 projects. Currently, the overall budget of all RBF projects from all rounds is 45.6 million €. The RBF projects which form the basis for this report (the 'MTE portfolio') represent 78% of the overall budget currently planned (and 78% of the initially proposed budget).

Table 12: Overall budget of all RBF projects per Round (initially proposed vs. 12/2016)

Rounds	Budget initially proposed		Budget currently planned (12/2016)	
	Total	MTE portfolio	Total	MTE portfolio
Round 1 projects	18,388,000.00 €	13,632,000.00 €	17,168,485.00 €	14,530,000.00 €
Round 2 projects	10,650,000.00 €	8,975,000.00 €	10,650,000.00 €	8,975,000.00 €
Round 3 projects			17,755,000.00 €	12,076,000.00 €
Total	**29,038,000.00 €**	**22,607,000.00 €**	**45,573,485.00 €**	**35,581,000.00 €**
in %	**100%**	**78%**	**100%**	**78%**

Source: Project proposals and EnDev Annual Planning.

As at 31/12/2016, roughly 13% (5.80 million €) of the total budget (45.6 million €) was spent by RBF projects from all three rounds. Most budget (3.78 million €) was spent by Round 1 projects (started in 2013). Round 2 projects (started in 2014) spent 1.41 million € and Round 3 projects (started in 2015) spent 0.60 million €. Table 1 presents a detailed overview of the budget spent by all RBF projects per round (as at 31/12/2016) and compares this with the budget spent by the RBF projects that were analysed in the frame of this MTE. 87% of the costs spent were spent on RBF projects included in the MTE portfolio. Projects from Round 1 and Round 3 not included in the MTE are in fact progressing to a lesser extent (in comparison to the other RBF projects of those Rounds) because 94% of the costs spent in these rounds were spent on RBF projects of the MTE portfolio. In fact, the budgets of the two RBF projects from Round 1 that were not part of this MTE were downscaled (by 2.6 million € and by 0.66 million € respectively) by the end of 2016. Similarly, the two RBF projects from Round 3 that are not part of this MTE face considerable delays and are progressing slowly. In contrast, the Round 2 RBF project not included in the MTE portfolio is progressing rather well and had spent roughly 0.5 million €.

Table 13: Budget spent by all RBF projects vs. RBF projects of MTE portfolio (by 31/12/2016)

GIZ cost categories	Round 1		Round 2		Round 3		All three rounds	
	Total	MTE	Total	MTE	Total	MTE	Total	MTE
1 - Personnel cost	743,417.38	609,138.95	313,303.03	313,303.03	701.16	0.00	1,057,421.57	922,441.98
2 - Travel costs	44,727.85	24,144.67	9,867.12	9,867.12	1,539.89	0.00	56,134.86	34,011.79
3 - Equiment, materials & construction work	26,089.52	13,372.74	1,890.00	357.94	297.80	16.08	28,277.32	13,746.76
4 - Financial contributions	2,636,075.69	2,632,743.70	976,840.13	506,798.14	571,812.59	541,239.89	4,184,728.41	3,680,781.73
5 - HCD measures: participant related costs	2,478.68	0.00	0.00	0.00	0.00	0.00	2,478.68	0.00
6 - Other direct costs	37,241.30	31,398.65	11,735.50	11,720.50	23.32	17.00	49,000.12	43,136.15
7 - Total direct costs	3,490,030.42	3,310,798.71	1,313,635.78	842,046.73	574,374.76	541,272.97	5,378,040.96	4,694,118.41
8 - Overheads and imputed profit	294,434.72	262,023.22	98,540.94	76,161.08	27,047.72	25,283.68	420,023.38	363,467.98
9 - Total Cost	**3,784,465.14**	**3,572,821.93**	**1,412,176.72**	**918,207.81**	**601,422.48**	**566,556.65**	**5,798,064.34**	**5,057,586.39**
in %	**100%**	**94%**	**100%**	**65%**	**100%**	**94%**	**100%**	**87%**

Source: Project proposals and information provided by GIZ EnDev headquarters. Please note that for some budget lines of the Round 2 projects, the budget spent by all RBF projects is equivalent to the MTE portfolio projects. This is because the Nepal RBF project of Round 2 (which is not part of the MTE) did not foresee costs in this budget line.

3.2 Brief summary of the RBF projects

Round 1 RBF projects	
Benin	Lifting up 3 Offgrid PV market segments to the next level
This project implemented by GIZ incentivises the import and sale of picoPV products and the sale and installation of solar street lights and solar water pumps. The implementation period is from 2013 to 2019, with a budget of 3.06 million €. The objective is (1) to attract entry of new players with best practice who can participate in shortening the overall timeline required for establishing a self-sustaining solar PV sector in the Benin, (2) to introduce solar PV for street lights, and (3) promote agricultural water pumping. The street light component was closed due to the sector being too much publicly dominated.	
Rwanda	Sustainable Market Creation for Solar Lighting (picoPV)
This project is implemented by GIZ from 2013 to 2018, with a budget of 2.24 million €. RBF incentives are paid to importers/distributors. The project proposal specifies that the project's objective "is to incentivise companies to invest more money into reaching customers in poorer regions, where the highest unmet demand is, but where it is currently not possible for companies to invest due to the high cost of developing the infrastructure and marketing".[34]	
Rwanda	Sustainable Market Creation for Renewable Energy Village Grids
This project is implemented by GIZ from 2013 until 2017. However, the project has been extended with the original targets and will now finish in 2019. The budget has a total volume of 1.891 million €. 70% of the budget (1.3 million €) shall be paid to the private sector in the form of incentives with an additional 10% covering the fees of the financial institution. The objective is to incentivise companies to (1) acquire the capacity to manage and operate grids as their own business or on behalf of public owners and (2) to develop private pico power plants.	
Tanzania	Rural Market Development of picoPV Solar, Lake Zone energy access
This project is implemented in Tanzania's Lake Zone region by the SNV. The project duration is five years from 2013 to 2018 and the budget amounts to 3.6 million €. The objective is to build efficient rural supplier-retailer chains in the rural districts of the Lake Zone's six regions. The project incentivises importers and distributors.	
Vietnam	Creating a market driven biogas sector in Vietnam
This project is implemented by SNV in cooperation with the Ministry of Agriculture and Rural Development from 2013 to 2017. In the first phase, the incentive design is applied in five provinces and finally extended to 55 provinces. The budget for the RBF biogas programme accounts for 3.74 million €, of which 2.75 million € (74%) will be paid as RBF subsidies to the private sector. The project has the objective "to transform the existing national biogas programme from a government-led and externally supported programme into a self-sustaining commercial market for domestic biogas plants".[35]	

[34] Project proposal of RBF project "Sustainable Market Creation for Solar Lighting (picoPV)" in Rwanda.
[35] Project Proposal of RBF project "Creating a market driven biogas sector in Vietnam".

Round 2 RBF projects	
Kenya	Higher tier cookstove market acceleration
This project is implemented by SNV. The project duration was initially planned to cover the period from 2014 to 2018, but has now been extended to 2019. The total budget amounts to 2.06 million €, of which 1.522 million € (74%) are expected to be paid to MFIs and manufacturers intervening across Kenya. The objective formulated in the project proposal is to introduce incentive mechanisms to further strengthen Tier 2 and 3 cookstove market development and to accelerate access to clean cooking by mitigating barriers and challenges affecting cookstoves credit provision by financial institutions.	
Kenya	Market Creation for private sector operated mini-grids
This project is implemented by the GIZ. The project duration was initially planned to cover the period from 2014 to 2018, but has now been extended by one year. The total budget amounts to 2.075 million €, of which 1.55 million € (75%) are expected to be paid to manufacturers (including project developers, operators and utilities) intervening across Kenya, focused but not necessarily restricted to the two northern counties, Turkana and Marsabit. The objective formulated in the project proposal is to support the development of solar hybrid mini-grids with up to 50 kWp installed capacity.	
Kenya	Building sustainable and affordable credit lines for small solar systems in rural areas
This project is implemented by GIZ from 2014 to 2018. The total budget amounts to 2.8 million €, of which 2,062,950 € (74%) are expected to be paid to MFIs/distributors. The objective formulated in the project proposal is to "provide and/ or scale-up flexible and affordable financing schemes for picoPV products targeting small-scale entrepreneurs and end users".[36] The schemes are supposed to be offered by solar companies, financial institutions or intermediaries.	
Peru	Getting to Zero Energy Poverty: Closing gaps in access to thermal energy in Peru
The project proposal for this project was jointly prepared by GIZ and Practical Action. It includes two components: results-based finance for solar water heaters and portable cookstoves. The project duration was initially planned to cover the period from 2014 to 2018, but the solar water heater component was extended to 2019. The overall budget amounts to 2.04 million €. The objective of the solar water heater component is to "scale-up the market for solar water heaters from a local market to a national level".[37] The objective of the improved cookstoves component is that Peruvian companies develop "portable improved stoves appropriate to the needs of rural markets with viable business models that allow a production scale."[38]	

[36] Project Proposal of RBF project "Building sustainable and affordable credit lines for small systems in rural areas" in Kenya.
[37] Project Proposal of the RBF project "Getting to Zero Energy Poverty: Closing gaps in access to thermal energy in Peru".
[38] Project Proposal of the RBF project "Getting to Zero Energy Poverty: Closing gaps in access to thermal energy in Peru".

Round 3 RBF projects	
Kenya, Uganda, Tanzania	Biogas Business Boost Benefitting Farmers (4B-F)
This project is implemented (on a regional level) by the Dutch NGO, Hivos, and includes activities in Kenya, Uganda and Tanzania. The project started in 2015 and is scheduled to end in 2019. The total budget amounts to 3.87 million €. The RBF incentives are paid to MFIs and manufacturers. The project's objective is to "strengthen the sector and engage the most important actors in a sustainable way, taking the bio-digester market to a new level"[39].	
Cambodia, Vietnam, Laos	Market Acceleration of Advanced Clean Cookstoves in the Greater Mekong Sub-region
This project intended for three target countries, Cambodia, Laos, and Vietnam, is implemented by SNV over a period of four years from 2015 to 2019. The overall budget amounts to 3,839,704 € of which the RBF fund (incentives + fees) accounts for 3.072 million € (80%) with incentives being paid to producers and in some countries also to distributors and fees paid to the financial institutions. The objective is to accelerate the market development for advanced biomass stoves in Cambodia, Vietnam and Laos and increase the overall access and use of modern energy services particularly of rural and peri-urban households.	
Bangladesh, Kenya, Tanzania, Uganda, Rwanda	Accelerating the uptake of off-grid solar technologies with RBF
This project is implemented by the NGO CLASP. The project duration is planned to cover the period from 2015 to 2019. The total budget amounts to 4.11 million €, of which 2,925,600 € (71%) are to be paid to private enterprises that manufacture or retail off-grid appliances in the target countries of the project. The project's objective is to catalyse the global market for high-quality, super-efficient off-grid appliances by identifying the world's best off-grid appliances through the Global Lighting and Energy Access Partnership Awards competitions and incentivizing off-grid energy companies in key markets to procure and sell Global Lighting and Energy Access Partnership Award Winners and Finalists.	

The executive summaries of the project reviews written in the frame of this MTE can be found in Annex 8.1.

[39] Project Proposal of the RBF project "Biogas Business Boost Benefitting Farmers".

4 Direct results: effectiveness and efficiency

This chapter reports on the direct results and outputs of the RBF projects regarding sales, build-up of the private sector on the supply side, and build-up of the demand for the energy access technologies. Chapter 5 covers higher-level market transformation results.

For each aspect, hypotheses[40] have been formulated in the Concept Paper for this MTE (see Annex). These form the starting points for the discussion in the following sections. They will be compared with the empirical evidence. This will ultimately lead to conclusions, lessons, and recommendations regarding RBF as an instrument and the EnDev RBF portfolio specifically.

The starting hypothesis with respect to the effectiveness and direct results was that the RBF was expected to ensure market acceleration and increase in product volumes coming to the market (Hypothesis (H) 2a according to the Concept Note for the MTE). In the following, this will be discussed with respect to sales outcomes, increased supply offerings, and increased demand for the technologies promoted through RBF.

4.1 Sales outcomes

4.1.1 Sales uptake

By end of December 2016, 10% of the total sales targets had been achieved. Three projects – Vietnam biogas, Benin PV and Tanzania PV – are the major contributors to the reported target. In sum, the RBF portfolio has supported the sales of 62,665 solar products; most of them are picoPV systems sold especially in Benin (32,672) and Tanzania (24,028). 32,058 biogas digesters were built, mainly in Vietnam. Additionally, 1,260 cookstoves were sold and 23 mini-grids were built so far. For Bangladesh, being the only RBF project that explicitly supports more efficient off-grid appliances – television sets –, no sales have been documented yet.

The achievements at this point in time are not in line with the projected sales. For most technologies only a small fraction of the final targets was achieved. Per se, this does not have to be a point of concern at this mid-term review. Successful market transformation normally starts slowly. While some of the numbers seem low at first glance, sudden exponential growth can occur in later years. In Tanzania, the RBF-supported product sales went up from 2,600 to 12,800 to 24,000 from year to year. Small numbers in the first years therefore do not need to give reason for concern that large numbers cannot be reached later.

It is noteworthy that the sales uptake comes mainly from three projects from the same age cluster (Round 1), and two of them need to be considered atypical.[41] The projects in the sample that do not show sales are younger, and often still in a phase where they are searching for the best design to trigger market development.

[40] The list of evaluation questions is attached in Chapter 8.5 and the list of hypotheses in Chapter 8.7.

[41] The Vietnam project builds on an established national biogas programme that was based on end-consumer subsidies which was initially continued under the RBF before transitioning to a system whereby incentives are provided to businesses rather than to consumers. Until end 2016 only 10,500 of 31,276digesters were built under a company incentive basis.
The Benin project has included an import incentive, leading to a considerable amount of incentive payments which have not yet led to a sales uptake

A mere extension and redesign of the incentive without a reduction of the ambition level is a defensible solution for low sales rates in early project stages. But, in cases where the market is clearly not moving, a faster early stop of the project and the re-devotion of funds are indicated and should be implemented quickly. The aspect of up- and downscaling of projects is further examined in the Chapters on implementation structures.

Table 14: Technologies deployed until 12/2016 by technology cluster

Technology cluster	Country	Technology		Technologies deployed			
				Target	EnDev Progress Report Achieved	%	KPI -Achieved
Solar	Benin	PicoPV		187,000	32,672	*17%*	33,232
		Solar Street Lights		2,500	747	*30%*	
		Solar Pumps		262	15	*6%*	
	Kenya	PicoPV		120,000	-	*0%*	-
	Rwanda	PicoPV		220,000	4,907	*2%*	4,907
	Tanzania	PicoPV		105,000	24,028	*23%*	24,028
	Peru	Improved Cook Stoves Solar Water Heaters		26,000	296	*1%*	296
	Bangladesh	Off-Grid		540,000	-	*0%*	-
Total				1,200,762	62,665	*5%*	
ICS	Cambodia	ICS		120,255	1,260	*1%*	1,260
	Kenya	ICS		100,000	-	*0%*	-
Total				220,255	1,260	*1%*	
Biogas	Kenya	Biogas		21,490	782	*4%*	779
	Vietnam	Biogas		55,000	31,276	*57%*	31,276
Total				76,490	32,058	*42%*	
Mini-Grids	Kenya	Mini-Grids		20	-	*0%*	-
	Rwanda	Mini-Grids	Solar AC	4	-	*0%*	775
			Solar DC	80	22	*28%*	
			Pico Hydro	6	1	*17%*	
			Distribution	4	-	*0%*	
Total				114	23	*20%*	
Total				**1,497,621**	**96,006**	**6%**	

Notes: For Benin PV see footnote.[42] Data to measure key performance indicator (KPI) achievement vary between the RBF progress reports and the synthesised monitoring information provided through EnDev headquarters. Synchronisation should take place to facilitate overall programme reporting.
Source: EnDev Progress Report 2016. Draft for governing board.

4.1.2 Additionality

The targets for the RBF should be ambitious to underscore the additionality of RBF. Low sales numbers at an earlier project stage should not lead to a premature downscaling of the ambition levels. Downscaling should be supported by a deeper assessment of why the project is not expected to lead to the market growth that was anticipated in the proposal phase. The first remedy should be adaptive project management with respect to the incentive structure, communication strategy or other variations that improve the effectiveness of the project.

[42] This number includes (i) PicoPV products which have been supported through an import and sales incentives; (ii) PicoPV products which have only benefitted from an import incentive and not through sales incentives. Sales figures also include those products distributed through other programmes. Case (ii) covers roughly 2/3 of progress reported. It is a matter of interpretation if case (ii) can be reported as achieved target as in this case, RBF has not contributed to market development through the establishment of appropriate distribution systems.

It has been recognized already (e.g. by the EnDev evaluation of 2014) that judgements with respect to additionality are difficult. Generally, RBF countries and the markets for the respective technologies fall in three clusters. These are presented and discussed in the following. For picoPV projects a more detailed quantitative analysis was undertaken regarding additionality. It is illustrated in the Annex 8.3.

Table 15: Additionality clusters[43]

Project clusters	RBF projects
Market development was already ongoing, and baseline sales were significantly different from zero.	Bangladesh appliances[1]; Kenya ICS[2]; Vietnam biogas[3]; Kenya picoPV[4]; Rwanda PV[5]; Africa biogas[6]
Market development was not noticeable before the project, and market size was expanded through RBF.	Benin picoPV[7], Benin water pumps[8], Mekong ICS[9]; Tanzania PV[10]; Peru ICS[11]; Peru SWH[12]
Market development was not noticeable before the project, and market size was expanded. However, is not attributable to RBF.	Rwanda village grids[13]; Kenya mini-grids[14]; Benin solar street lights[15]

Notes: [1)] Bangladesh appliances: no sales yet [2)] Kenya ICS: no sales yet [3)] Vietnam biogas transforms the subsidised market into a commercial market [4)] Kenya picoPV provides financing schemes for companies in a pre-existing market [5)] Rwanda PV supports the last mile customer in a developing market [6)] Africa biogas enhances quality control and biogas plant affordability in a pre-existing market [7)] Benin picoPV promotes quality PV products on the pre-existing market 8) Benin promotes solar water pumps in a newly developing market [9)] Vietnam and Cambodia ICS as part of the Mekong ICS promote advanced biomass cookstoves on the existing conventional market.[10)] Tanzania promotes picoPV via new rural supplier-distributor chains in the Lake Zone only [11)] Peru ICS promotes the new portable cookstove technology on the pre-existing market [12)] Peru solar water heaters (SWH) develops a non-existing SWH market [13)] Rwanda village grids introduces new innovative technologies on the market [14)] Kenya mini-grids tests new business models on a developing market [15)] Benin solar street lights: vast need; however demand was compromised due to non-transparent tender procedures; eventually this part of the project was not continued because it was not able to achieve higher market coverage. Accelerating market development is driven by government tenders and its sustainability is still questionable.

Country technology markets, where market development was already ongoing, and baseline sales were significantly different from zero before the project

In eight cases, market development was already ongoing at the outset of RBF project implementation, and baseline sales were significantly different from zero before the project. In these cases, RBF aims at achieving additional benefits through the intervention, for example reaching of a new target group (Kenya ICS and PV) or a phase-out from an existing subsidy system (Vietnam biogas). The aim was to achieve this e.g. through providing financial schemes, through a focus on the last-mile-customer or a focus on quality control. Examples are the projects in Bangladesh appliances, Kenya ICS, and the Vietnam biogas and Africa biogas projects. The sales numbers in these markets – and sometimes also the RBF results – look high but are not necessarily attesting an additional market push from the RBF. Mostly, they are referring to a qualitative change, e.g. in support regime (Vietnam), approaching new target groups (Kenya) or improve product quality (Biogas).

The Kenya projects tried to incentivise lending to poorer tiers of the population that cannot otherwise afford PV systems or advanced stoves. This was additional in terms of the target group, but not very successful so far. The Bangladesh appliance project is supporting several products that were not available in the country (neither before nor after the project), and thus is additional but also unsuccessful.

[43] Cf. Annex 2

Country technology markets, where the projects lifted sales from zero to the RBF-level

In five cases (Vietnam ICS; Cambodia ICS; Tanzania PV and Peru ICS and SWH) market development for the products supported by the RBF project was not noticeable prior to the RBF. The project is introducing a new technology or promoting a technology in an area where it was not systematically marketed before. Examples are in particular those cookstove projects that are emphasizing a technological upgrading of the existing technology. The Mekong ICS projects, for example, are providing technologies of a higher tier than currently used in the countries. In the Peru ICS project and the Vietnam project, local technology developers are supported in product development. In the Tanzania PV and Peru solar water heaters projects, products of this quality were similarly unavailable in the regions in which the projects are active. Thus, as the products were not in the market before the project start and their introduction can be clearly attributed to the RBF projects, the latter can be clearly rated additional.

These projects make a clear difference in that the market development is directly attributable to the RBF, and they are additional. According to the available data, overall sales are lifted to the level of the RBF-incentivised sales. On the one hand, this does not guarantee that the markets are able to sustain themselves without the RBF support, or that the projects were efficient. On the other hand, this clearly indicates that the projects were effective.

Country technology markets, where sales rose rapidly, including and particular outside RBF.

In three cases, product markets were practically non-existent at project design, and are now on a significant level, due to a multitude of factors. These are the two village grids projects and the Benin solar street light project. In these cases, the projects were not able to prove additionality. Here, other actors or programmes were equally active during the project period, so that a significant “baseline shift” took place with respect to the RBF projects. The Benin street light component, for example, was discontinued because a government programme provided 15,000 street lights to municipalities. Therefore companies were not interested to sign up for the RBF. Both village grid projects experienced challenges because larger programmes of the World Bank are competing for the attention of the target group (a more thorough discussion follows in section 4.1). In these cases, the RBF incentive typically was not the main causal pathway for the larger market development.

This clustering allows for a comparison between projects that might seem similar otherwise. For example, the picoPV projects in Tanzania and Rwanda pursue similar incentive and MEVA strategies, but the Rwanda project’s participants were involved in a qualitatively different environment with respect to ongoing programmes and market environment than the ones in Tanzania’s Lake Zone. The RBF project in Tanzania could be more effective due to its clearer additionality.

4.1.3 Review of the evaluation hypotheses

Additionality of RBF projects

The alignment and coordination with pre-existing national programmes is crucial for the question whether or not RBF projects can trigger additional market development or whether the RBF framework is a negligible influencer of the market. The experience from the RBF portfolio shows that this needs to be discussed before designing the project. It also needs to be closely monitored during the project implementation period as national programmes and policies can influence the private sector just as strongly as, or even more strongly than the RBF incentives.

In general, additional effects of RBF projects are strongest where market development was not ongoing and new technologies could be introduced and no international or national programmes negatively influenced their roll-out.

Effectiveness with respect to market uptake

Despite varying additionality, there is evidence that most of the RBF projects are on a good track to achieving smoother running markets, market acceleration and increased product volumes – even if their specific sales targets seem for the moment out of reach. This is particularly true for some of the picoPV projects – some stimulation of the market in terms of LA certified products and significant quantitative impact on the markets can be seen in the data.

On the other hand, several projects have not yet paid out RBF incentives. Partially, they are still in a prolonged inception phase,[44] but partially their incentive structure is not as effective as expected (in particular for the MFI-oriented Kenya projects; cf. section 4.2). The biggest challenges in this respect are encountered by projects that have focused on enhancing sales volumes through microfinance.

Some projects have paid out incentives but not yet delivered energy access benefits, or not to the same degree as incentives have been disbursed. The reason is that the incentives reward activities that prepare product development or businesses for the participation in the market (cf. Chapter 4.2).

4.2 Supply side response

In addition to the overarching hypothesis, two additional hypotheses were formulated with respect to effectiveness and efficiency, namely:

- On effectiveness: The RBFs effectively improved the viability of the private sector responses (H2a);
- On efficiency: The support delivered by the RBFs was efficient in that it provided the right level of incentive to ensure efficient delivery of goods of the RBF with respect to the supply side response to the incentives (H2a).

4.2.1 Incentive uptake

Number of recipients and disbursed incentives

Across all projects, 730 private actors benefitted already directly from disbursements of incentives of up to 4,059,240 € (Evaluation Question (EQ) 2a.2). The projects with the biggest incentive disbursements so far have been Vietnam biogas – with more than a million € and Tanzania PV with almost 800,000 €. All other projects' disbursements are significantly smaller.

The level of disbursements is not necessarily related to the age of the project. Of the five highest disbursing projects, only three are from Round 1, but Peru ICS is from Round 2 and Cambodia ICS (as part of the Mekong project) from Round 3. In both cases, as well as in the Benin project, significant funds are spent on steps of the supply chain that lie before the sales to the users of the technology. The rewarded results are product development in Peru and imports in Benin and Cambodia. The verified uses are disconnected from these disbursements (cf. Chapter 4.3).

[44] Most Round 3 projects.

Number of recipients and disbursed incentives by recipient type

Depending on the incentive design of the projects, the incentives are paid out to different groups along the value chain. No project provides incentives to consumers. Nine project components provide incentives to distributors, four project components provide incentives to importers, eight provide incentives to manufacturers, and four provide incentives to consumer finance institutions.

Overall, until December 2016, most of the incentive budget has been paid to (local) manufacturers (2,511,064 €) with 316 recipients in seven countries. In four projects incentives to manufacturers have been already disbursed. The largest single group of all RBF recipients are biogas masons (250) in Vietnam who received 1,287,434 €.

Technically, the largest group of recipients are the distributors and retailers (385) who received 639,026 €. This is in line with the understanding that the biggest challenge of rural energy access is the last mile distribution. But most projects do not incentivise last mile distribution (or only indirectly when the incentives increase the efficiency of the import— suppliers' or manufacturers' outbound logistics). 361 of the 385 retailers are part of the Tanzania PV project, where they have received bonus products worth 368,979 €. Other projects supporting the last mile are Peru SWH, Benin PV and to a smaller extent Cambodia ICS and the Bangladesh appliances project where the higher incentives are directed towards the importers. In three projects (Kenya picoPV, Vietnam ICS, Bangladesh appliances), where the incentive structure favours distributors, no disbursements have been made yet.

In five projects covered by the MTE, import-suppliers can receive incentives for proven sales – all three picoPV projects (Tanzania, Rwanda, and Benin), the Bangladesh appliance project and the cookstove project in Cambodia.

In the ICS projects that have manufacturers as participants (Peru and Vietnam), seven Peruvian and three Vietnamese companies benefitted with 321,470 € and 4,307 €, respectively. For the Peru ICS project this does not yet include incentives for sales, implying that until the end of 2016 there have not been any verified sales. The financial incentive has been spent by the companies on product development and business development but does not yet imply any energy access benefits as of the cut-off date of the evaluation.

Table 16: Supply side response: number and type of recipient

Round	Country	Technology	Local Manufacturers		Import-Suppliers		Distributors		Financial Institutions		MTE-Total	
			Number of recipients	Disbursed incentive	Number of recipients	Disbursed incentive	Number of recipients	Disbursed incentive	Number of recipients	Disbursed incentive	Number of recipients	Disbursed incentive
1	Benin	pico-PV			10	€ 154,349	2	€ 49,586			12	€ 203,935
		solar street lights					1	€ 130,516			1	€ 130,516
		solar water pump					2	€ 19,714			2	€ 19,714
	Rwanda	pico-PV			6	€ 46,953					6	€ 46,953
		mini grids	2	€ 155,867							2	€ 155,867
	Tanzania	pico-PV			7	€ 407,704	361	€ 368,979			368	€ 776,683
	Vietnam	biogas	250	€ 1,287,434							250	€ 1,287,434
	SUB TOTAL Sum		**252**	**€ 1,443,301**	**23**	**€ 609,006**	**366**	**€ 568,795**			**641**	**€ 2,621,102**
2	Kenya	mini grids	0	€ -							0	€ -
		pico-PV					0	€ -	0	€ -	0	€ -
		ICS	0	€ -					0	€ -	0	€ -
	Peru	SWH					9	€ 51,800	1	€ 3,670	10	€ 55,470
		ICS	7	€ 321,470							7	€ 321,470
	SUB TOTAL Sum		**7**	**€ 321,470**			**9**	**€ 51,800**	**1**	**€ 3,670**	**17**	**€ 376,940**
3	Kenya	biogas	56	€ 18,158					8	N/A	64	€ 18,158
	Cambodia	ICS			4	€ 144,277	10	€ 18,431			14	€ 162,708
	Vietnam	ICS	3	€ 4,037			0	€ -			3	€ 4,037
	Bangladesh	off-grid	1	€ 275,023			0	€ -			1	€ 275,023
	SUB TOTAL Sum		**60**	**€ 297,218**	**4**	**€ 144,277**	**10**	**€ 18,431**	**8**	**N/A**	**82**	**€ 459,926**
MTE-Total			**319**	**€ 2,061,989**	**27**	**€ 753,283**	**385**	**€ 639,026**	**9**	**€ 3,670**	**740**	**€ 3,457,968**

Source: Project reviews conducted in the frame of this mid-term evaluation. Data is based on project level information.

Private sector leverage – a key measure for value for money

Private sector leverage can be assessed in two dimensions. The RBF Facility defines its Key Performance Indicator (KPI) Private Sector Leverage (PSL) as the ratio of all funds leveraged from private sources over the spent project budget. The private funds can include the investments of the RBF recipients in energy technology, but also private finance mobilized from non-public sources by the companies involved in the project or the project itself. This value is calculated by EnDev on the basis of the reports from the project. For the projects without disbursements no PSL value is calculated yet, and thus no leverage can be determined.

In terms of the standard EnDev RBF KPI "Private Sector Leverage" (PSL, see Table 17), the overall target for the portfolio is 2.9, of which 1.7 are achieved so far. As the programme expects private sector investments to increase at a higher rate in the later stages of implementation, this is a good sign generally. But as with the other indicators, the highest contributions stem from few projects, notably the Vietnam biogas and Tanzania PV projects. The latter has already overachieved the target PSL value and ratio, probably because the larger systems reach incentive caps. Overall, as is to be expected, the KPI PSL for the cluster "Round 1" is closest to the target value (3.1 as compared to 3.3). As almost no sales and thus no private sector impact has been recorded for the Round 2 projects, the KPI for Round 2 is at 0.1. This indicates significant deficits. In the Kenya projects, no disbursements have been made. In Peru, 25% of the incentives of the revised budget have been paid out, with less than 8% of the PSL value target achieved. Round 3, in comparison, is on a better track for impact.

Another useful parameter is the leverage ratio of the incentive payments alone. Across the portfolio, the private sector investment was almost 6 times (5.9) as high as the disbursed incentives: disbursed RBF incentives of over 4 million € led to a total private sector investment of more than 24 million €. Comparing the two parameters project by project illustrates the relative importance of TA vs. incentive payments.

Comparing these indicators leads to interesting findings. Looking at the Rwanda PV project, and including the non-incentive budget in the leverage ratio (which is 1.4), the project is under its target of 3.0. Looking only at the incentives, the leverage is the highest of the whole portfolio, almost 18. This is caused by two factors: firstly, the incentives are very low, only 6% of the total private sector investment, compared to e.g. Tanzania or Vietnam with 10%. The value for money (VfM) for the incentives is very high. On the other hand, the difference between the leverage including non-incentive payments and incentive payments is striking, meaning that non-incentive costs in this project are dominating in the budget. This is partially caused by the low uptake in the market. But given the fact that the market could only start uptake with a one year delay[45] the project should be compared with Round 2 projects rather than Round 1 projects. In this comparison, the factor of 1.4 is not a reason for concern. Similar considerations can help put projects' progress in perspective.

[45] The companies had to sell the stock that another ODA project had built up for them first.

Table 17: Private Sector Leverage (PSL)

			Target				Achieved					
Round	Country	Technology	Incentive budget	PSL value	PSL in relation to incentives, only	PSL in relation to overall budget	Disbursed incentive	PSL value	PSL in relation to incentives, only	PSL in relation to overall budget	% of PSL value achieved	% of disbursed incentive compared to PSL value
1	Benin	Pico-PV Solar Water Pumps Solar Street Lights	€ 2,400,000	€ 9,792,000	4.1	3.2	€ 345,035	€ 1,136,482	3.3	1.6	12%	30%
	Rwanda	pico-PV	€ 2,200,000	€ 9,150,000	4.2	3	€ 46,953	€ 840,385	17.9	1.4	9%	6%
		mini-grids	€ 1,071,000	€ 1,891,000	1.8	1	€ 155,867	€ 209,077	1.3	0.6	11%	75%
	Tanzania	pico-PV	€ 2,200,000	€ 7,480,000	3.4	2.2	€ 776,683	€ 8,061,558	10.4	5.9	108%	10%
	Vietnam	biogas	€ 2,750,000	€ 62,228,198	22.6	7	€ 1,287,434	€ 12,643,927	9.8	5.7	20%	10%
	SUB TOTAL Average/Sum		€ 10,621,000	€ 90,541,198	8.5	3.3	€ 2,611,972	€ 22,891,429	8.8	3.1	25%	11%
2	Kenya	pico-PV	€ 2,062,950	€ 6,160,000	3.0	2.2	€ -	€ -	0.0	0.0	0%	0%
		mini-grids	€ 1,550,000	€ 2,075,000	1.3	1.0	€ -	€ -	0.0	0.0	0%	0%
		ICS	€ 1,522,000	€ 3,502,000	2.3	1.7	€ -	€ -	0.0	0.0	0%	0%
	Peru	ICS SWH	€ 1,490,000	€ 7,140,000	4.8	3.5	€ 376,940	€ 604,880	1.6	0.3	8%	62%
	SUB TOTAL Average/Sum		€ 6,624,950	€ 18,877,000	2.8	2.1	€ 376,940	€ 604,880	1.6	0.1	3%	62%
3	Cambodia + Vietnam	ICS	€ 2,598,268	€ 5,160,960	2.0	1.3	€ 166,745	€ 143,195	0.9	0.2	3%	116%
	Kenya	biogas	€ 2,911,915	€ 19,814,400	6.8	5.1	€ 18,158	€ 422,167	23.2	4.2	2%	4%
	Bangladesh	off-grid	€ 2,925,700	€ 16,851,000	5.8	4.1	€ 275,023	€ -	0.0	0.0	0%	0%
	SUB TOTAL Average/Sum		€ 8,435,883	€ 41,826,360	5.0	3.5	€ 459,926	€ 565,363	1.2	1.4	1%	81%
	TOTAL Average/Sum		**€ 25,681,833**	**€ 151,244,558**	**5.9**	**2.9**	**€ 3,448,838**	**€ 24,061,672**	**7.0**	**1.7**	**16%**	**14%**

Source: GIZ EnDev RBF documentation. Project reviews conducted in the frame of this mid-term evaluation. Data is based on project level information.

4.2.2 Determining factors for RBF effectiveness

Generally, it is safe to assume that the incentives have effectively enhanced the viability of the private sector in the area of renewable energy. However, a couple of qualitative aspects have influenced the effectiveness of the support, and contributed to the slow start that some of the projects experienced.

Preparedness of private sector recipients

In eleven project reviews it was concluded that the (initial) preparedness of the private sector recipients was insufficient. The main challenge found were the limitations in business capacities**,** especially of small companies. In nine cases, the suppliers/importers had difficulties to fill in the required forms and to present the necessary quantitative data as well as qualitative (technical) descriptions in the beginning. Especially small companies struggled with deficits in their business skills, including pricing, procurement and negotiation, decision-making processes, communication and marketing. During implementation, in most projects, companies had difficulties to provide accurate customer records as not all customers have phone numbers and many companies sell to cooperatives or distributors, which sometimes fail to collect data properly. Most projects observed that companies learned over time and set up the requested data collection system, some even introduced Client Relationship Management systems. In some cases these skills were built up by the private sector with help of EnDev or other technical assistance agencies, e.g. Energy4Impact in the case of Rwanda village grids (cf. section 6.1).

Technical product quality

Technology providers were also challenged with technical product quality. In at least two cases (Rwanda PV and Vietnam ICS) many products had difficulties to fulfil the required quality standards to qualify for the RBF. In Rwanda, there had been no standards and certification is costly. In the Vietnam and Peru cookstove projects, local technology had to be developed and certified, and manufacturing capacities had to be built up. In most cases, these challenges were overcome but it took some time. Cases are documented where distributors left the programme when they wanted to continue to sell lower quality products or where they sold qualifying and non-qualifying products side by side. It is not a given that in all instances the high product quality will persist on the market after the closure of the RBF project. This is for example a real risk for task lights or cookstoves.

Availability of growth capital

A third consistent challenge for business expansion is the availability of growth capital. It is documented in several cases. In the Cambodia ICS project neither producers nor distributors had enough working capital to pre-finance their engagement with the new market. Importers have confirmed that they are using the incentive to build up a stock of working capital – this is limiting their speed of growth. In Tanzania, some of the companies were dependent on the incentive payments for maintaining their current business model, not to mention growth. In Rwanda, one mini-grid developer was supported by a local Small and Medium Enterprises (SME) fund, under the precondition that the first incentive will be disbursed directly to them. With the exception of three firms in Benin, one in Tanzania and one in Rwanda, projects did not report that the RBF agreements helped them in accessing bank loans for growth capital. The venture-capital dependent (PAYGO-) Operators confirmed that it supported their discussions with their investors, but it was not formally used to secure a loan. This is true for international as well as local firms. Many solar companies in East Africa are supported by European and United States (US) venture capitalists who are appreciative of the RBF programme but would probably also support the companies without it. Thus, the RBF did build up working and growth capital to some degree, but mainly through the actual incentives. This is most obvious for the ICS firms in Peru, but was also confirmed by cookstove importers in Cambodia.

4.2.3 Secondary effects of the RBF projects

Effects on competition

One of the evaluation questions was whether competitors have been hurt by the RBF (EQ 2a.9). Competition exists at the level of manufacturers, import-suppliers and distributors, between certified and uncertified products, between Financial Intermediaries (FIs), between technology of higher and lower tiers or different product characteristics (e.g. simpler traditional biomass (charcoal/firewood) cookstoves against (non-biomass) cleaner stoves or portable versus fixed stoves.

Principally, the RBF is designed to crowd out inferior technology. This might have negative social impacts, for example when potters of relatively lower quality stoves are not finding a market anymore and lose their income. So far, due to the comparatively early stage in the projects' market impact, and with only a limited number of sales, no evidence could be found for the hurting of competitors. However, data on hurting the competitors are not available, because they are not part of the monitoring scheme of the RBFs, and the sectors are often poorly documented or fully informal. At this point, it cannot be ruled out that competitors might be hurt in the long run, and the hypothesis needs to be revisited in the final evaluation.

Consideration of vulnerable groups and gender-specific aspects

In general, there are two levels at which the projects can strive to include vulnerable groups (EQ 2b.3): at the level of the industry that will be transformed and at the level of the users who are granted access to energy and thus uplifted from poverty.

The number of female-owned recipient enterprises is not used as a KPI in the EnDev reporting to DfID. Only two projects formulate gender specific target indicators with respect to female income generation in the clean energy sector. In the Vietnam biogas project, for example, a target number of 55 energy enterprises was expected to include 10% owned by female entrepreneurs.

In the EnDev reporting to DfID, the only gender aspect included is the male/female split in the number of jobs. Women occupied portfolio-wide, only 17% of the 234 jobs. In Tanzania, in the beginning, 90% of the employees were men and the project target was to reach 25% female employment in newly created jobs. Until December 2016, 293 additional jobs (36% of the target) have been created, with 34% female employment.

Coverage of intended and unintended effects

In all cases, the intended effects (outcomes and impacts) are duly reflected in the project's logframe and Theory of Change of the project proposal (EQ 1.11). Measurable indicators have been formulated. In at least one project proposal (Mekong ICS), the different potential risks and their mitigation measures mentioned in the proposal refer only to risks regarding the project management and implementation (e.g. limited participation by distributors), and do not refer to unintended impacts outside the project context. In that case, unintended impacts in regard to the RBF recipients have been addressed in the project planning phase and via different contractual safeguards, e.g. in regard to fraud risks.

4.2.4 Review of the evaluation hypotheses

Effectiveness at supply side level

In those cases where sales have been verified, the RBF did strengthen the supply side and improve its viability (H2a). Where no sales have been verified, various reasons apply, in particular a lack of business capacity on the supply side, or the lack of high quality products.

The need of the projects for accurate documentation of sales has forced companies to build up better record keeping where the quality has not been good enough. The high product quality standards enforced by the projects have enticed those companies that wanted to benefit from the RBF to sell better products.

RBF has not solved the challenge of access to finance and growth capital for supply chain businesses. Where companies received incentives for achieving intermediate steps in the product cycle, such as product development in Peru, or financing imports (e.g. Peru ICS, Benin PV), the pre-financing bottleneck could be addressed through RBF project support. However, it has also been found that the use of incentives as the main source for building up working capital may be insufficient to support companies' growth. As incentives are always proportional to past sales, companies cannot grow exponentially on that basis, but markets can (and are expected to) scale exponentially for renewable energy access technologies. As a result, if companies have no other source of working capital, they might be losing market shares in exponentially growing markets, particularly if these markets are capital intensive (like for example the PAYGO-markets).

Efficiency of delivery

The efficiency of the programme in terms of providing the right level of incentive to ensure efficient delivery of goods (H2b) can be measured by comparing the KPI PSL with the spent budget. Across the portfolio, the efficiency is at a level that is commensurate with the implementation progress of the portfolio.. But particularly for the Round 2 projects, a need for adjustment can be stated. Some striking cases can be highlighted: If the incentive is given at an early stage of the value chain (e.g. for product development or importation, such as in Benin PV) and the product does not reach the customer the value for money can be at risk, because a large proportion of incentive budget can be spent without actually reaching the customer. The other extreme is the Tanzania PV project that has over-achieved both its private sector effect and the ratio between private sector effect and project costs. (Additional analytical findings e.g. on the level of incentives are dealt with in Chapter 5.2).

4.3 Demand side response

The intention of the RBF is to improve energy access for the targeted groups (poor and vulnerable tiers of the population) (H3b on impact). RBF mainly addresses the Sustainable Development Goal (SDG) 7, namely *to ensure access to affordable, reliable, sustainable and modern energy for all*. More specifically, it covers target 7.1, *to ensure universal access to affordable, reliable and modern energy services by 2030*; target 7.2, *to increase substantially the share of renewable energy in the global energy mix*. The existing monitoring and evaluation systems established for RBF duly consider and measure these targets. Through interlinkages, further SGS, such as, among others, SDG 1 (no poverty); SDG 13 (urgent action to combat climate change and its impacts) are also affected.

The demand for decentralized low carbon energy products is expected to increase (H2b on effectiveness) and targeted consumers should increasingly accept and take up decentralised low carbon energy products and services by targeted consumers (H2b). This increased demand shall be maintained over time (H3b on effectiveness).

4.3.1 Quantitative uptake: additional local access

According to the EnDev counting method, 347,244 people gained access to the respective technologies through the RBF projects (EQ 3b.2, see Table 18). So far, this constitutes 8% of the target for the whole facility. This additional access was mainly generated by Round 1 projects. The Vietnam biogas project

achieved already 57% of its target. And in Tanzania 30% of its target has been achieved. Together Round 1 projects have achieved 20% of the overall Round 1 target. Some of the 2nd and 3rd Round projects are still in their set-up phase and have not verified any sales yet so that no additional energy access can be reported yet.

Table 18: Number of verified end users ("beneficiaries") by 12/2016

Round	Country	Technology	Number of verified end users (EnDev counting method)		
			Target	Achieved	%
1	Benin	PicoPV Solar Street Lights Solar Water Pumps	475,689	52,311	*11%*
	Rwanda	Mini-Grids	22,000	3,311	*15%*
		PicoPV	550,000	15,782	*3%*
	Tanzania	PicoPV	360,000	107,133	*30%*
	Vietnam	Biogas	275,000	156,380	*57%*
2	Kenya	Mini-Grids	22,500	-	*0%*
		ICS	500,000	-	*0%*
		PicoPV	246,000	-	*0%*
	Peru	ICS Solar Water Heaters	130,000	1,335	*1%*
3	Bangladesh	Off-Grid	1,111,200	-	*0%*
	Cambodia	ICS	600,726	6,300	*1%*
	Kenya	Biogas	128,940	4,692	*4%*
Total			**4,422,055**	**347,244**	***8%***

Source: EnDev Progress Report 2016. Draft for governing board.[46]

In some cases, not only the technology itself is benefiting the users. Biodigesters for example provide cooking fuel – but this requires additional investments. The project in Vietnam is supporting this with the so-called "appliance bonus" – the biomass installer is requested to provide the household with a rebate towards the purchase of gas-based appliances. For cookstoves, a change in cooking habits and a structural and systematic increase in demand is difficult to achieve. Most households use more than one stove, so that they do not necessarily substitute the old stove, or will continue to request the new cookstove once it is at the end of its life time.

4.3.2 End users of the technology

Target groups

Overall, in all but one project rural households are the users of the renewable energy products. Only in the case of the street-lights project in Benin, municipalities are addressed as the main user of technology. Peri-urban households qualify in most of the picoPV and the solar water heaters projects, as well as the ICS projects in Kenya and the Mekong. Mini-grid projects are more and more addressing productive uses. The ICS project in Peru also addresses institutional users.

[46] The results for December 2016 reported in the EnDev KPI results table slightly differ for Tanzania picoPV, Benin PV and Africa biogas.

Where consumer surveys are available[47], consumers confirm that they generally like the energy products that they have acquired. For lighting, they typically aspire to move up to the next tier. In the East African PV projects PAYGO operators make larger systems more affordable. According to stakeholders in Tanzania, having one light – which is easy to afford for most people – quasi automatically leads to the wish for a second and third, and a multi-light system. After that, the most important requests are cell phone charging, and after that "the boom box," amplified music speakers. Other appliances that are requested from solar suppliers are electric shavers/razors and TVs. The demand for fans and refrigerators is relatively low. Water heating or boiling equipment is not requested.

Vulnerable groups

The overall objective of the access agenda is poverty alleviation through access to energy. The contract between UK's DfID and the German Federal Ministry for Economic Cooperation and Development (BMZ) regarding the RBF Facility does not emphasize vulnerable people (apart from the need to highlight gender differences in income from productive uses) (EQ 2b.3). Rather, the emphasis is on market-transformation with the main objective of building markets. In line with the philosophy of the RBF, most projects leave it up to the business strategy of the recipients who they want to serve and how they want to do it. In Rwanda PV, for example, the distribution strategy of the recipients is focusing on building up central sales points. The "last mile" is not yet part of their sales focus. In the local mom-and-pop stores[48] in remote and hilly areas, lower quality task lights are available if anything. RBF projects do not explicitly focus on vulnerable groups, nor are the contract between DfID and BMZ nor are the calls for proposals requiring such strategies. Still, projects offer some ways of dealing with them. Generally, three strategies are tested to support disadvantaged groups:

a. To differentiate the incentive depending on characteristics of the final customers;
b. To focus on MFIs or financial intermediaries as the recipients of the incentive – implying that it is the affordability barrier that keeps poor people from accessing energy; and
c. To combine the RBF with a social programme.

Strategy a. is followed in Kenya. In the Kenya picoPV and ICS projects, the incentive is staggered geographically so that sales activities in poorer and harder-to-reach districts qualify for higher incentives. The disadvantages of this "differentiation strategy" are clear: Creating incentives for the RBF participants to gear their marketing activities towards particularly vulnerable groups or regions causes additional administrative effort in the management and verification of the incentive, and requires a much more complicated incentive design which makes it harder to communicate the concept to the recipients.

Strategy b. is pursued by the Kenya PV, the ICS projects, the Peru solar water heaters and the Kenya biogas project. Its effectiveness will be discussed in Chapter 4.4.

Strategy c. is followed for example by the Peru ICS project (FIDECOP[49]) to promote, via collaboration, the eventual adoption of the incentivised technology by governmental social programmes that provide free ICS to the poorest. While this is not an explicit objective of FIDECOP, it nevertheless demonstrates how government programmes can be involved to further enhance the social impact of RBF among the poor.

[47] Periodic consumer surveys are available in the Vietnam biogas project; a consumer acceptability study was undertaken in the cookstove project Cambodia; IVA surveys are carried out and regularly monitored e.g. in the Rwanda mini-grids and picoPV project and the clean cookstoves project in Cambodia/Vietnam, a case study on picoPV has been done in the Tanzania PV project.

[48] Corner shops or mom and pop stores are tiny businesses in mainly residential areas where a limited selection of everyday items, such as groceries, canned and general goods, are sold. They are often only one income source for the owners among several.

[49] FIDECOP: Fondo de Innovación y Desarrollo de Cocinas Portátiles.

As market prices for the cookstoves are still high and cannot easily be paid by the extremely poor, in FIDECOP – like in most other projects –, RBF recipients' market strategies have at least initially focused on the low-hanging fruit (clients with sufficient income to buy the relatively expensive stoves). Fortunately, this results in a high degree of complementarity in market coverage with social programmes. While incentivised firms are likely to concentrate on the moderately poor market segments, they and EnDev are aware that the firewood portable improved cooking stoves (technology can potentially reach the poorest strata through social programmes. EnDev has actively promoted the technology in meetings with ministries, partnerships (e.g. United Nations Development Programme, UNDP) and by connecting entrepreneurs with public initiatives and clients. Through the complementarity between FIDECOP and existing social programmes, significant social impact by reaching even the poorest can be combined with market transformation.

4.3.3 Secondary benefits of the improved energy access

Economic and health benefits

As the projects are comparatively young, the secondary benefits in developmental dimensions like health, education or income levels (EQ 3b.4) will still take some time to fully mature. The use of light allows for extended hours for study and productive uses. In addition, larger solar systems and biogas facilities might allow for the additional use of appliances, including for productive uses. Solar water pumps make extended cultivation and increased agricultural productivity possible.

Measurable income gains have been demonstrated with the use of bio-digesters, as farms can be more profitable in selling milk (Africa) or save fertilizer (Vietnam). There is one case where a direct social and economic impact is measurable on a community scale. This is the case of Benin, where the availability of (solar) street lights in public locations has created new spaces for public encounters and exchanges and has attracted, among others, street vendors, school kids and students.

Beyond the direct energy access and fuel cost savings, most technologies offer co-benefits on health and safety: Better cookstoves and solar lights are reducing indoor air pollution and improving safety. As the programme strives to support high quality products with a long lifetime, these benefits can be sustained for a relatively long time.

Gender

The gender dimension of energy access and cookstove programmes has also been discussed extensively in the literature. Whilst economic savings generally benefit households as a unit, reductions in smoke and other harmful pollutants associated with incomplete fuel combustion typically generate much greater benefits for women and children as they are the ones mostly in the kitchen, as do time savings associated with lower firewood demand (hence less time collecting fuel).

Opportunities in the stove supply chain, however, are mixed. While the new technologies provide some employment opportunities for women as distributors and promoters (Cambodia and Vietnam), they might also damage women businesses, e.g. where they work as potters supplying the less efficient stoves, collect firewood, or fuel for a living or provide other services and goods that might be displaced by the new technologies.

Where there is access to mini-grids or picoPV technology and women are using solar lamps or solar home systems (SHS) instead of the traditional firewood, they have more time for income generating activities during the day because they don't need to take care of energy provision for lighting and they can shift household chores to the evening hours. Apart from that women benefit from a reduced

firewood collection and cooking time. Additionally, women are less exposed to smoke from candle and kerosene lighting and less exposed to open flames that can cause burns or fires.

In the Kenya biogas case, feeding the digester is traditionally a task for boys; this means that boys are increasingly busy collecting cow dung. The girls in this case, are saving time, because they have to spend less time fetching firewood.

Green House Gas (GHG) emission reductions

Greenhouse gas (GHG) emission reduction targets were set in line with the sales figures and along established conversion routines of EnDev, so that they mainly relate to the expected sales outcomes. Whenever the expected sales targets are scaled up or down, the expected CO_2 reduction targets are increased or decreased (e.g. Rwanda mini-grids). No project so far has up-scaled its target, so that the overall expected GHG impact of the portfolio has gone down so far. Changes in the calculation method of EnDev[50] have also impacted the calculated amount of the achieved GHG emissions (e.g. Tanzania PV). In a third case, the CO_2 reduction data cannot be completely counted as EnDev achievement, because certificates are generated and sold on the voluntary market (Vietnam biogas).

The portfolio under evaluation has a target of nearly 7.2 million tons, and until the end of 2016 has achieved 3,903,531 million tons of GHG avoidance, mainly through the biogas project in Vietnam. It is therefore premature to conclude at this stage on the GHG emission reductions through RBF.

Table 19: Avoided CO_2 emissions (in tonnes)

Round	Country	Technology	t CO2e avoided (Over lifetime of products sold during project)		
			Target	Achieved	%
1	Benin	PicoPV Solar Street Lights Solar Water Pumps	33,288	5,974	*18%*
	Rwanda	Mini-Grids	11,534	974	*8%*
		PicoPV	40,500	1,090	*3%*
	Tanzania	PicoPV	29,000	5,712	*20%*
	Vietnam	Biogas	4,469,000	3,871,406	*87%*
2	Kenya	Mini-Grids	5,106	-	*0%*
		ICS	41,811	-	*0%*
		PicoPV	22,378	-	*0%*
	Peru	ICS Solar Water Heaters	195,875	-	*0%*
3	Cambodia	ICS	541,013	811	*0%*
	Kenya	Biogas	1,719,200	17,564	*1%*
	Bangladesh	Off-Grid	61,786	-	*0%*
Total			**7,170,491**	**3,903,531**	***54%***

Source: EnDev Progress Report 2016. Draft for governing board.

[50] Along with the increase in sales of picoPV systems, at the end of 2015 4,517 tCO_2eq have been avoided in the Tanzania picoPV project which means the project had caught up to its milestone target of 4,347 tCO_2eq. increasing to the abatement of 4,625 tCO_2eq until June 2016.[50] The reported high rise of achieved GHG emissions from 2015 onwards may be also due to changes in the calculation methods of EnDev

Even without the Vietnam biogas project[51], the Round 1 PV projects (Benin and Tanzania) have by far the highest achievements regarding the mitigation of carbon emissions. At this point in time, 5,974 tons of CO_2 emissions have been avoided in Benin and 5,712 tons in Tanzania. For both Rwandan projects, low level of achievements could be already registered (mini-grids 8%; picoPV 3%).

Negative environmental impacts

A potential negative ecological effect is waste disposal. While this has previously only been an issue with solar energy-access products,[52] the emergence of more sophisticated stoves and other new products bears the risk of introducing new harmful substances into the environment. Projects should increasingly consider appropriate measures.

4.3.4 Review of the evaluation hypotheses

Effectiveness with respect to energy access

There is evidence that, overall, energy access and demand for decentralised low carbon energy products have been improved (H2b): Co-benefits have been leveraged commensurate with the sales. Typically, these include fuel cost reductions and efficiency gains. Moreover, in technology-specific co-benefits, like the reliable availability of pumped water through solar pumps, it reduced (indoor) air pollution and shifts in time availability for energy-related tasks.

Impact

The effects of the RBF Facility on increased acceptance and uptake of decentralised low carbon energy products and services by the targeted consumers are commensurate with the current sales levels (H2b).[53] Acceptance has been comparable with other projects. Although a systematic review on impact has not been undertaken at this stage, we assume that, overall, the products do not seem to be more or less acceptable or attractive to the consumers because this is an RBF project and not another project design.[54] The user surveys e.g. in Vietnam biogas project or the Tanzania PV project that have been reviewed indicate that consumers like the products (H2b effectiveness) but the sustainable increase of the demand has not yet been proven as a consequence of the RBF only (H2b effectiveness).

In line with their mandates, the projects are implementing a market development logic. They are promoting technologies and market expansion with a focus on the development of the supply side. Per se, this is irrespective of the type of purchaser. There is no in-built focus on any particular property of the user, including whether or not he or she had access to the same energy technology before, or whether he or she is a member of a poor or vulnerable group.[55] Therefore in most cases, they are most likely also underrepresented among the end-user beneficiaries, but no reliable data are available on this yet (H3b impact). The envisaged impact assessments for two selected RBF projects will need to shed further light on this aspect.

[51] The Vietnamese biogas project is registered to sell emission reduction certificates in the voluntary carbon finance market. Therefore, the emission reductions cannot be included in the overall counting for the EnDev achievements.
[52] In the off-grid appliance project in Bangladesh for instance, an increasing awareness on that issue among development actors in the sector is noticeable, though waste collection efforts are still negligible.
[53] H2b: RBF supports increased acceptance and uptake of decentralised low carbon energy products and services by targeted consumers.
[54] H2b effectiveness: demand for decentralized low carbon energy products has increased.
[55] H2b impact: Energy access is improved for the targeted groups (poor and vulnerable tiers of the population).

4.4 The financial sector's response

The original setup of the RBF included several references to the financial sector. The financial sector is often important in energy access programmes as a micro-lender to the households and microbusinesses that are expected to purchase the energy access technologies. In market transformation programmes like the RBFF's projects, often financing is also required to provide working capital to the supply side that is expected to grow. In the current design, the programming documents proposed to include financial intermediaries (FIs) as fund managers, potentially in the hope that their involvement in the administration of the incentives would result in a farther-reaching commercial relationship with the participating companies. This relationship would leverage financing for the development of the market from the banks.

4.4.1 Financial institutions as fund management agent

Level of involvement of financial institutions

In nine project proposals, it was envisaged that an external financial institution should take over the role as Fund (or Financial) Management Agent (FMA). This was actually implemented for seven projects (Rwanda PV and mini-grid; Tanzania PV; Kenya ICS, mini-grids and picoPV; Peru). Some of these projects (e.g. Rwanda) are struggling with the competency level of these Third Parties. For the Kenyan ICS and picoPV project a quasi-FI was selected. Besides fund management, the Micro-Enterprises Support Programme Trust (MESPT) also offer loans to financial organisations, including MFIs, Savings and Credit Cooperatives (SACCOs) and financial services associations. No FI was selected as FMA in both active countries of the cookstove project in Asia. In the case of Cambodia, a capital investment company was selected (C-Quest Capital LLC) and in Vietnam, SNV decided to take over the responsibility of organizing and managing the stove auction and disbursement process. These seemed the locally appropriate solutions to the project teams. Generally, the performance of the project does not seem to be hinging on the question of whether the Third Party is a financial institution or not. It might be more relevant whether the Third Party is capable and genuinely committed to the purpose of the project, or not.

Preparedness of financial institutions

In most cases where a FI was selected as FMA, the financial institution was not well prepared for and capable of launching and implementing RBF (EQ 2a.5). Reasons for that were either lack of capacity and (fund) management knowledge or limited interest and scepticism in/about the specific renewable energy sector, or both. Often when the capacity of the FI was not as high as expected (e.g. in Rwanda), the implementing organisation (GIZ) had to take on certain management tasks that were initially expected to be done by the FMA.

Sustainability of financial sector involvement

Nevertheless, FMAs typically consider their participation in the project a long-term commitment. They are setting up infrastructure (EQ 2a.6) and hire additional dedicated staff (EQ 2a.7). The FMA for the Peruvian SWH project, for example, has set up a separate project management unit for the management of RBF. It integrates the experience in other programmes. The Tanzania Investment Bank is also managing the funds for the rural energy programme of the World Bank Tanzania Energy Development and Access Project (TEDAP).

4.4.2 Financial services to RBF recipients and end-user beneficiaries

Financial sector as provider of growth capital to the supply chain

In only two projects, the financial sector provides growth capital to the supply chain (Tanzania PV, Peru SWH). In the case of Tanzania there is evidence that the RBF has been supporting access to working and growth capital for the participating companies (EQ 2a.1). So far, none of the banks that function as FMAs have also extended credit to the participating supply chain companies. In Peru, the provision of loans to distributors was mentioned as an option and the managing FI actually offers loans to the supply chain. Access to finance however, is not seen on a larger scale than before (cf. section 3.2.2).

Financial sector as provider of microloans to combat the affordability barrier of household assets

Several projects were counting on the financial sector to provide household loans. Four projects even included Financial Institutions as RBF recipients (EQ 2a.2) (Kenya ICS and picoPV, Africa biogas, Peru SWH) (see Table 16).

In the African biogas project, six MFIs of 18 contracted FIs are active and have received incentives for 69 sold units. In the Kenyan ICS project seven MFIs and in the picoPV project 5 MFIs and 1 FI are active. The claims are still under verification so that no incentives have been disbursed yet. In the Peru SWH project only one of the contracted five MFIs is active and has received incentives of 12,000 €. In summary, the inclusion of the FIs as recipients has failed. For example, in the Kenyan ICS project, the market developed independently of the RBF programme.

Obviously, the limited success to include financial institutions as recipients in the RBF projects to increase the supply of loans to households has negatively affected the effectiveness – and efficiency – of the projects.

Additionally, many projects tried to include the financial sector (especially microfinance institutions in Cambodia and Peru, SACCOs in the Sub-Sahara African projects) as provider of microloans to households into the project, even though it was not part of the incentive design. While the project proposals considered the collaboration with the financial sector important, in most cases this could not be realised and the projects experienced difficulties to build up reliable structures. This is pointing to structural issues: it seems to be difficult to interest the FIs in these types of loans.

Chapter 6 of this report provides a further analysis of the challenges related to financial sector involvement in RBF management. Chapter 7 presents corresponding lessons learnt and recommendations.

4.4.3 Review of the evaluation hypotheses

Relevance of RBF for financial sector development

Generally, it is evident that the financial sector played a less important role within the RBF than expected. The viability of an engagement in the market for low carbon energy access has not increased sufficiently for the financial sector to engage (H2a, EQ 2a.1). Even for fund management, the capacities of (private) financial intermediaries were often found to be insufficient. The field missions undertaken for this evaluation have confirmed that their interest in providing working capital for the supply chain is limited – often these companies are seen risky to invest in or have other (less costly) sources for working capital – even though working capital seems one of the most important limiting factors for the growth of several markets. Last but not least, the projects that aimed to increase the (M)FIs' interest in consumer lending were among the least successful so far. The evaluators assume that this might be because the incentive structure in these cases is necessarily more complex, but it might also be because the FIs have no particular interest in pushing this (or other) sectoral programme(s). It has not been demonstrated in

the RBF portfolio that FIs can be the drivers of market development, and it has also been difficult to include them to mitigate the financial barriers to market growth.

Sustainability of financial sector involvement

In cases where the financial sector has been involved in RBF implementation, they have mostly worked on building up their capacities to provide a sustainable contribution. However, as mentioned, the financial sector engagement has been below expectations in most projects so far, so that it can be expected that the level of sustainable engagement will probably continue to be limited.

4.5 Conclusions on direct results of RBF

Market uptake

Generally, in most projects where incentives were claimed, there is evidence that RBF has ensured market acceleration and increases in product volumes (*H2a)*. Even if verified technology sales might look small, it can be expected that the potential for lasting market transformation exists. The extent to which this expectation will be met needs to be assessed with the final evaluation. In four cases, RBF has led to new markets for new products. These are Cambodia ICS, Vietnam ICS, Peru ICS and Peru SWH where the products had not been on the market before. In these cases, almost all sales of the RBF-eligible product quality have been incentivised by RBF. If in the future, higher incentivised sales as well as sales outside of the incentive systems are found, this would be an indication of real and sustainable market transformation. In one case (Tanzania PV), a market for the products existed in the country, but could be expanded into a so far underserved region. Several projects, specifically the biogas projects, were able to maintain the baseline deployment working towards a qualitative change of the support framework of the market. For some projects, in particular the mini-grid projects, market development has accelerated during the implementation of the RBF projects, but the main driver was most likely not the RBF incentives. In these cases, the evaluators think that the RBF impact is blurry.

A number of projects have not had verifiable sales. For some of the Round 2 and 3 projects, this can be attributed to start-up challenges, or in case of the Kenya projects that work through MFIs, to the recipients' lack of interest and an at least 6 months delay due to IVA contracting challenges. Here, a reconsideration of the actual market barriers and a redirection of the incentive would be appropriate. Other challenges for delivering results have been the lack of suitable financial management agents, insufficient business capacity on the side of the recipients, poor record keeping leading to non-verifiable claims, and other administrative or political delays. Overall, the evaluation team opinions that these challenges are not stronger than in comparable ODA programmes. For Round 2 projects, however, the evaluation team concludes that there is a fundamental need to rethink incentive designs and approaches and fit them to the actual market barriers and their addressability through various interventions.

Private sector leverage

Regarding the efficiency of the portfolio, there is evidence that the private sector leverage was very high. Overall, the leverage is already at 1.7 compared to a targeted PSL of 2.9. It can be expected that markets and sales will be picking up in the near future in several projects, and incentive levels as well as management efforts will be reduced. Therefore this can be considered a lower bound. However, the efficiency assessment does not take into consideration the significant co-financing and preparatory effort that went into the market development. As a result, the evidence for this judgement is not strong.

Renewable energy access

According to project documentation, almost 350,000 people have so far gained renewable energy access through RBF. The evaluators could not verify the validity of this information. People seem to

generally appreciate the technology and – at least for lighting technologies – aspire to purchase more and better products in the future. The RBF projects have mostly not attempted to direct these sales specifically to vulnerable groups. In cases they did, they have been only marginally successful so far. On the basis of the EnDev GHG accounting method, 3.9 million tons of CO_2 equivalents will be saved over the lifetime of the products during project duration.

5 RBF and market transformation: relevance, sustainability and impact

The objective of the RBF Facility is to trigger market transformation so that more companies provide energy access technologies to the target groups. The discussion regarding relevance, impact and sustainability therefore needs to go beyond the direct outputs of the projects and discuss these immediate results in the context of the local markets and the influences that the projects had on these.

5.1 Interactions between the RBF projects and the market and policy framework

In several situations, the RBF projects are the first and only projects supporting the technology (e.g. Peru projects, Mekong ICS). At the other end of the spectrum, there are some projects where the RBF project is only one of many measures that work towards supporting rural energy access (e.g. the mini-grid projects). This can strongly influence the relevance of the chosen RBF structures for energy market transformation in the respective country context (H3a). In eight cases, it can be clearly stated that RBF has complemented the existing support framework rather well but a closer look is warranted.

5.1.1 Influence of other programmes on energy access in the country on the RBF project

RBF projects are highly specialised and develop in-depth market expertise. They are a natural entry point for other donors that want to work on these markets. In most cases the RBF projects were able to influence these other donor programmes, but there is no automatism that will preserve the RBF's effectiveness, efficiency, impact or additionality once another programme is planned. This is a risk that needs to be mitigated with intensive donor consultations and policy dialogue with governments. Those implementing RBF need to be self-critical and ready to phase the project out when it cannot be effective or efficient anymore.

Cooperation with (inter-)national actors is manifold. RBF projects cooperate with many international and national agencies, public institutions such as universities, private companies, NGOs and other civil sector organisations. With respect to their embeddedness in national initiatives and programmes on energy access and the resulting synergies and competition (EQ 1.3), as well as their collaboration with the local stakeholders (policy makers, private sector, other local and international agencies, financial institutions) (EQ 1.2), four groups can be distinguished:

- Projects that are completely embedded in government programmes (Vietnam biogas);
- Projects that are cooperating with existing TA programmes;
- Projects that compete with financing (e.g. World Bank) programmes;
- Projects that are "the only game in town".

RBF embedded in a government programme

For RBF embedded in government programmes it is important that RBF is fully aligned with the government on the objectives and underlying theory of change. The Vietnam biogas project is a unique case, but provides lessons for using the RBF as a phase-out strategy for a government-run subsidy programme:

- Several of the challenges arose from within-government coordination and not from coordination between the RBF Facility and the responsible ministry.

- For governments, it might be more plausible (to the government) to give household subsidies within poverty reduction programmes, rather than incentivise businesses.
- On the other hand, the project was benefitting enormously from the existing administrative and TA structure in the form of the National Biogas Programme secretariat and the extension network of the Agriculture Ministry that ensured that MEVA (monitoring, evaluation, verification and audit) and technical quality assurance can be done throughout the country.

Projects that are cooperating with existing TA programmes

There is a need for technical assistance (TA) beyond of what can be covered from the RBF projects' budgets. This need exists in project preparation and throughout the implementation, and makes it necessary that projects cooperate with other TA projects. Significant positive interaction was leveraged with other TA projects and no negative influence has been reported.

As discussed earlier, most GIZ-implemented projects build on earlier EnDev programmes, or in at least six cases (Rwanda mini-grid, Benin PV, Kenya picoPV and ICS, Peru SWH and ICS) ongoing parallel EnDev projects. Almost all projects that are implemented by third parties are building on earlier efforts financed from other sources that were testing approaches, establishing technical assistance infrastructure or analysing the market in preparation for the RBF. The Bangladesh appliance project is the only one that is not building on prior work in the country but on a global award scheme for efficient appliances. In this case as well, a stand-alone effort without any preparation, financed alone from the RBF funds would not have been possible.

In at least four cases, RBF is partnering with NGOs or public organisations on technical aspects (Rwanda mini-grids, Peru SWH, Bangladesh appliances, Africa biogas). In the case of Rwanda mini-grids, for instance, the quality of the local construction companies was so low initially that the project relied on SNV and the Global Village Energy Partnership (GVEP) to support the mini-grid proposal phase. In the biogas project in Kenya, trainings are carried out, and to a small extent financed by RBF, to introduce RBF and its programme regulations, to instruct biogas construction companies on keeping up certain standards as well as to improve quality standards through after-sales-service and to improve the business capacity of the masons. A number of initiatives are complementing the cookstove RBF in Kenya with a focus on institutional capacity building ("Strategic support to the Clean Cooking Sector in Ghana and Kenya project" and "Evidence Based Advocacy for Clean Cooking"), simpler entry-level ICS (EnDev) or behaviour change communication (Population Services Kenya and Practical Action). All picoPV projects have fruitful and positively complementary partnerships with the Lighting Africa (LA) programme of the International Finance Corporation. For matters of quality assurance, this link allowed them to set up and lift the quality standards of products in the market, as all LA supported systems automatically require a warranty procedure. Many of these synergies have already been factored into the project design.

Synergies can also arise when the RBF works together with non-energy programmes. In the solar water heater programme in Peru, EnDev has signed an agreement with the Peruvian Ministry of Housing under the Tambos programme where SWH distributors use Government service centres in rural areas (tambos) as showrooms for their SWH products. Further, ICS Peru is linking up with national social programmes, which are fully subsidised by the government, targeting the poorest areas of Peru, and that also provide ICS to groups and institutions. EnDev has actively promoted the FPICS technology in such social programmes and raised awareness of its benefits among officials. In the case of the school feeding programme, Qali Warma, this has led to the first public tender for the RBF-promoted FPICS technology, opening up additional market potential for the project's RBF recipients. The firms' preferred strategy is to now sell to social programmes via public tenders, rather than directly to the end users.

RBF projects and potential conflicts with financial assistance programmes

As discussed above, the RBF has typically not been able to support the build-up of working capital for accelerated growth. Therefore, other financial programmes can be helpful. But unlike in the TA programmes, there is potential competition in addition to the opportunity:

- Many companies in Eastern Africa have benefitted from the Energy and Environment Partnership (EEP) Southern and Eastern Africa, a donor-funded (including DfID) facility that provides concessional loans to enterprises in the region. In at least one case it has been used as an alternative to RBF participation, due to the smaller effort in documentation and MEVA. In the interviews with companies, the complementarity has been praised as being very beneficial as the Energy and Environment Partnership was able to provide growth capital.
- At least three projects (Rwanda PV, Rwanda mini-grid, Kenya mini-grid) compete for the attention of the recipients with other projects of larger financial players. When RBF started in Rwanda, it overlapped with the World Bank's Energy Small and Medium Enterprises (ESME) programme in the country which provided 200,000 USD to each of the seven solar lighting companies to build up stock and increase their marketing and awareness raising capacities. Most of the relevant companies were not interested in the RBF project during 2015 because funding conditions were less attractive. Only when companies had finally sold out the products purchased through the Energy Small and Medium Enterprises programme did they begin to start selling under the RBF.
- In both, Rwanda and Kenya, large scale World Bank (WB) projects on off-grid technologies (SREP[56] and KOSAP[57]) are starting up, and significant project resources have been tied up in negotiating complementarities. In the best cases, the WB projects might relieve the pre-financing challenges for investments and supply chain growth. During the field visits for this evaluation in 2016 it has turned out that the private sector had apparently adopted a potential wait-and-see attitude, delaying project progress.

Summarizing, a co-existence with financial assistance programmes can fill important gaps in the RBF framework. However, the additionality, effectiveness and efficiency of RBF and incentives can be threatened, although technical assistance from EnDev is also needed for the success of the WB projects.

All climate finance and ODA programmes claim additionality. Additionality of at least one of the facilities is questionable however when a climate finance programme like SREP is used for pre-financing mini-grids and EnDev gives incentives that are used to refinance the SREP-loans or ensure their viability. It would be clearer and better designed to cover both aspects – the lending and the incentive – in one facility. This would also limit the double-counting of benefits that will – in the current setup – be claimed once by each facility.

RBF projects as "the only game in town"

In some cases, the RBF projects were the only ones supporting a specific technology. This is in particular the case in those projects that are introducing new technologies to a market, as in the Mekong ICS projects or the Peru SWH project. Tanzania PV was also in a position to be perceived as the only project that supports picoPV products, not only in the region but in the country, which is potentially a major reason for its success. In these projects, market development is naturally strongly influenced by the project, including the quality of the products offered.

[56] SREP: Scaling Up Renewable Energy Program.
[57] KOSAP: Kenya Off-Grid Solar Access Project.

Benin can also claim this situation. However, during project implementation, competition has emerged from other government-supported programmes which provided PV systems and Solar Street Lights at lower prices or even for free, and the project has been crowded out from these markets.

Challenges in positioning RBF projects

The discussion above shows that projects were influenced by their environment to varying degrees. Intense donor consultations are often required tying up significant project resources to ensure coordination and coherence. Financial programmes of other donors and governments follow their own logic and complementarity with the RBF cannot be taken for granted. Other programmes have the potential to threaten the RBFs' additionality, relevance, effectiveness, efficiency, impact and sustainability.

While the RBF teams are often able to influence the other programmes on energy access, this is not strictly in line with the budget provisions and general idea of the RBF Facility. In the interest of value for money, it is sensible for a project to withdraw from a market if it is crowded out by other programmes of the same technology. This should be a consideration for the mini-grid projects.

5.1.2 Influence of the RBF scheme on national policies

With respect to how and to what effect the RBF projects have influenced the positioning or presence of other programmes in the country relevant to these sectors (EQ 1.10) the project documentation is incomplete because pathways for policy influence are often not clear. In addition, most projects have an ongoing dialogue with the policy makers on their project experiences and market expertise but most often, this comes from RBF and non-RBF projects so that a specific influence of the RBF Facility is hard to ascertain. Nevertheless, there are a few well documented cases.

Upscaling the RBF to a national policy or transfer of its experience to other programmes

In at least two projects, other programmes copy elements of the RBF mechanism and design. This is the case in Tanzania, where elements of the RBF mechanism and design have been transferred to the energy sector reform programme and agricultural programmes. In Kenya, the envisioned upcoming behaviour change communication (BCC) campaign of the Global Alliance for Clean Cookstoves (GACC), implemented by Population Services Kenya and Practical Action, is targeting to foster the sales of 380,000 stoves over a two-year period and has adopted a very similar stove selection process to the one developed by the cookstove RBF.

In several cases, EnDev is influencing national and sectoral policies. In Peru, FPICS technology will be further fostered in (social) Government programmes and also in the Nationally Appropriate Mitigation Action (NAMA) for clean electrification, heating and cooking. In Benin, the project has positively pre-empted some necessary programme initiatives in the country. It has led to an import duty exemption, which is widely seen as the single most important impact of RBF on renewable energy supply. It has also increased the pressure on policy makers to embark on an improvement of the relevant support framework and thus has motivated policy makers to catch up and to initiate picoPV support. The documentation is potentially incomplete for the reasons discussed above.

In at least two cases, it can be clearly stated that RBF was not able to influence the positioning or presence of other programmes. The 4B-F programme is a regional entity and not perceived as a project of its own, but as an add-on to the long-standing and very popular multi-country African Biogas Partnership Programme active in Kenya, Uganda and Tanzania as well as Ethiopia and Burkina Faso. The same applies to Peru SWH, where per December 2016 the project had not yet had any effect on the positioning of other programmes by the national government or other donors.

Influence on technical standards

In at least 12 cases, the RBF projects are designed to considerably influence the quality of products on the market. International and/or EnDev standards are used for this. This is for example the case in the four picoPV projects, the water pump project, the biogas and cookstove projects. Only the mini-grid projects are not geared towards the introduction of quality standards. With their activities, the projects are contributing to the setting of new technical as well as quality standards. However, these are rarely made into national standards, and even more rarely enforced by governments. The Bangladesh off-grid appliance project is a good example of how RBF contributes to set national technical standards. It does so by channelling its activities via companies partnering a market aggregator in off-grid financing (Infrastructure Development Company Limited, IDCOL), and advocates for a faster admission of high-efficiency TVs and other appliances in IDCOL´s portfolio. However, no example for a formal, government-enforced standard in the sense of a legal instrument has been found in the portfolio to date.

5.1.3 Review of the evaluation hypotheses

Relevance

It was found that other programmes strongly influence the relevance of the chosen RBF structures for energy market transformation in the respective country context (H3a). Moreover, in many cases, general risks for doing business, such as in Kenya and Tanzania, and elections have hampered private sector activity significantly and thus impacted investments in Renewable Energy.

Four groups exist with respect to the embeddedness of the projects in national initiatives and programmes on energy access. Firstly, RBF can be a completely embedded as integral part of the government's activities in this area. Secondly, it can be "the only game in town". Thirdly, there can be positive interaction, which has mostly been the case with active TA support from other initiatives and programmes. But there can also be detrimental competition.

Complementarity

In most cases where efforts were undertaken to influence the positioning or presence of other programmes in the country, measurable impact of the RBF on other projects can be found and have a clearly describable impact. The evaluators confirm that positive complementarities with other national and international initiatives and programmes are dominating overall.

Challenging aspects for RBF management were also found. These often relate to the due consideration of and coordination with subsidy policies of governments, public institutions and other international programmes. The type and quality of coordination varies widely between the projects. Stakeholders have been involved in a number of ways, through direct consultations, workshops, as advisory groups or through submission of letters of support, through regional knowledge exchanges or periodic workshops. The coordination challenge is particularly evident for the large-scale World Bank Climate Finance programmes, such as the upcoming Scaling up Renewable Energy (SREP) programme in Rwanda. Primarily designed to catalyse private investment in renewable energy technologies, the WB programmes benefit from the technical competence of EnDev by drawing on their advice, although TA is not the main focus of the RBF projects. This confirms the value added of RBF. On the other hand, RBF management needs to mitigate the risk of diminishing private and public sector engagements with the RBF by putting RBF participants into a holding position, waiting to see if the WB project might provide better terms. This may limit the additionality, effectiveness and thus also the impact of the RBF projects. Collaboration strategies and a collaborative spirit of all involved stakeholders are therefore required to ensure complementarity.

5.2 Incentive level and design

The incentives are the core element of the programme logic of the RBF. Five evaluation questions were formulated to their effect, all of which also influence the corresponding hypotheses:

- How did the level of incentives compare across the portfolio, including with respect to effectiveness? (EQ 1.13)
- How was the incentive determined and to what effect? (project level and comparative) (EQ 1.8)
- How do different mechanisms for determining the type and level of incentive compare with respect to effectiveness? (EQ 1.9)
- Was the level of incentive offered appropriate? Needed? (EQ 2a.4)

Evidence for comparing the effectiveness, efficiency, impact, and sustainability of different incentive designs is limited for two reasons; for the successful RBFs that have resulted in significant sales, the time series are too short to understand whether impact is lasting and sustainable or not. Further, comparability between different incentive designs is limited. Differences in effectiveness, to the degree that they are observable, can be caused by incentive design but many other aspects might be equally causal. Therefore, many of the observations at this point can be preliminary and form hypotheses rather than concrete findings.

For incentive definition, three parameters need to be determined:

- Whom to incentivise (recipients);
- What results to incentivise (single vs. multiple, what stages of the value chain) and when to pay out the incentive in the value addition process (timing);
- How high the incentive should be (level).

The qualitative discussion will elaborate on these three dimensions separately to capture the diversity of incentive structures across the portfolio and arrive at conclusions, lessons, and recommendations.

5.2.1 Average incentive levels

Table 20 displays the average incentives, according to the KPIs that are reported from EnDev to DfID. These numbers are averages over all product types in the respective project components, and over the lifetime of the project. As most incentive schemes envision a reduction of the incentive over the years, it can be expected that the current averages are higher than the target averages, which is the case for Tanzania PV, Peru SWH and Mekong ICS, but targets are still achievable. Five of the 12 projects that are part of this review have not yet managed to verify sales, and accordingly no data can be included here.

Table 20: Average incentives per technology deployed

Country / Countries	Technology / ies	Average Incentive target per technology (KPI report)	Average incentive per technology (KPI report)
Rwanda	Mini-grids / connections	285.60 € [1]	
Kenya	Mini-grids / connections	344.44 € [1]	
Africa	Biogas	135.50 €	23.31 €
Vietnam	Biogas	50.00 €	40.37 €
Peru	SWH	57.31 €	732.75 €
Cambodia, Lao, Vietnam	ICS	21.61 €	51.18 €
Kenya	ICS	15.22 €	
Tanzania	PV	20.95 €	15.91 €
Benin	Solar	12.65 €	10.38 € [2]
Rwanda	PV	10.00 €	3.94 €
Kenya	PV	17.19 €	
Bangladesh	Appliances	5.42 €	

Notes: [1] For all mini-grid projects unit of reference is connections. [2] With regards to the Benin solar project, the average numbers presented in this table should be interpreted with caution as it covers three different solar technologies (picoPV, solar street lights, solar water pumps) for which the incentive target and incentive level vary greatly depending on the technology.

Source: Project reviews conducted in the frame of this mid-term evaluation. Data is based on HQ information. The calculation basis is provided in the Annex (Chapter 8.4).

Overlaying this with the levels of achievement by the projects (EQ 1.13), it is not clear that there is a direct relationship between higher incentives and higher project success. However, for the outliers with the lowest incentives in comparison to other projects of their technology cluster, e.g. Rwanda PV, an incentive that is too low could be a factor that limits their success. A qualitative analysis of the link between the level of the incentive and the impact of the projects can be found in section 5.2.5.

5.2.2 Recipients of incentives

The projects test various types of recipients of the incentives (cf. Table 12). The most common approach is to incentivise the distributors (nine projects), or the importers (four projects), or the manufacturers (seven projects). Four projects (Kenya ICS and PV, Africa biogas, Peru SWH) are including financial intermediaries as potential recipients of incentives. None of the projects include incentives to the final households, although in Vietnam the government is considering reintroducing household subsidies for poorer households from non-EnDev-RBF resources.

Baseline assessment

Often, recipients of RBF incentives are already active in the market. This automatically leads to a challenge in identifying and rewarding additionality. If the baseline is non-zero, the projects should still only compensate for the additional installations. In other places, like the Kenya PV project, baseline assessments and additionality assessments are more difficult as the level of market development is challenging to assess. The baseline assessment needs to be tailored to specific situation of the recipient. This limits the comparability of the reported results as well as the interpretability of the overall impact of the RBF on market development on the basis of KPIs only. Rather, projects and their impacts should be viewed and discussed in the context of the additionality discussion (cf. section 5.2).

Strategic relevance of whom to incentivise

Table 21: Barriers and incentivised results

Barrier	Rewarded result	RBF type	Recipient	Example
No last mile distribution network	Sale	Capital incentive[58]	Import-supplier	*Tanzania PV, Rwanda PV, Benin*
			Distributor	*Vietnam biogas, Mekong ICS, Peru SWH*
	Sale	Distributor commission / bonus	Additional cash incentive to wholesaler that is supposed to be handed on to the distributor	*Tanzania PV*
	Household connection	cash incentive per head	Project Developers	*Rwanda mini-grid, Kenya mini-grid*
Lack of affordability with the end customer	Loan	Cash incentive	(Micro)Finance Institution	*Kenya picoPV, Kenya ICS, Africa biogas, Peru SWH*
		Cash incentive	Household	-
Insufficient customer awareness	Add-on product sale[59]	Small cash incentive	Distributor, Producers	*Kenya ICS (pellets), Vietnam biogas (appliances)*
	Sale	Cash incentive, voucher or give-away	Household	-
Lack of willingness to pay by consumer	Sale	Cash incentive, voucher or give-away	Household	-
	Sale	Voucher or give-aways	Household, from distributor	*Vietnam biogas[60]*
Lack of working capital in the supply chain	Importation	Cash incentive	Importer	*Import incentive in Benin, stove auction in Cambodia*
	Construction	Lump sum cash grant	Investor / project developer	*Lump sum grant of up to 70% of investment costs for Rwanda mini-grid*
		Cash incentive	Project developers	*Capacity incentive per kW installed for Kenya mini-grid*
Lack of high quality products on the market	Certified product sales only	Any	All recipients	*All projects*
	Importation	Cash incentive	Importers, Distributors	*Mekong ICS, Benin PV, Bangladesh appliances*
	Product development premium	Lump sum cash payment	Manufacturers	*Peru ICS*

Source: Particip analysis

[58] Can be cash, product or working equipment (e.g. calculators)
[59] In some projects, the eligible product is more useful if additional appliances or fuels are provided by the RBF participants to the end users of the technology. In Kenya, for example, this applied to pellets for the improved cook stoves, in Vietnam to biogas appliances.
[60] In the non-full-RBF provinces.

As illustrated in Table 22, incentives can be designed to address the market barriers that are considered to be limiting energy access for the poor. The information in the table represents the interpretation of the evaluation team of what barrier is being meaningfully addressed by that incentive. This does not necessarily coincide with the barrier assessment of the baseline studies in all cases. Special cases are, for instance, the Kenya picoPV and ICS projects. Here, the underlying thinking was that energy access by poor people is limited by their access to finance. Incentivising loans by financial intermediaries was thought to motivate them to look for lending opportunities and extend their lending portfolio to subprime customers. Still, the Kenya ICS project found little uptake by the MFIs – highlighting that even if the right barrier might have been identified, the barrier removal strategy might target the wrong change agent as recipient of the incentive.

This illustrates that who exactly to incentivise and whether or not to add recipients are important strategic decisions, requiring a very good knowledge of the market. Still, changes in recipients between the project proposal and the implementation stage were rare even after implementation experiences had been gained, indicating that the barrier situation might be different from the expectations underlying project design. A discussion of these larger implications of adaptive management decisions should be influencing decision making.

Administrative effort limits number of recipients

There are several types of qualifying recipients that have not yet received incentives. Specifically and unlike in other RBF programmes, households are not receiving direct incentives in the EnDev RBFs. Direct incentives to shop and retail outlets are rare - the only projects that explicitly incentivise the person who is in direct contact with the last mile customers are the biogas projects, the SWH project and the Tanzania PV project.

Partially, this might be caused by administrative factors. For example, the MEVA systems currently require the collection of detailed records of all final owners. Experience has shown that the quality of these data is highly relevant for disbursing the incentives, and the more recipients have to provide these data the more difficult it becomes to obtain high quality data. The project with the highest number of recipients is the Vietnam project which has the benefit of building on years of capacity building with the Biomass Masonry Enterprises, and a high level of literacy and relatively high level of digital competence with these enterprises.

The second administrative aspect is that the verification systems themselves cannot absorb unlimited numbers of claims. Most systems verify each claim immediately after submission, including field verification. This means that the participating companies can receive their funds faster but with significant effort for small claims in particular. This can also only be implemented for a limited number of participants. This is just one indication how the MEVA system influences the RBF setup. In this case, it limits the recipients to a comparatively small number (e.g. less than 100 per RBF) and they need to have professional-grade administrative competence levels. Important groups like last-mile retailers are much more numerous and would be submitting too many claims to be manageable.

Incentives to last mile distributors

A crucial problem in energy access is the last mile distribution, which also applies to RBF projects. Traditional fuels are being distributed through established networks and cooking solutions are produced locally. Building up retail and distribution networks for the RBF technologies from scratch to compete against this is difficult and requires a lot of time and significant financial investments. Rewarding the build-up of such a distribution network is easiest through sales incentives. Consequently, sales incentives are the only instrument for example in the Tanzania and Rwanda PV projects and part of the incentive structure in the Peru ICS and SWH projects as in many others. Whenever the projects wanted

to incentivise the last mile of the retail chain, and this would have resulted in an unmanageable number of recipients, they solved this by rewarding the next higher rung on the value chain. For example, in Tanzania, the >300 distributors receive benefits through the suppliers. This leaves the administrative burden on the suppliers. In Vietnam, it was desired that the households buy appliances for biogas so that they can use it e.g. for cooking. For this, the mason's incentive included a component that was used for appliance rebates to the customer.

If distributors don't receive any incentives the motivation to keep good records is low. In the Vietnam cookstove project, for instance, products could only be traced down to the distributor but not to the final consumer. In these cases, claims could not be validated and incentives not disbursed. This might also be one of the biggest differences in effectiveness between the Tanzania and Rwanda PV projects. In Tanzania, the non-PAYGO suppliers have to demonstrate to the RBF that they have handed on half of the incentive to the distributors before they receive a second instalment of the incentive. This led to a situation where they were often pre-financing the incentive to the distributors, including in-kind, with products that the distributors could sell directly. In Rwanda on the other hand, the incentive is paid to the suppliers who are building up their own retail chain. Their distribution outlets are concentrated in central places and have not necessarily expanded to the last mile; potentially a reason for the relative underperformance of the Rwanda project.

No incentives to households

Cash incentives to the supply chain are among the most popular incentives, but do not stimulate demand in the direct way that e.g. vouchers to the households would. So far, no project has tested households as recipients.[61]

5.2.3 Incentive-triggering results

Typical result that is incentivised: Sales

All projects incentivise the technology access for the final user (cf. Table 23). This is the result that will actually deliver the development benefit. All projects have a precondition with respect to the quality of the products. In addition, many projects combine the sales incentive with other incentives that target other barriers, including bonuses for local sales agents or special customer service, depending on the barriers that have been identified ex-ante.

Results in the early stages of the product life cycle

Several projects that have identified a lack of product availability on the market chose to reward results higher up in the supply chain. Table 23 illustrates which results are rewarded in the projects. Several projects do not incentivise the sale but the innovation or another result higher up in the product life cycle. This is a hazardous strategy but with specific advantages:

- The RBF in Peru for ICS in particular rewards results that are much earlier in the product cycle than the actual sales. However, there are also projects in the portfolio (e.g. the Vietnam cookstove auction) that do not specifically design an incentive around this barrier. This latter project for example, supports product development with TA.
- In the project in Benin, import incentives were successful in bringing large numbers of units into the country, but the distance from the first incentivised result to the actual outcome of energy supply

[61] With the exception of Vietnam biogas, where the purpose of the RBF is to phase out household subsidies. Although not in the MTE sample it is worthwhile to mention that regional Malawi/Mozambique RBF project is working with a voucher system that entitles beneficiaries of the national Social Cash Transfer Programme to collect an ICS for free.

has proven to be too long to effectively establish a market through the RBF so far. This illustrates how unreliable this approach is. The Bangladesh appliance project functions according to the same logic and is facing the same problem.

- In Cambodia, importers or manufacturers can sell their products in the auction, but only as many as are requested by the distributors. This has been flagged to the evaluation team by market participants as mitigating the "distribution risk" that has become so problematic in Benin. They receive a guaranteed price and their incentive makes up the difference between this and the price paid by the distributors / bidders.
- On the other hand, rewarding early results is one of the few ways that RBF can help overcome financing constraints, as in the cases of the mini-grid projects.

Table 22: Results that have triggered disbursements

Round	Country	Technology	Incentivised Result	Amount	Total
1	Benin	pico-PV	Imports and sales	€ 188,641	€ 345,035
		solar street lights	Sales and installation	€ 130,516	
		solar water pump	Sales and installation	€ 25,878	
	Rwanda	pico-PV	Sales	€ 46,953	€ 46,953
		mini grids	Construction	€ -	€ 155,867
			Connection	€ -	
	Tanzania	pico-PV	Sales	€ 739,657	€ 776,684
			Bonus	€ 37,027	
	Vietnam	biogas	Sales	€ 1,281,690	€ 1,287,434
			Bonus	€ 5,744	
2	Kenya	mini grids	Capital expenditure (per kW installed)	€ -	€ -
			Household connection	€ -	
			Electricity production (per kWh supplied)	€ -	
		pico-PV	Credit sanctioning	€ -	€ -
		ICS	Credit sanctioning	€ -	€ -
			Pellet sales	€ -	€ -
	Peru	SWH	Sales	€ 51,800	€ 55,470
			Credit sanctioning	€ 3,670	
			After-sales service	€ -	
		ICS	Product development	€ 91,569	€ 321,470
			Business development and certification	€ 219,957	
			Production and sales	€ 9,943	
3	Kenya	biogas	After-sales service	€ 18,158	€ 18,158
			Credit sanctioning	€ -	
	Cambodia	ICS	Auctioned products (Importer)	€ 144,277	€ 162,708
			Sales (Distributor)	€ 18,431	
	Vietnam	ICS	Sales (Manufacturer)	€ 4,037	€ 4,037
	Bangladesh	off-grid	Purchase and deliver to retailer (Manufacturer)	€ 275,023	€ 275,023
			Sales (Retailer)	€ -	

Source: Particip analysis

When it is necessary or helpful to incentivise upstream stages of the value chain, specific care should be taken that the products will ultimately help build the market. This implies not only that they reach the consumers, for example, when they are used as give-aways. It implies that they are marketed through a retail chain with commercial orientation and the intent to build up long-term sustainable businesses. The incentive design needs to ensure this, through conditions and through the right balance in the level of the incentive between the upstream and downstream stages of the retail chain. Examples of incentives on upstream stages in a retail chain can be seen in Peru ICS, Benin, and Cambodia ICS, as part of the Mekong project, where incentives are used for product development (Peru) and importation (Cambodia and Benin). An example of incentives used at the downstream stage is the Tanzania picoPV project which forwards the money to the retailers.

Compared with Table 22 the choices of the projects for the results that trigger incentives seem rational, but might not always address all barriers. In fact, there is potential for improvements:

- The MFI projects in Kenya, for example, did not choose the right type of incentive, the right level of the incentive or the right triggering result. Another reason for the lack of success might be that they only address a small part of the barriers that keep poorer people from buying stoves. In the case of the picoPV systems, it is likely that task lights are so cheap by now that even poor people do not need credit for them anymore, while the larger systems are distributed through PAYGO providers with packaged loans. Similarly, in the biogas project, incentivising the banks has not lead to actual loans.
- The table also allows comparing incentive structures between projects to some degree, for example between the ICS projects.

5.2.4 Methods for determination of the incentive level

Approaches to incentive level definition

The original programme design had proposed three mechanisms for determining the incentive level, e.g. in the calls for proposals (EQ 1.8):

a. An initial fast “price finding“ phase, during which EnDev would test one or more incentive amounts or approaches in several small test regions in order to fine-tune the final method;
b. Auction or tender processes, which would determine the subsidy amounts;
c. Estimates for viability gaps or cash flow limitations on the sides of the supply chain.

Two projects (Bangladesh appliances and Peru SWH) went for approach a. of a price-finding phase, in the case of Peru complemented by stakeholder consultations. This approach required the least in-depth knowledge of the market. A gradual reduction over time in the Peru case should ensure efficiency. However, so far, the sample is too small to be analysed regarding the suitability of that approach. Most projects thus went for approach c, and tried to understand the viability gap on the basis of stakeholder consultations or market research. The practical difference should be that adjusting the incentive quickly is built into approach a. and all participants expect rapid adjustments. This potentially makes it easier to actually adjust the incentives quickly to actual first market experiences in approach a. than in approach c, as it limits the level of justification that is required by the different stakeholders. However, as Bangladesh has not demonstrated any verified sales, and for Peru the sales volume is currently at 5% of the target, the number of observations is not large enough to understand whether any difference in performance is systematic or determined by other factors. Therefore, at this point in time, no data exist to determine if one approach is superior to the other.

Four projects proposed an auction approach, which will be discussed in the following.

Auctions as the "market mechanism" for determining incentive levels

Several projects attempted to determine the level of the incentive through competitive bidding among the suppliers, including reverse auctions. The idea behind it is that if the recipients compete with each other for the incentive, the economically efficient, i.e. lowest effective incentive level will be determined. The experiences were mixed.

- The two Kenya projects (ICS and picoPV), originally proposed a reverse auction approach. Business could submit proposals for the level of subsidy that was required to start lending for the project purpose. However, the subsidy requests made by applicants at Expression of Interest stage were deemed too high by the project. In addition, other criteria needed to be considered, such as the adequacy of the financing model and of the participants' data systems.[62]
- The Mekong ICS is currently the only model that is determining incentive levels in bidding processes. In the Cambodia Stove Auction, distributors bid for a stove model, specifying price and volume. If the bid is higher than the (secret) minimum price that the auction has determined for that stove the distributor receives the stoves at this price. The manufacturer receives the market clearing price and the incentive. The incentive is the difference between the market clearing price and the guaranteed price that is defined in the agreement between the sellers and the auctioneer. This auction model has so far led to comparatively high per unit incentives. In 2017, the minimum price has been increased step by step. This auction and the warehouse facility are managed by a specialised private company that receives a fee from both, sellers and buyers.
- In Vietnam, manufacturers are bidding for incentive options. If they own 200 incentive options and succeed to have a claim for 200 stoves verified, they receive their bid amount for the 200 options. They can submit bids that specify the value of the option. The lowest option value succeeds and receives the options from that auction. Each auction had one winner. Generally, the team has been surprised at the low incentives that result from this auction, but a validation of the model was not yet possible as too few claims could be verified so far.

Auctions result in individualised incentive levels across recipients, which – in Kenya – was considered not in line with a level playing field and transparency, both towards current and future recipients. It becomes clear from the evidence that auctions require rules and active management, significant (additional?) communication with the market players and analysis of their behaviour. The associated administrative effort should not be underestimated – from qualifying the auction participants, to organising bid submissions to keeping track of payments and fulfilment. In addition, auctions are subject to gaming. The auctioneer always needs to be smarter than the participants. While this is possible – after all he or she is also the nodal point that gathers information from all participants that discloses their interests and strategies – this is also a significant amount of work.

The expectation is that auctions are more cost-efficient overall. As they are the "market mechanism" to determine incentive levels, they lead to "the correct" level of incentive because the competition between the participants drives the level down in line with market growth and professionalisation of the participants. Even with the higher administrative effort, they might cost less overall and the risk of windfall profits might be lower. As the Mekong auctions are still in their early stages, this cannot be assessed at this point. So far, the options in Vietnam have been less costly than expected, while the incentives in Cambodia have been comparatively high. It is not clear on the basis of the evidence available so far that auctions are more suitable than other approaches for fixing incentive levels.

[62] See, for example, the RBFF beneficiary Due Diligence reports (2015/16)

5.2.5 Findings on the appropriate incentive level

Incentives should be kept as low as possible to manage the project cost efficiently and minimise market distortions. While these theoretical guidelines are clear, it has turned out that there are a number of other factors that make this much more complicated in practice. As indicated in Table 21, the target incentive levels were already very heterogeneous in the different projects, even within the same technologies. EQ 1.13 asks for an assessment of effective incentive levels, and EQ 2a.4 whether the level of the incentive was appropriate and needed. A number of important findings could be derived from the evidence.

Minimum level

Capping the incentives in Tanzania has not harmed market development and has greatly enhanced efficiency of the RBF. But the incentive level should exceed any additional transaction costs caused by the participation in the RBF. This includes the MEVA effort.

- In the Rwanda PV project, at least one case is known where a company selling small lamps decided against an application for the RBF because the incentive was not considered cost-covering. Instead, the company applied for the Energy and Environment Partnership and obtained an upfront grant for which less monitoring and verification was required. The risk for this to happen is higher the smaller the incentive and the smaller the product – photovoltaic task lights are notoriously hard to track which lead to a situation where tracking and record-keeping effort can easily become extremely high.
- The Kenya ICS and PV projects target financiers, and here, too, the understanding could be that transaction costs need to be covered with the incentive rather than hard costs.

However, even seemingly very high incentives might not be high enough. For example, in the Rwanda mini-grid case, up to 70% of the investment costs are reimbursed in the first year following the commissioning. Still, both mini-grid projects have difficulties attracting investors. Three potential reasons can be considered: The incentive structure does not address the correct barriers – which is likely because it does not necessarily improve access to financing and investment capital. The incentive might still not cover the viability gap. Or the incentive might not be attractive enough compared to other programmes (existing or expected). In both countries, World Bank programmes are scheduled to start “soon”. These programmes would also rely on private sector project developers for implementation. Both, the project developers as well as the communities might prefer to wait and see if the World Bank projects offer better conditions than the RBF. A definitive answer which of these reasons explains the behaviour cannot be given.

Find the right level – and constantly adjust it

This example also illustrates that the “appropriate” incentive level, i.e. the incentive that is effective and efficient at the same time, will always be very context-specific. In the Kenya ICS and PV projects, the incentives for the financial intermediaries were set shortly before a government regulation changed the highest possible interest rate to be charged by banks. This first triggered the need for reorientation among the banking circles, and then the level of interest in new lending opportunities as well as the viability gap.

The Kenya example highlights the importance of adjusting the incentives to changes in the market and market framework in a timely manner. However, setting the right incentive always remains something of a guessing game. Validation can only be given by measuring the success after the fact. Generally, once an incentive level has been found that is high enough, it needs to be reduced over time, so that phasing it out at the end of the project will not lead to a disruption of the market.

Communicability versus transparency of incentive levels

The decision about the level of incentives is complicated even further by the fact that most RBFs intentionally incentivise several products (different brands from different suppliers and recipients, to ensure competition) and most of the time also several technologies and/or sizes of the product. But the incentive system must not favour one product over the other. To make them comparable in the absence of an auction, projects use a number of different strategies

- A fixed share of Free On Board (FOB) costs or retail prices (e.g. Benin, Kenya PV and ICS projects);
- A fixed incentive per transaction (e.g. Vietnam biogas);
- An incentive per energy output (e.g. kilo lumen hour (klmh) in Rwanda PV) or energy service delivered (e.g. residential energy service units in Tanzania);
- Top-ups for special features or services provided by the recipients (e.g. distributor bonus in Tanzania) or the products (e.g. phone charging);
- Geographic diversification in the Kenya picoPV and ICS projects.

These measures can bring along additional complications. Market fairness and manipulation needs to be traded off with transparency and communicability. Businesses need to be able to understand how high the incentive will be, and to rely on that level.

Targeting the incentive to support the poor

So far, little attention has been paid to how to make business with poor and vulnerable groups more attractive to private enterprises. This is difficult not only because of an added complication in the tracking framework – many technologies change hands without payment or documentation. It is also difficult to communicate and difficult to design appropriately. Geographic differentiation is a first step in that direction. The Kenyan incentive scheme for PV and ICS provides lower incentives for urban regions and higher incentives for harder to reach regions. The Tanzanian system has successfully brought the Lake Zone onto “the map” of the Tanzanian solar industry. But so far, no incentive design has expressly targeted the poor.

The exit strategy

On the other hand, a standard element of incentive level is the decline over the course of the project. This is a good practice as part of the exit strategy. After the project, a sustainable market should be established that functions without the RBF support. Typically, the incentives are lowered over the course of the project. The PV project in Rwanda had it as part of its proposal but has just decided against the phase out because it found that the incentive is already low in comparison to other projects in East Africa.

Phasing out the incentive is a very critical step in the project cycle and should be well considered, and executed as early as possible. However, this is not always done. In the Cambodia stove auction, the auctioneer is now forcing the prices to approach the guaranteed price, and thus reduce the incentive levels. However, the auction itself might persist after the project because it can be financed from the auction itself if and when participants see sufficient value added in keeping up the auction.

But the risk that the market will collapse exists. The Vietnam biogas project has unintentionally “tested” this situation, when administrative challenges made it impossible to pay out incentives. The project was relieved to see that the market was continuing at an almost constant rate. After the administrative challenge was removed, the incentives were paid out retroactively. In this particular situation, this was justified in order to not damage the reputation of the programme.

5.2.6 Review of the evaluation hypotheses

Choice of recipients

The findings on the incentive design lead to the conclusion that the first strategic decision when designing an RBF system already lies in the choice of the recipient of the incentive. Projects have chosen those recipients whose behaviour they saw as providing market barriers. But the MEVA system also provides limitations on the design of the incentive system. For example, too many claims cannot be managed by most MEVA systems, which limits the number of direct incentive recipients, and thus eliminates important target groups – distributors, households – that would be too big, submitting too many claims to be manageable.

Different incentive structures have been tested in the RBF projects, in particular structures that reward intermediate results along the supply chain (like importation, product development). This has demonstrated the risk that not all steps towards providing the final consumer with energy services are taken.

Effectiveness of incentive designs and incentive level

Many different incentive systems have been tested through RBF. From the analysis on the ground it can be concluded that their effectiveness seems to be mainly determined by who is incentivised, and what results are rewarded. The most successful projects – Tanzania PV and Vietnam biogas – incentivise the last mile retailers. Paying out incentives higher upstream – for example for product development or import – risks that the products will never reach the consumer. The projects that were trying to engage with the financial sector as a provider of consumer loans have not been very successful so far. The evaluators also conclude from the evidence that the absolute level of the incentive, on the other hand, is not the most important parameter for RBF success.

In summary, from the information gathered for this evaluation, the evaluators conclude that the level of the incentives and how they were determined are less important for the success of the projects than the incentive structure. These are highly influential in two aspects: who is being incentivised, and which result is rewarded. To answer these questions, a well-structured and systematic barrier assessment and market analysis are the most important elements. After all, even the original guidance would have allowed for a “price finding phase”, implying that during a time of experimentation, some small windfall gains are an acceptable risk.

There are of course some red lines to be observed: the incentive should at least cover the additional transaction costs caused by RBF involvement. From this, it can be concluded that a certain absolute minimum level needs to exist.

The assumption (H2a on effectiveness) that RBF can effectively improve the viability of private sector responses implies that the right level of incentive will automatically lead to an increase in private sector supply and product volumes. This might not be fully valid as multiple examples from the EnDev-RBF portfolio demonstrate. Effectiveness of an incentive crucially depends on the existing business capacity of RBF recipients and the other market barriers. Higher incentive levels cannot ‘buy’ results if business capacity (distribution channels, sales capacity) or customer awareness are too low, or working capital is unavailable. These barriers are not very easy to address with the RBF.

Signalling effects of incentives

The evaluators’ experience from the field suggests that, where energy investment or management is incentivised, there are also psychological factors at work. While these may be difficult to prove and less strong in RBF, the evaluators got the impression that businesses might still see a benefit in simply being “looped in”, associated with the larger effort, and this might be a value in and of itself, also in terms of the reputation of their businesses.

In addition, RBF-triggered tools and facilities (e.g. market insights and transparency, warehouses, market access, financing) might offer services to the businesses. Importers see the stove auction in Cambodia as a market access opportunity for which they are willing to pay a fee independently of the incentive. These aspects make it unlikely that a direct and simple, unconditioned link between incentive level and effectiveness can be established, but the final evaluation will again look into this issue.

The generally good response of the private sector is indicating that results-based incentive payments are indeed able to affect business decisions. In particular, location signalling has worked in Tanzania where the project was able to attract companies to a formerly underserved area. The next frontier in the incentive experiments would now be to understand how the incentives can be designed for companies to serve poor and vulnerable tiers of the population. We expect that this evaluation, on the basis of the envisaged impact studies, will be able to shed some further light on this aspect.

5.3 Market transformation

The DfID Business case (p. 11) provides a number of defining characteristics and hypothetical pathways for market transformation[63]:

- Supply chains need to be set up, so that the transaction costs of reaching remote places drop,
- The supply chain businesses should be de-risked,[64]
- Access to (growth) capital and loans should be made easier and less costly, and
- Doing business becomes more worthwhile: The supply chain should be put into a position where they can "make profits early in the product uptake cycle (where returns are often low or negative – the so-called "valley of death")".
- Prices for the final products should drop, including through economies of scale and learning curve effects (for example through consumer feedback), more efficient production and distribution infrastructure, and
- Demand from customers should grow.
- Generally, market barriers should be reduced.

Accordingly, the business case identifies the risk to the whole mechanism, that the RBF projects fail to impact the market fundamentals, and that rent-seeking behaviour and market distortion caused by the incentives, or insufficient benefits for the consumers might lead to unsustainable market changes.

The overarching market transformation hypothesis is that RBF results in cost reductions for clean energy products and services via efficiency improvements in production or distribution, economies of scale or increased consumer awareness. In order to reach sustainable market transformation, the improvements of the business environment are expected to last beyond the project lifetime. Due to the comparatively early stage in the programme's implementation, not all of these sub-hypotheses can be fully rejected or confirmed. But preliminary evidence is mounting for some aspects that work better than others through RBF.

[63] E.g. for a commonly used definition of market transformation: http://aceee.org/portal/market-transformation.

[64] „By guaranteeing a favourable price or quantity on a particular market outcome (e.g. a connection, units of electricity generated, lanterns sold) an RBF reduces risk and elevates returns in a market for early movers.", Business case, p. 11.

5.3.1 Market transformation and sustainable barrier removal on the supply side

Generally, the original market development hypothesis proves to be correct, and did not need to be adjusted during the implementation of the projects (EQ 3a.1). The needs for adjustments were focused more on the details of where market barriers were located and what was needed to remove them.

Relevance of RBF for market transformation

Supply chains have been set up, and the evaluation has seen signs that participating companies are committed to serving the markets on a continuous basis. Staff capacities have been built up in most cases, and generally businesses appear to be considering their investments as long-term commitments (EQ 2a.6). This is also true for most financial institutions that have engaged with the RBF. However, the absolute numbers of sales do not consistently show the RBFs to be fundamentally driving the markets. Other influences prevail. Apart from quantitative impacts, though, qualitative impacts are also important. Almost all RBF-supported products have higher certified quality than the general market average. This "quality-oriented market transformation" is an important factor that needs to be kept in mind.

Overcoming the viability gap

Aggregate information does not indicate that de-risking is in all cases the major pathway to market transformation in the RBF (EQ 2a.8). Larger investments like mini-grids will remain high-risk even with the RBF. The risk of smaller retail businesses can be reduced through the RBF, but only in few cases de-risking has been identified as the major driver of market transformation. Pushing projects and businesses over the viability gap is in most cases much more important. In fact, some of the market-building effects of the RBF can also increase the risk of doing business, for example when multiple competitors enter the same market at once.

Last mile distribution as persistent challenge for market transformation

Last mile distribution is still the biggest challenge in most projects (EQ 3a.2). Looking at the participants of the RBF, we often see that they are building up their own distribution networks. The lower quality products, however, manage to be distributed through the mainstream supply and distribution network. This puts the higher quality products supported by the RBF at a disadvantage. The reasons for this are partially because projects have established links with clean energy distributors. Most of the time, however, it is because the manufacturers or importers of the RBF-supported products do not yet have access to the mainstream distribution networks for the respective (retail) technologies. In the long run, it might be more cost-effective for the recipients to do last mile distribution through established networks than through own systems.

5.3.2 Market transformation and sustainable barrier removal on the demand side

As described in chapter 4.3, in most projects overall demand has been growing, often as a result of the RBF intervention although some products are easier to market than others. The RBF philosophy leaves it mainly to the businesses to remove awareness and cultural acceptability barriers, and success is commensurate with the strategies of the businesses.

Limited access for market transformation

The demand side still suffers from the fact that the last mile remains a big challenge. Moreover, providing energy services to the poor has not yet been a major focus of most projects. This limits the ability of the RBF to enhance awareness for the new technologies with the actual target groups of the RBF – the rural poor. There are indications that businesses so far still pick low-hanging fruit in most

markets. Very few projects have incentivised local distributors directly to serve the more difficult and remote markets, or have considered incentivizing households or other energy users directly. Barrier removal on the demand side still leaves much to be desired (EQ 3a.2).

No project has documented significant price drops for the products which are generally assumed to be a major indicator of market transformation.

Limited finance

Last but not least, the attempts to improve access to financing for the poor who would not be able to afford higher-tier cookstoves or lights have only been successful where PAYGO systems applied unconventional ways for credit ratings. The MFI-oriented and geographically staggered RBFs in Kenya have not found enough uptake to remove the affordability barriers.

5.3.3 Conclusions on market transformation

Market transformation is a long-term process. It cannot be expected that at mid-term a conclusive and complete assessment can be given. In addition, the impact evaluations are expected to provide deeper insights on market transformation.

A big challenge is posed by the fact that the focus of the projects on the barriers on the demand side so far has been very limited. Market transformation requires both – a sustainable supply and sustainable demand. This includes but is not limited to access to financing and cultural and awareness barriers.

In addition, some higher-level conclusions emerge; barriers are dynamic. As soon as one barrier is removed, the next limiting factor can be identified. This means that the projects need to be constantly analysing the market state and adjust their range of activities.

There are also several barriers on the supply side that the RBF projects have often not been able to address so far. Specifically, these are working / growth capital and business capacity limitations (cf. chapter 4.2.4). Innovative solutions can and should be developed by the project either alone or in cooperation with other programmes. They can consist in incentives or technical assistance as appropriate.

5.4 Conclusions on the relevance and sustainability of the market change

Relevance of RBF for energy market transformation

Overall, the analysis shows that most of the chosen RBF structures were relevant for the energy market transformation in the respective country context. This conclusion can be drawn even though – given the youthfulness of the projects – market development processes have often just started and are not yet (fully) measurable. In a majority of cases, it can be clearly stated that RBF has complemented the existing support framework rather well and thus been very relevant for market transformation.

Effectiveness of market barrier removal and de-risking

An integral part of market transformation is the removal of market barriers. The evaluation confirms that not all projects are equally successful. De-risking the entry into the business of providing low carbon energy access – a term that has played an important role in the HQ discussions – has been observed in some projects. But often the de-risking is incomplete, for example when businesses and projects are exposed to political risks, e.g. caused by a lack of donor coordination, or changes in administrative processes or government preferences. But for example, the elections in Tanzania and in Kenya and the ensuing measures to enhance tax revenues in Tanzania were very disruptive for busines-

ses in these countries. These barriers are hard to remove through a pure incentive based scheme; they would additionally require a policy dialogue. De-risking would also be relevant for the mini-grids. Even if the incentive levels are compensating for a large share of the investments, these constitute large and lumpy investments and a significant risk for the local investors. Some of these risks are manageable by the investor – for example the technical and procurement-related risks. Others – like the competition with the national grid or the risk of delinquency of the target group – are hard to mitigate with RBF.

These examples highlight that de-risking requires complementary measures, including technical assistance, namely business and technical training and policy advice. From this, the evaluators conclude that, rather than the de-risking, the main pathway for effectiveness and impact of RBF is still the direct reduction of the general viability gap. Where non-financial barriers exist, effective barrier removal will most likely require a higher emphasis on TA.

Scope and sustainability of the market transformation

Market transformation is a long-term process. The idea of the RBFs is that after the project, the market is sustainably providing energy access technologies. Therefore, overall, the programme targets a longer term market transformation impact. It is still questionable though to what extent individual entrepreneurs see the range of individual support mechanisms offered under RBF as an opportunity to scale up their businesses at a broader scale as opposed to an opportunistic behaviour without a long term market development strategy. Field visits have so far delivered mixed results. The impact evaluations will need to shed further light on this.

The low sales figures of the RBF projects demonstrate that none of the projects is “over the hump” so far. Even the advanced Vietnam biogas and Tanzania PV projects are exposed to risks concerning their ultimate phase-out and market sustainability after the program’s end. No systematic drop in price of the energy technology has been observed yet. Therefore, it is too early to declare victory and move on.

Major challenges apart from the risks that are unsolved as of yet are the lack of growth capital for the supply chain, high transaction costs of reaching remote places or poorer tiers of the population, and high product prices. For a sustainable market transformation, these three parameters should drop significantly.

Overall it is thus concluded that sustainability is not yet achieved. More effort needs to be put into a sustainable push of the markets to improve energy access to the poor. To attain sustainable market change, more attention needs to be devoted to barriers on the demand side. They need to be analysed and addressed more systematically through the RBF incentive systems. As the RBF projects so far rely mostly on the businesses for consumer education, this is an area where new designs and innovative ideas can come in. For example, only one of the RBF projects so far incentivises the users of the technology. And certainly, beyond this, there are other dimensions in which innovation can be tested.

6 Implementation structures and guidance products

The RBF projects reviewed under this evaluation are structured in accordance with the DfID business case. To be effective, such structuring needed far-reaching technical input and/or to be built on previously well-established implementation structures. For most RBF projects, kick off and set-up required considerably more time than originally envisaged in the RBF project proposals. Reasons for delayed project starts included varying depths of preparation and knowledge of the market, lack of (understanding of the) stakeholder structure of the sector in the country, deficits in business capacity in both financial and supply chain stakeholders, and human resources capacity constraints at the level of RBF project management.

6.1 Project preparation, setup and adaptive management

6.1.1 Project preparation and design of implementation structures

Effectiveness of the context analysis

In most cases, the context and its suitability for the RBF approach have been properly analysed. Previous exposure of implementing organisations to the RBF partner countries has facilitated a good understanding of the context. As market intelligence has grown through implementation, in almost all cases the originally envisaged RBF set up has been adjusted accordingly. The review of the portfolio provided the following picture:

- A very good and in-depth context analysis has been found in three cases under the responsibility of SNV as implementing organisation. A thorough analysis has proven to be one of the reasons of these projects' success (such as for Tanzania PV). The best case scenario is an ultimate familiarity with the chosen sector through prior engagement with and exposure to it (e.g. Vietnam biogas). For the regional ICS project (Cambodia, Laos and Vietnam), a comprehensive context analysis has led to tailored approaches for each of the countries involved.
- In six further cases (Africa biogas; Kenya ICS, mini-grids and picoPV; Rwanda PV and mini-grids), the context and its suitability have been broadly analysed with most of the information based on secondary data and consultations with stakeholders. In these instances, a specific market study would have garnered little additional information that the project analysis did not establish itself. The RBF project has drawn the necessary conclusions for an appropriate project design.
- In three projects (Bangladesh appliances, Benin PV, Peru ICS), the analysis and the project design relied on meetings with local stakeholders. These needed to be revisited at a later stage to gather further information, and a number of assumptions were consequently drawn which were only partially correct (e.g. with respect to potential recipients and main bottlenecks for solar market development).
- In five cases (Benin PV and Africa biogas; Kenya ICS, mini-grids and picoPV) it is debatable whether the financial sector was sufficiently understood at the time of project design. It could be expected that only few MFIs and/or financial institutions were capable and willing to engage in the renewable energy market. As a result, initial expectations with respect to the readiness and willingness of FI to engage in the renewable market proved unrealistic.
- In one case (Benin PV) a key challenge of setting up RBF structures was that the RBF Facility was launched as an early mover at an early stage of market development. Little structured and systematic information about main stakeholders, potential demand and most promising development paths was available at that time. Due to a lack of reliable information, the RBF project management

had to take over almost all the data collection and coordination functions. Overall, the project design and the final RBF structures had to be set up in a context with a high level of uncertainty.

A systematic and in-depth market analysis before project start clearly correlates with a subsequent good project performance. It is imperative that the most important gaps in sector development are comprehensively scrutinised during the analysis and planning phase. In combination with a project design that is flexible enough to accommodate needs, an in-depth gap analysis is pivotal for effective and adaptive management. RBF experience has shown that incorrect or incomplete conclusions from the context analysis translate into delays and the subsequent slow uptake of the incentives provided.

Suitability of the envisaged RBF implementation structures

Overall, without considering the financial sector challenges, the envisaged implementation structures have been largely suitable for the intervention. Yet, with the design of envisaged RBF approaches, exit strategies have only minimally been considered. This has led to some degree of ambiguity with respect to the phasing out of incentives and scaling down in cases of insufficient success and/or a changing context. The suitability of RBF implementation structures can change quickly in an environment in which the state strongly influences market operations.

Specific project-related experiences in this respect include:

- In four projects, the original implementation structures have been largely maintained although RBF recipient selection has posed problems (Benin PV where originally envisaged RBF recipients have ultimately not participated; Kenya ICS), the role of the financial institution had to be reconsidered (Rwanda PV) or the range of appliances eligible for RBF was very limited and not sufficiently in line with customer demands (first round of Bangladesh appliances). This confirms the need to build on a rather critical assessment of main market bottlenecks, available capacities and the willingness of local stakeholders as potential project partners.
- Testing the suitability of key elements of the envisaged RBF approach in a pilot has considerably reassured projects about the suitability of certain key elements of the planned set-up. For instance, the Peru SWH benefited substantially by drawing on lessons from a previous RBF pilot scheme when drafting the project proposal.
- In one case in particular (Vietnam biogas) the suitability of the envisaged RBF approach with respect to the envisioned co-financing from voluntary carbon purchase was affected by changing political priorities which made repeated adjustments in the implementation structures necessary.
- In one case (Rwanda village grids) the envisaged implementation structure was plagued by unfulfilled assumptions in terms of RBF management needs and challenges related to the mini-grid technologies (also see findings in the preceding chapter). In Kenya (mini-grids) the RBF project also made slow progress and the evidence of the extent to which RBF structures are appropriate for this type of technology is still pending. Another management issue for these projects has been the involvement of other development partners such as the World Bank. It imposes additional requirements on project management and coordination.
- A matter of debate remains regarding having a fund management agent as a separate implementation actor (such as is the case in Kenya ICS). For the purpose of market transformation (i.e. effectiveness), such a fund manager has the potential to become a showcase for projects involving similar fund management structures and for smaller-scale renewable energy financing. While it may require some extra effort in supporting fund management through the implementing organisation, it may help to enhance sustainability and showcase that fund management and financing are market-driven and not primarily a donor or NGO field of activity.

- Implementation experience confirms that a strong geographical focus can be an important success factor such as in Peru, Tanzania and Vietnam. It is imperative to consider local contexts in order to be sensitive to any differences and a challenge for multi-country RBF approaches.

Suitable RBF approaches build on a clearly structured and flexible RBF design as well as streamlined management structures which maximise the attractiveness of RBF for RBF recipients (Tanzania PV). Appropriate approaches to RBF setup have also been characterised by a strong capacity for adaptive change and a strong willingness and capacity to invest in technical assistance to overcome implementation challenges (such as in the case of Peru ICS). The extra costs of intervening at an earlier stage of market development seem to be of benefit. If corrective action, including project closure at an early stage, is not taken in a timely way, the risks of lock-in and continuous leakage increase and endanger the value for money for the whole RBFF. To the extent possible, an appropriate support approach should address all barriers in the entire value chain.

6.1.2 Main challenges in the project setup

Financial sector involvement in RBF project management

One of the main challenges in setting up RBF was that, overall, the financial sector was not sufficiently prepared for and capable to launch and implement RBF. In most RBF countries, the financial sector is only moving slowly towards renewable energy as a target sector. Across all RBF countries, few potential FI proved to be capable of designing proposals of convincing quality. SACCOs seemed to be particularly unfit due to their internal decision-making processes. A snapshot from the RBF Facility shows the following picture and underscores the need for adaptive management to cope with financial sector challenges:

- In seven projects (Kenya ICS, mini-grids and picoPV, Peru SWH, Rwanda PV and village grids, Tanzania PV) financial institutions are involved in RBF implementation. In the Africa biogas project, MFIs are the incentive recipients. Yet, their level of involvement and additionality in terms of programme management tends to be low. In these cases, the main challenges experienced in the selection processes for fund managers were the very limited response by FIs. This has caused delays in the overall RBF implementation process. In many cases, the interest of the financial sector in being part of the programme has been limited and the selection process of a financial institution as part of the implementing structure took much longer than expected (e.g. Peru SWH, Rwanda PV and village grids).
- In five cases the financial sector was not involved. It was not prepared for and capable to launch and implement RBF (Benin PV, Vietnam biogas), respectively not considered in the project design (Bangladesh appliances, ICS Mekong, Peru ICS, Africa biogas).

Fund administration is not the core business of financial institutions, with the exception perhaps of development banks with a more political mandate. Therefore, the expectation that attracting local financial institutions as effective fund managers and engaging them to support commercially viable business models has not been fulfilled in most of the RBF cases. Resulting from this, the decision not to involve financial institutions seems justifiable, as long as market transformation does not require financial sector transformation.

Appropriation through main stakeholders

Deficits in wider business management and in marketing capacities at a recipient level have been largely present in all RBF countries. These capacity constraints informed project preparation, set up and management, as they involved the deployment of considerable management resources at RBF management level.

Some further challenges with an impact on RBF management mostly relate to two sub-sectors:

- Improved cookstoves (ICS): The cookstove conundrum[65] with the challenge of low adoption rates for improved cookstoves is confirmed (such as in Vietnam ICS). Related to this, in some cases the recipient selection process turned out to be very tedious (Kenya ICS). In two other cases, the "on boarding" of potential stove distributors posed an important challenge to the project due to the limited number of local stove distribution companies active or interested in the project (Cambodia ICS, Peru ICS).
- Mini-grid sub-sector: An obstacle to increased private sector development is the fact that the operational costs of mini-grids incentivised by the RBF programme are not fully covered by consumer tariffs after installation. Resulting from this, the motivation for private sector participation and the attractiveness for financiers are limited. The proof of concept is evidently challenging for project developers. Moreover, an unclear regulatory framework for mini-grids, in particular regarding tariff application, limits the interest of private sector stakeholders (such as in Kenya mini-grids). A further challenge relates to the capacity of the private sector to ensure appropriate standards at the level of local construction companies (such as in the case of the Rwanda village grids project). As a result, RBF projects have faced sector-related challenges, which obviously cannot be resolved with an RBF project set-up.

Overall, RBF management has tended to take over the responsibilities originally assigned to local implementers and stakeholders. This has led to an overload of often scarce RBF management resources.

Establishment of appropriate verification structures and processes

A challenging aspect was the establishment and running of verification structures. Verification structures and processes need to be efficient and safeguard the independence of the verifiers. Unlike PAYGO companies with their robust management information systems, private sector partners very often do not have the necessary management information system in place to facilitate the tracking of sales and the support of the verification process.

Several aspects are worthwhile mentioning in this respect:

- In some projects verification was taken over by the RBF management from the outset and only later subcontracted and externalised to ensure independent verification processes (e.g. Benin PV, Peru ICS). Three projects have faced problems in setting up effective verification structures and approaches (Benin PV, Rwanda PV) and/or needed a substantial amount of time for contracting independent verification agents (IVAs) (Kenya ICS and picoPV). In some cases, the RBF project has faced challenges in recruiting sufficiently qualified third parties to establish a verification process with independent verification agents (Vietnam biogas, Tanzania PV).
- Almost all projects complained about challenges with the completeness and consistency of proper selling records for the verification process. In some cases, this stems from logistical challenges posed by the lack of a proper addressing system combined with a frequent change of SIM[66] cards and phone numbers. In four projects, RBF management had to address compliance issues with respect to minimum verification standards, even at the level of PAYGO companies (Cambodia/Vietnam ICS, Peru SWH, Tanzania PV, and Rwanda PV).

In all projects, appropriate solutions took time to develop effectively. They had to be developed and fine-tuned during project implementation. The challenge regarding verification remains that in many

[65] Cf. https://india.blogs.nytimes.com/2012/04/23/the-cookstove-conundrum/?smid=pl-share&_r=0
[66] SIM: Subscriber Identification Module.

cases, the allocated budget was not sufficient. The Vietnam projects provide interesting examples of increased efficiency by using a software-based electronic mapping system.

Coping with the policy environment

Overall RBF is vulnerable to changes in the policy and support environment. Political changes and election periods have challenged the setup of RBF and its implementation (Benin PV, Kenya/Tanzania PV). These have caused changes in relevant regulations and laws and wait-and-see attitudes on both the supply and demand sides. In some cases, RBF only became attractive after other support programmes were ended (Rwanda PV). Further evidence of the need to react to political disturbances is detailed below.

In four countries (Benin PV, Vietnam, Tanzania PV, Rwanda PV) changes in the policy framework, such as the introduction of a new government or a new legislation, and/or the introduction of "competing" support programmes have led to considerable uncertainties and delays in RBF implementation. Changes in the regulatory framework in Rwanda and a rapid extension of the national grid to the rural areas rendered the construction and/or operation of micro-hydro plants unattractive; this is obviously problematic for a RBF project that aims at promoting connecting grids to new or existing hydro plants. The Rwanda village grid project had therefore to react to these changes in the policy framework through adaptions in the project implementation, as adjusting the targets to other grid-technology deployed, such as photovoltaics.

This confirms the finding that any market-based approach, such as RBF, remains a high-risk intervention in politically influenced markets, which are still largely exposed to public and/or donor interventions. Adaptive management has its limitations with respect to changes in the overall policy environment.

Availability of management resources

In all projects, there was a permanent struggle to cope with the constrained management and project delivery resources and to integrate effectively third party resources and/or programmes. Human resources from other programmes were needed to cope with the programme management requirements that the setup of the RBF system demanded.

These limitations have constrained the capacity for adaptive management. To some extent, scarcity in the availability of resources has resulted in delays to project implementation as resource bottlenecks could not always be overcome.

A specific challenge in setting up some of the RBF projects was staff turnover and the insufficient availability of resources and capacities at programme management level at both, EnDev Headquarter, but also at country level. These bottlenecks have caused delays and have not facilitated a systematic context analysis at the beginning of the RBF projects and the proactivity needed to cope with emerging technical challenges. A case in point is Benin which suffered perpetual staff shortages during the early stages of project implementation. Another example is the Vietnam Biogas programme where both managers left within a short period of time.

6.1.3 Adaptive management

Final design of the interventions

Resulting from diverse challenges in setting up RBF structures, the final nature of the interventions varies widely across RBF countries. According to the DfID business case, the intention of the RBF Facility is to generate and apply different forms of RBF to low carbon energy access markets within a learning framework, while delivering value for money results. It seeks to stimulate innovation in the design of individual RBF instruments tailored to specific country and market sub-sector contexts.

Overall, with the broad variety of actual RBF designs, RBF implementation structures have proven their capacity for adaptive management. Adaptive management aims at improving development interventions by recognizing that strategies, project designs and implementation plans may need to be altered as new learning emerges or the development context shifts. RBF management has by and large aimed at implementing tailored solutions for specific challenges. In most projects, RBF projects have managed to learn from implementation experience and adapted approaches, albeit in some case, this adjustment process has taken more time than originally envisaged.

Three factors mainly influenced the actual RBF project design:

- The lack of readiness of the financial sector and supply chain in most of the RBF countries, which has led to externalised financial management and the private sector to be involved less than expected.
- The high level of technical input needed resulting in an overstraining of available human resources and set up periods that were longer than expected, which has eventually also led to extended implementation periods.
- The dynamics of the relevant market and policy environment and the ongoing learning informing constant streamlining and fine-tuning of the design (all interventions) requiring a greater number of stakeholder consultations than expected.

Adaptive management and individual tailoring have led to a level of complexity affecting transaction costs related to programme management, technical assessment and delivery. There seems to be a trade-off between tailoring to local conditions in view of given capacity constraints on the one hand and the simplicity and transparency of design and processes on the other.

Complexity increases even further for multi-country projects (such as the ICS project in Cambodia/ Laos/ Vietnam) or projects consisting of various components (Benin PV). RBF project set ups and designs are not always easily understandable meaning that smooth implementation calls for very high RBF programme management and sectoral competencies at the same time.

Adaptive management and coordination at the EnDev Headquarters level

Adaptive management also calls for flexibility of the overall RBF management, monitoring and backstopping structures. EnDev headquarters (HQ) in Germany provide these. It is a strong advantage that RBF can draw on established EnDev structures with its monitoring systems. Therefore RBF-KPI reporting can largely be based on the information in EnDev's monitoring system. Resulting from this, available synergies are not only used at an individual RBF project level, but also at an overall coordination and management level. This helps to facilitate adaptive management through coordination and knowledge management at EnDev HQ level.

It appears that some bottlenecks in the availability of sufficient human resources have been addressed. Processes and knowledge exchange are constantly improving; knowledge exchange platforms and instruments are increasingly applied. This forms the basis for improved (future) adaptive management.

Upscaling and downscaling of projects

A yearly project review process looks at the performance of projects in light of the incentive uptake and the overall market development for the respective sector targeted by the project. The review also assesses the need for adjustments in the project portfolio, fund allocation and project set up. It provides for the possibility of an up- or downscaling of budgets and targets. It is well understood that upscaling or downscaling decisions are made on the basis of additional factors, such as supported technologies, complementarity with other projects, positioning of EnDev etc.

In the evaluators' view the rationale and justifications for up- and downscaling or on phasing out are not sufficiently transparent though. Downscaling was often observed when RBF project teams acknowledged that targets had been set over-ambitiously during the proposal stage. However, a downscaling of the target numbers is not always the most appropriate mechanism to respond to low sales figures. The evaluators see the risk that it discourages the project team from searching for and introducing more promising efforts to improve sales.

For example, the Rwanda picoPV project was downscaled from originally targeted 880,000 end-user beneficiaries (352,000 systems) in the proposal to 550,000 end-user beneficiaries (220,000 systems) in 2016 to 350,000 end-user beneficiaries (90,000 systems) in 2017, together with a project extension, explicitly choosing a lower ("conservative") target. While it is certainly appropriate to correct assumptions from the proposal stage and to unlock the respective funds and allocate them to more promising projects, it is not clear to the evaluators what the benefit of choosing overly "conservative" targets is. In the Tanzania case, the reduction of targets was motivated by the fact that the share of larger systems in the claims was higher than originally expected. Instead of downscaling the sales targets, the RBF incentive volume could also have been upscaled to account for this effect.

There are cases where it becomes clear that the RBF approach is not suitable for the respective environment (such as e.g. in Ethiopia where decisions about discontinuation have been delayed; Bangladesh[67]). It is unclear to the evaluators why it seems so hard to react faster in these cases. In some cases, like the Kenya projects, there are clear external factors like elections that might delay projects, and the projects might be brought on track again by changing the incentive structures.

Cost-effectiveness of setting up RBF through EnDev

The Value for Money (VfM) argument mainly triggered the choice of setting up of RBF within the existing EnDev programme framework. It was built on the assumption that management and delivery costs amount to 20% of the overall RBF programme budget. Management costs are supposed to include (i) management of RBF in country; (ii) verification costs; and (iii) management overheads. This implies that RBF incentives, including the fees of financial institutions, amount to at least 80% of the overall RBF project budget.[68] As a result, DfID had foreseen to allocate roughly 36 million € (80%) for incentives to be paid to the RBF recipients (including the fees for financial institutions) and roughly 9 million € (20%) to the management of the RBF projects (including the costs for GIZ overheads). A separate budget for other activities such as preparation, knowledge management and evaluation, amounted to approximately 2 million €. GIZ as implementing partner for RBF had accepted these terms and conditions.

[67] These projects were not explicitly covered by this evaluation as it had to be limited to a manageable number of country case studies. The projects were excluded because of a lack of results and implementation successes and they seemed not to be promising for the learning purpose of this evaluation.

[68] Initially, DfID had not foreseen to assign the fees of financial institutions to manage the RBF funds to the "RBF incentives" budget line. On the contrary, it had foreseen to include those costs to the 20% management costs of overall RBF project costs (cf. DfID (2012): RBF business case, p. 31; budgets in project proposals).

By 31/12/2016, roughly 3 million € of the total 6 million € disbursed for RBF was spent on management and other activities (including the GIZ overhead costs), meaning that roughly 30% of the budget foreseen for the management of the RBFF had been spent.[69] At the same time, roughly only 8% of the budget foreseen for the RBF incentives (including any fees for financial institutions) had been spent.

Resulting from the country contexts in which RBF is operating and the continued necessity for adaptive management, the 20% ambition has clearly proven to be unrealistic, even when acknowledging that for the start of a project more TA is normally required than at later stages. The proportion of management and delivery costs is much higher than originally envisaged. The initially assumed high level of cost-effectiveness is not confirmed; however, it was apparently unrealistic from the outset.

6.2 Production and dissemination of guidance and knowledge products

According to the DfID business case, a secondary output of RBF should be the production and dissemination of guidance and knowledge products. It seeks to improve the way in which the energy sector is supported. It is expected that the intervention regularly and systematically engages with the wider energy and development sector to support lesson-learning and improved results and value for money. The design of RBF as a targeted instrument for market transformation does however not include capacity building or policy development activities at significant levels. In its design, the production and dissemination of guidance and knowledge products appears to be rather a by-product of effective implementation. Guidance and knowledge products need to be highly complementary to be effective. Collaboration with sector support programmes such as Lighting Africa dealing with issues such as quality standards can create further leverage for the envisaged RBF output.

Approach to the design of guidance and knowledge products

The preparedness and capability of local partners (apart from the financial sector) informs the appropriateness of RBF implementation structures as well as the design of guidance and knowledge products provided by RBF projects. It is evident that the preparedness and capability of local partners across countries and supported sub-sectors strongly vary. This finding reflects the heterogeneous context and market situations RBF projects are operating in. Overall, at the outset the renewable energy sector was not sufficiently prepared in the RBF countries. Extra time was needed to strengthen the required structures at recipient level. Moreover, the establishment of sound relations with market players and partners was a very time consuming activity for the companies. As a result, the given project contexts led to a systematic underestimation of the needed guidance and coaching for local partners. In fact, it has turned out that the dissemination of guidance and knowledge products are not 'secondary outputs'[70] but rather prerequisites for effective implementation and market transformation.

The preparedness of market players also hinges on the previous commercial market exposure. Local partners with an NGO background or history tend to maintain a "recipient mentality" resulting in a lower level of preparedness for the implementation of results-based and market-driven schemes (such as in the case of Kenya picoPV or the IDCOL partner organisations within Bangladesh appliances). Particularly in the picoPV and ICS sub-sectors, the preparedness and willingness to cover rural markets is a key determining factor for their capacity to embark on effective renewable energy marketing. In two cases, most of the participants selected had not been active in the solar sector before (Benin PV) or in

[69] The figures above relate to the whole RBF portfolio (all RBF projects). With regards to the RBF projects analysed in the frame of this MTE report, roughly 2,5 million € (of in total ca. 5 million € disbursed) RBF was spent on the manage¬ment of the RBFF and other activities (including the GIZ overhead costs) by 31/12/2016.
[70] As foreseen in the DfID Business Case for RBF

the respective region (Tanzania PV). In some countries (Benin PV, Rwanda PV), the final selection of partners was rather different from the originally envisaged RBF recipient landscape. This also reflects the dynamics of an emerging sector. In the two cases covering the mini-grid sub-sector (Rwanda village grids and Kenya mini-grids), capacity challenges were particularly striking and covered (i) lack of capacity of local companies; (ii) absence of most of the relevant data as a basis for sound investment decisions; (iii) no reliability with respect to national grid development. This potentially also holds true for Round 3 projects for which a final judgement is still premature. In three cases, most participants were particularly well prepared, based on previous market/technical exposure (Vietnam biogas, Peru ICS and SWH).

Based on these findings, guidance and knowledge products are mainly required in the following areas:

(i) Management know-how and human resources management;
(ii) Access to high quality technology and to related quality assurance;
(iii) Long term planning and strategy development (instead of short term ad-hoc management);
(iv) Market development and information (including international suppliers);
(v) Distribution channels (especially in low level market environments);
(vi) Policy advocacy – how to deal with an exposure to discretionary sector policies and regulations.

Overall, larger-size and better-established participants tend to have stronger technical competence than smaller structures. The more immature and scattered participants are, the more capacity building needs to be factored into RBF project design. Within an environment of multiple constraints, the RBF projects can only do so much. They proved to be running most smoothly when they were able to prioritise and to clearly address main bottlenecks.

Organisation of the production and dissemination of guidance and knowledge products

Cross-subsidisation from other sources has mainly secured the production and dissemination of guidance of knowledge products as the secondary main output of RBF. Overall, the projects run by SNV as the implementing organisation are particularly strong in the production and dissemination of guidance and knowledge products. Guidance through other third party implementing organisations has been less visible so far (such as through CLASP and Hivos).

Specific evidence with respect to the production and dissemination of knowledge products include:

- In six cases, RBF participants have benefited from some technical guidance and training facilitated by RBF management although specific budgets are hardly available for this type of activity (Benin PV, Kenya ICS, mini-grids and picoPV, Rwanda, Vietnam biogas).
- In three countries, RBF participants have been assisted with training organised / facilitated by RBF management with respect to verification (Peru SWH, Tanzania PV, Vietnam biogas).
- In one country (Rwanda PV and village grids) RBF provided expert assistance for the involved financial institutions. While this guidance was required to ensure the continued participation of the involved financial institution, its leverage effect for sector development was limited.
- In three projects (Africa biogas, Peru ICS, Mekong ICS), no training activities for institutional actors were carried out.

Stakeholders seem to increasingly enquire about the experience and lessons learnt so far; thus, overall, the projects have managed to create a leverage effect. The RBF Facility has managed to position itself as a knowledge repository for renewable energy and RBF in their countries of operations. This is evident in almost all Round 1 and Round 2 countries (for Round 3 it is still premature to comment on this).

Additionality and engagement with the wider energy and development sector

Overall, the RBFs collaborate and coordinate well with local stakeholders (policy makers, private sector, and other local and international agencies and financial institutions). A long-term presence and the strong technical expertise of the implementing organisation are key ingredients for effective engagement with the wider renewable energy sector:

- In two projects (Tanzania PV, Vietnam biogas), collaboration and coordination with local stakeholders have been outstanding. Such networking with relevant stakeholders has helped maintain an innovative spirit, overcoming implementation challenges and laying the foundation for the sustainability of the interventions. The evaluators also observed very good collaboration in two further projects (ICS in Cambodia and Peru ICS).
- In one project (Benin PV), regular cooperation and coordination has focused on institutionalised platforms. In this case, capacity limitations and political inertia (e.g. through elections) have delayed/ constrained such cooperation.
- In cases in which government-driven implementation organisations are involved (such as in Bangladesh appliances), the danger exists that regulated markets emerge which poses a risk to the unpreparedness of more dynamic market development.
- In one case (Kenya mini-grids), the additionality of the RBF project in terms of sector innovation and relevance can be questioned. It is most probably simply too small to prompt other programmes to adapt to their approach. Yet, a journey of a thousand miles begins with one step and RBF can be seen as such step in Kenya.
- In two cases (Benin PV, under the umbrella of EnDev; Vietnam biogas), the RBF project has made efforts to enhance the level of organisation. For increased visibility of coordinated and coherent sector advocacy, their impact is, however, still too limited. In one case (ICS Cambodia), the project has been particularly designed to raise awareness of cookstove standards with end-users and policymakers. In one case (Peru ICS), the project has been innovative in exploring ways of further sector development in terms of support structures and technology promotion. In addition, EnDev has also cooperated effectively with the national government to increase public demand for the supported technology.

Overall, with few exceptions, RBF activities and services have well complemented the existing support framework for the target sectors through targeted support programmes. They have positively influenced the introduction of other support programmes in the renewable energy sector. RBF projects have motivated policy makers and encouraged them to initiate renewable energy support schemes. The visibility and impact of the RBF Facility positively correlates with its positioning as an innovative initiative which is not absorbed by a wider programme framework (such as in Kenya with the biogas project, for example, where it is not perceived as a project in its own right but an add-on to another long-standing programme).

The direct and visible influence of RBF on policy makers with respect to renewable energy regulatory and legal aspects appeared, however, to be limited. Together with other relevant renewable energy initiatives, it has (at least) increased the pressure on policy makers to embark on an improvement of the relevant support framework:

- In most cases, RBF complements well the existing support framework (Bangladesh appliances; Benin PV Cambodia ICS; Africa biogas; Kenya ICS, mini-grids and picoPV; Peru ICS and SWH, Tanzania PV) and also had a visible impact on national policy for specific renewable energy sub-sectors (Vietnam biogas). In these countries, the RBF project is appreciated as a pilot mechanism for renewable energy support programmes; it has influenced other programmes.

- In Rwanda in particular, despite existing challenges in implementation, the project has done outstanding work in informing relevant national policies. It is exemplary for the influence of a sector initiative on national policy making.
- A number of RBF projects faced, at least to some extent, detrimental competition from (subsidised) renewable energy support schemes. Particular challenges are the programmes supported by the World Bank (e.g. the SREP programme) in Kenya and Rwanda. RBF projects are smaller in terms of scope, ambitions, and are therefore at risk of being marginalised. Coordination efforts in this situation cannot be challenged as long as the loan conditions of the WB programmes are not clarified, i.e. if the private sector can hope for better conditions from these programmes, there is an incentive to delay investment. In these cases, cooperation or withdrawal of RBF are the only options to cope with such situation in the long run.
- Coordination efforts with development partners active in the renewable energy sector do not always lead to actual cooperation and coherence of activities in the sector (such as in Benin with the Millennium Challenge Corporation).
- In five specific cases competing programmes (Benin PV, Kenya mini-grids, Rwanda PV) and/or conflicting regulations (Tanzania PV, Vietnam biogas), have the potential to negatively affect the positioning of RBF on the renewable energy market and its success.

6.3 Conclusions on implementation structures and guidance products

Effectiveness of the chosen implementation arrangement

Implementation experience has confirmed so far the value added of engaging with EnDev as an existing energy programme with extensive in-country operations. The chosen project setup of engaging with EnDev as an existing energy programme has been the most effective approach to achieve the envisaged RBF objectives and market transformation (OECD DAC effectiveness criterion)[71]. It is safe to conclude at this stage of RBF program implementation that in view of the complex realities on the ground with respect to the target sectors, any other option would have been unsuccessful.

Efficiency of the chosen implementation arrangement

In consideration of the limited resources for programme management and delivery foreseen by DfID, the chosen setup has also been the most efficient solution compared to the other options assessed in the DfID business case. This judgement is based on the review of the market realities and main relevant stakeholders on the ground across all RBF countries. It has been the best of the alternative choices set out in the DFID business case given the strong limitations of management and delivery costs. The chosen arrangement has facilitated cross-subsidisation through EnDev and implementing organisations. Since the level of such cross-subsidisation is difficult to quantify, it is almost impossible to quantify the Value for Money (VFM) of RBF as an approach. More clarity and transparency in the accounting of RBF-related activities (e.g. what technical assistance activities have been funded from the RBF budget, or which co-financing sources have supported the RBF) would contribute to a better understanding of the VFM of the RBF approach as such.

[71] Here, the three options as laid out in the DfID business case, were reviewed, namely (1) EnDev as partner; (2) DfID as implementer; (3) different implementers for each country/region. Further options, such as implementation through other international organizations, have not been further reviewed here as these were not part of the scenario assessment at the outset of RBF programme design.

The VFM for DfID as a donor is clearly higher for the chosen arrangement than for any other option. In fact, DfID has strongly capitalised on the well-established structures of EnDev. In selecting EnDev, consideration has been given to its well-established country network and its links with GIZ as a co-implementation partner in other territories. The relative focus on capacity building in the use of other EnDev donor funds at the outset of RBF implementation has complemented results-based UK funding. Its chosen set-up of RBF has thus also helped ensure leverage through working with the other five EnDev donors.

Reasons for the strong need of additional technical input affecting the efficiency of the RBF approach are manifold. Firstly, costly technical input is due to the variety of country- and technology-specific challenges, which require strong perseverance in knowledge creation and capacity building. Secondly, it is due to the rather complex application and verification processes, particularly for the stakeholders involved. At least partially, these processes can be simplified and streamlined.

Overall, reliance on cross-subsidisation from other programmes has been overly high so far and a more balanced approach between incentive financing and capacity enhancement should be explored.

Appropriateness of implementing organisations

The evidence found on the ground has clearly confirmed that EnDev/GIZ and SNV as main implementing organisations in RBF countries have capitalised on their existing projects and contacts relevant to the decentralised energy access sector, notably with governments, local firms and NGOs. Collaboration with other programmes has proven to be most effective when it was based on an in-depth technical knowledge exchange and previous sector exposure. Coordination with other development partners and national governments was helpful but not always effective at ensuring the coherence of interventions.

The choice of SNV as a sub-contracted implementing organisation by GIZ for some of the RBF projects has proven to be a good approach to safeguarding the VFM principle. It has demonstrated to be a very efficient and effective implementation structure with in-depth sector knowledge that could hardly be found with other organisations. This will increase the likelihood of achieving impacts within the allotted programme timescales and of facilitating sustainability beyond the lifetime of the RBF program (as SNV can be expected to ensure the availability of the needed technical knowledge and market exposure also in the future). While in-depth sector know-how has helped getting RBFs off the ground quickly at country levels, the reality has shown that these project setups have still faced delays and required considerable effort that was apparently unexpected at the project appraisal stage.

The evaluation has also revealed the requirement that individual projects and EnDev HQ need to further develop guidance products. The level to which the implementing organisations carry out the most appropriate approach hinges on the their continued capacity to capitalise on implementation experience and to further fine-tune and expand existing knowledge sharing products for enhanced implementation and market development.

Effectiveness and efficiency of financial management arrangements

Ambitions with respect to the involvement of financial institutions for fund administration have not been fulfilled. In addition, where financial institutions were involved, implemented solutions have consistently given rise to question its comparative advantage.

The evaluators confirm the judgement that, if it works, the involvement of a separate financial institution as fund-manager may not be most efficient, but an effective method for market transformation. It has then the potential to become a showcase for projects involving similar fund management structures and thus to contribute to the desired market-driven transformation in the small-scale renewable energy-financing sector. According to the experience of the evaluators, the engagement of

financial institutions tends to attract additional attention to this type of renewable energy financing. It can send a signal to the market that this type of renewable energy financing is no longer necessarily restricted to NGOs, as is often the perception. In addition, it helps to make use of synergies in the preparation of different RBF projects and facilitates capacity development surrounding RBF mechanisms and approaches.

Sustainability of stakeholder cooperation

The sustainability of stakeholder cooperation hinges on the extent to which RBF projects are truly integrated in the renewable energy policy and support framework as opposed to being a stand-alone project. RBF projects are struggling with coordination challenges at the macro (policy) and micro (private sector) level; this is mainly due to their limited scope compared to other support programmes (such as through the World Bank) and/or due to their limitations in reaching out to the business communities.

Adaptive management as pillar for the relevance, efficiency, effectiveness, and sustainability

Overall, adaptive management was used wisely and appropriately to the degree that structural decisions were concerned. The final RBF structures were more relevant and effective than those originally foreseen. This confirms that adaptive management prevails with the chosen RBF structures. However, there were cases where adaptive management was not necessary; this is an illustration of the fact that intense market research and knowledge of the markets and their barriers before the design of the RBF should be considered crucial success factors.

One disadvantage of the adaptive management process is that it has proven to be time-consuming. Limited resources at RBF management level have thwarted consultation and coordination processes with local stakeholders and did not allow dealing with limited (absorption) capacity at the level of local stakeholders and lengthy political processes in the partner countries. The adaptive management approach has thus come at increased programme management and delivery costs.

Despite the successes of adaptive management, the efficiency of the finally chosen implementation structures compared to the DfID business case still provides a mixed picture. In hindsight, assumptions presented in the project proposals in terms of outputs and inputs often appear to be overly optimistic. Required resources for project set up, capacity building and verification have been considerably higher than originally anticipated. It is difficult to judge to what extent this was foreseeable during the proposal stage.

While adaptive management has in general contributed to enhance relevance, efficiency and effectiveness, it has not always ensured transparency. In some cases, upscaling and downscaling decisions have been delayed. Such delays may have an overall negative impact on effectiveness as they imply that budgets earmarked for less effective projects could not be reallocated for more promising ones.

Overall, the evidence found on the ground confirms that working through EnDev has not had a detrimental effect on competition and driving innovation in the design of the RBFs[72]. As such, this potential risk related to the chosen overall implementation approach has not materialised so far. This risk was mitigated by using a Challenge Fund-type call to EnDev country offices to propose RBF designs and incentivising EnDev offices to work at a country level with other relevant institutions and sector players in developing RBF designs. The subcontracting of SNV as an implementing organisation for some projects has also contributed to an innovative and market-driven spirit. Yet, implementation structures remain donor driven and appropriate phasing out needs to be ensured for longer-lasting market trans-

[72] This aspect has been formulated as concern in the DfID Business Case for RBF.

formation. Further implementation experience will show to what extent the sustainability of the innovative RBF approaches can be ensured with the chosen implementation structures.

6.4 Monitoring and verification

This chapter synthesises observations on the monitoring, evaluation, verification and audit (MEVA) framework across the projects visited. It concentrates specifically on the monitoring and verification (M&V) systems. In contrast to the evaluation and audit functions, these are directly carried out or designed by the projects themselves.

In this context, 'monitoring' is the continuous tracking of an RBF intervention's activities and progress. 'Verification' is the process of corroborating participants' claims to build the basis for the disbursement of RBF incentives and to prevent fraud. However, these two functions are intertwined in practice, in particular because project monitoring heavily relies on RBF claim and verification data. Many verification issues discussed in the following thus also affect the monitoring function.

Structure of monitoring and verification systems

Although the specific design of M&V systems differs across RBF interventions, there is a 'standard setup' applied by a number of projects. Based on monitoring, RBF projects, in line with regular EnDev monitoring processes, including financial institutions (FIs) produce biannual progress reports. The RBF projects also report information bi-annually for the central calculation of harmonised key performance indicator (KPIs).

The verification function is carried out by external agents that report to the RBF projects. Incentive claims with end user data are submitted by RBF participants and serve as sampling frames for verification. The verification itself consists of checking paper trails at recipient level, and phone and field corroboration of eligible transactions (sales etc.) with end user beneficiaries.

Several projects have modified the standard setup in specific aspects, in particular regarding verification:

- External verification combined with internal verification by EnDev or implementing actors (Peru ICS), including data quality checks (Tanzania PV);
- On-site visits to RBF firms, not only to end users (Rwanda PV, Tanzania PV, Bangladesh appliances);
- Distinct verification processes for multiple recipient types (Tanzania: importers and distributors, Cambodia: manufacturers and distributors);
- M&V systems for RBF that build on, replace or modify those of existing government programmes the RBF projects connect to (Vietnam biogas, Bangladesh appliances, Africa biogas);
- Verification procedures for PAYGO in East Africa (Rwanda PV, Tanzania PV, Kenya ICS).

6.4.1 Persistent challenges in monitoring and verification

Key issues in setting up MEVA frameworks

Setting up MEVA frameworks, especially the claim and verification procedures has been a resource-intense exercise for many projects. Most of the setup costs are associated with long learning cycles for all project stakeholders and the need for capacity building of participants and verification agents.

In many cases, the contracting stage for IVAs was finalised largely without major problems. A few projects highlighted some challenges, which could eventually be solved. Reported challenges in contracting include low numbers of applications (e.g. of independent agents in replacement of government verifiers

in Vietnam biogas), low-quality offers (Tanzania PV) or many offers exceeding the available budget (e.g. Peru SWH, which also had to split the IVA contract to not exceed thresholds for national procurement).[73]

Once the IVA was contracted, the different project stakeholders needed time to learn how to comply with MEVA requirements. The FIs and IVAs tended to internalise the processes in shorter periods although some also needed extra training. For instance, the phone verifiers sometimes initially had limited skills (low product/technology knowledge in Vietnam biogas, difficulties with categorising problems with installed products in Peru SWH). RBF participants needed more time to fully comply with all MEVA processes on average. Their difficulties with correctly completing RBF claims has led to delays in incentive disbursements in some projects (e.g. Benin solar, Kenya ICS & picoPV).

Response strategies by projects

The main strategies and tools for shortening the MEVA learning cycle were well-documented guidelines, standardised procedures and refresher training for IVAs (e.g. Peru SWH) and participants. Kenya ICS & picoPV envisioned a pilot phone verification before rolling out the verification process to a larger scale.

Continuous costs of the verification process

After setting up the MEVA framework, costs remained high especially for the continuous verification process. This has posed a challenge given the limited budgets for relatively comprehensive verification plans and/or claim management procedures (e.g. in Kenya ICS, Cambodia ICS). With the initial verification budgets, the number of IVA proposals that EnDev offices could effectively choose from was limited.

The uptake of some RBF projects has been slow, resulting in small claim size per RBF recipient. Given that most verification schemes use a fixed sampling share independent of claim sizes, IVAs may find it difficult to benefit from economies of scale. The fixed costs of verification may thus be relatively large for the small samples. This is further exacerbated by the high or vacillating frequency of claims. Not all participants achieve a large number of transactions within one quarter. Therefore, it is more costly to initiate verification processes for frequent but small claims than for larger claims at longer intervals.

Field visits to end users are particularly expensive (a point mentioned by the Rwanda PV, Vietnam biogas, Kenya ICS and Cambodia ICS). This is especially the case for end users living in remote areas with limited transport and long travel distances. The costs are particularly high if IVAs have little or no margin for replacing these clients with others from the customer lists submitted with the RBF claims[74].

Response strategies by projects

The projects have adopted various strategies to reduce the verification costs without increasing the fraud risk. Implicitly these strategies work through the following cost function for the IVA.

Box 1: Cost function for the independent verification agents (IVAs)

Total IVA costs =
fixed costs of the IVA
+ **number of claims** × fixed costs per claim
+ number of claims × (total no. of transaction per claim × **sampling share** × **costs per transaction**).

[73] Collusion between RBF participants and IVAs may be another potential concern. Tanzania PV effectively dealt with this issue by not revealing the names of contracted IVAs to participants and preventing them from meeting each other.

[74] Finally, verifying and storing paper trails may be a large-scale exercise as well. Some projects apply 100% of paper trail checks, which easily accumulates up to several thousand invoices or cash receipts that need to be checked individually, and stored.

The last row in the equation represents the variable costs in function of the total number of verified transactions. The fixed costs of the IVA include elements such as tender preparation, contract negotiations, development of verification tools and training of verifiers. The fixed costs per claim refer to checking paper trails at claim level, sampling, drafting work plans for a verification round on the phone and in the field, and other elements. Finally, the costs per operation include the time spent on contacting an end user on the phone or in the field, completing the verification tools for them, etc. The elements in bold are those through which projects have attempted to achieve costs reductions. One strategy envisioned (e.g. by Cambodia ICS) is to bundle smaller claims into larger ones. While this does not affect the variable costs, the total verification costs decrease since there are fixed costs for each claim. A more common strategy has been to cut back on variable costs by reducing the sampling sizes in function of previous verification results. This has been implemented by:

- Reducing the verification sample for a given recipient if no errors were spotted during the verification of its first claims: the sample decreases in function over time of the recipient's historic verification results (applied in the Tanzania picoPV project);
- Reducing the field verification sample for a given recipient in function of its phone verification results (Cambodia ICS);
- Classifying participants through risk categories, such as quality of management information and financial controlling systems (Kenya ICS) or based on the seniority level of the entrepreneur (planned for Vietnam biogas albeit ultimately abandoned), and draw smaller samples for low-risk participants.

The third strategy is to cut down the verification costs per transaction by rationalising field visits. In Tanzania picoPV, the project provides a map with a general route description and local infrastructure information to the verification agents. Moreover, the specific households to be visited are not predefined, but only their total number. Agents can thus avoid sample spreads with long distances. The Cambodia ICS project also employs geographic clustering for field verification.

Finally, since the verification costs cannot always be reduced without comprising the level of fraud prevention, some projects (e.g. Cambodia ICS) aim to complement the RBF budget for verification through additional funding from other sources.

Compliance of participants with information requirements

Another key issue in the verification process was that some participants did not provide the necessary information to contact all their clients and identify the RBF transactions (sales, microloans, installations). In several projects, this has caused multiple verification loops for the same transactions. The IVAs reported unsuccessful verification attempts back to EnDev and implementing organisations, which in turn had to re-contact the participants to obtain corrected data. This slowed down the verification process, increased its cost and delayed incentive payments. Specifically, the following problems were reported:

- Some participants had difficulties in adequately consolidating their lists of eligible sales/client (e.g. Tanzania picoPV or Kenya ICS);
- Phone verifications failed due to wrong or missing phone numbers – this is probably the most common problem reported by Rwanda PV, Tanzania, Peru SWH, Cambodia ICS, and others;
- Field verifications failed since households could not be located due to incomplete location data or missing address systems (Rwanda PV, Tanzania, Cambodia ICS);
- Some participants did not correctly attach serial numbers to products (Benin, Peru SWH);
- The clients listed in the RBF claims were no longer in possession of the products, for example because some solar lights or cookstoves were given away as presents, or because the direct client listed in the claim was a local distributor who sold the product to individual customers;

- Sometimes end users received the verifiers with mistrust if they were not properly informed about the procedure by RBF participants (e.g. Kenya ICS, Peru SWH).

Response strategies by projects

Most projects have developed operational and MEVA guidelines (albeit in varying depth) for internal use with EnDev, implementing actors and potentially IVAs. The full guidelines have usually not been shared with RBF participants, but have served as clear references for capacity building and training activities on claim management and verification. Each stakeholder's roles and responsibilities in the MEVA processes are also described in its contract.

In response to initial difficulties with the claim and verification processes, the projects have provided refresher training, especially to the participants. This has proved particularly effective, according to Tanzania picoPV, Peru SWH, Cambodia ICS and other projects. Some implementing organisations also perform simple data quality checks (e.g. missing or duplicated phone numbers) before passing on the claims to the IVAs for verification.

Compliance of participants with information requirements can also be improved through electronic claim submissions that incorporate some automatic checks for completeness, etc. In Cambodia ICS, for instance, participants submit their claims through the web-based auction platform. Kenya ICS is also testing an online platform for claim submission, and the Africa biogas project uses a mobile application for the same purpose. Going one step further, Vietnam biogas even conducts the verification process electronically via the Akvo Flow application, which allows field verification agents to collect their data via smartphone and submit them to an online platform.

6.4.2 Efficiency of monitoring and verification

The efficiency dimension is analysed through two broad questions. Firstly, could existing M&V systems have been implemented with fewer resources? Secondly, could they be extended for other purposes with little extra effort? To what extent have the existing frameworks for monitoring and verification been established by optimising the available resources (budget, time, effort, etc.)?

Summary of verification arrangements

Table 23 provides examples of existing verification arrangements and their costs. Note that it only compiles information on external verification procedures, but does not include the internal costs of EnDev and implementing organisations, such as MEVA design, IVA procurement, training activities. Nevertheless the table reveals some interesting facts:

- The average verification cost per transaction (product sale, installation, etc.) are 3 to 5 €[75];
- The per-unit verification costs for field visits exceed those for phone checks substantially; in Rwanda and Vietnam biogas the two verification methods differ by a cost factor of 10 or more;
- Verifiers receive 40-70 € per work day in Rwanda and Cambodia, and more than twice the daily rate in Kenya ICS & picoPV due to the exceptionally advanced verification process;
- Depending on the expected claim size, either all transactions are verified by phone or on site (Vietnam biogas, Peru) or only 5-10% of them (Rwanda, Cambodia ICS);
- About half of the projects also do on-site visits to participants, not only to end users.

[75] Where projects apply different rates for phone/desk-based and field checks (all except Peru), these average costs take into account the relative sample sizes for the two verification methods.

Table 23: Examples of external verification arrangements and costs (by 12/2016)

RBFF Round	Project	Types of transactions verified by external IVA	Max. number of transactions or work days (WD) in initial contract period [a]	Phone verification sample	Field verification sample	Other (non-standard) verification activities of IVA [b]	Approximate IVA costs as per contracts or ToR (excl. value added tax)	Initial contract period	Numbers and types of IVA
1	Rwanda PV	Sales	Total unknown. Per claim: Phone - 1 WD (avg. 24 sales) Field - 3 WD (avg. 15 sales)	5%	Approx. 2% depending on size of claim	Beneficiary visits	From sample contracts: Phone - 37 €* per WD **≈1.5 € per phone check**[d] Field - 68 €* per WD + accommodation costs **≈15.2 € per field check**[d]	1 year	≈ 10 individuals
	Rwanda village grids [c]	User connections		5%	n/a	Beneficiary visits			
	Vietnam biogas	Installations	Full-time availability	30-60% depending on model	40-70% depending on model	Beneficiary visits	Costs per check (2015 call): **≈ 0.2 € per phone check*** **≈ 6.0 € per field check***	Approx. 6 months	Unknown no. of individuals
2	Kenya ICS	Credit sales to end users	281 WD in total: Phone - 54 WD Field - 91 WD Other tasks - 136 WD	Still to be proposed by IVA	Still to be proposed by IVA	Beneficiary visits, theory-of-change & context analysis, review of MFIs' informat.systems	Global budget: 37,000 €* (≈ 132 € per WD) +accommodation+transport	5 months	1 company
	Kenya picoPV	Credit sales to distributors and end users							
	Peru SWH	A. Sales B. Functioning	Two IVAs: South (S), North (N) A. 2,400 (S) + 1,800 (N) B. 1,600 (S) + 1,200 (N)	A. 80% B. 100%	A. 20% (rural) B. none		Costs per verification (no distinction phone/field): **≈ 4.7 € per check**	3 years	S: 1 non-profit org. N: 1 company
	Peru ICS [c]	A. Sales B. Functioning	2,000 stoves	A. 90% B. 100%	A. 10% B. none		Global budget: 9,500 €* **≈ 4.8 € per check**	8 months	1 company
3	Cambodia ICS	Auctions/whole sales and end-user sales	5,000 stoves in Year 1 150 WD for IVA	10%	5%	Warehouse inspections	50 home days x 44 €/day* 100 field days x 62 €/day* + transport costs **≈ 3.3 € per check** [e]	1 year	1 company

[a] According to contract or, if not specified there, according to project proposal/logframe.

[b] 'Standard verification activities' include phone and field inspections of clients/products, document verification at RBF recipient and end user level, verification reports.

[c] Project also includes other incentives that are not verified by external agents.

[d] Phone checks 37 € / 24 phone checks = 1.5 € per check. Field checks: [(3 WD × 68 € per WD) + 11.5% accommodation costs as per contract] / 15 checks = 15.2 € per check.

[e] Total fees for 5,000 checks = 9,500 €. Transport costs = 75% of fees (project estimate). Costs per check = 9,500 € * 1,75 / 5,000 = 3.3 €.

* Values in the contracts stated in non-European currencies and converted into € using the following approximate exchange rates per € as per early June 2017: 1 € = 950 Rwandan Francs, 25,500 Vietnamese Dong, 3.7 Peruvian Soles, 115 Kenyan Shilling, 1.13 US-$.

Sources: Particip analysis of IVA contracts, IVA terms of reference and logframes.

Assessment of the efficiency of the monitoring and verification systems

In the strictest sense, monitoring is expected to generate and analyse data for the continuous assessment of project activities and progress. The purpose of verification is to minimise fraud through the corroboration of RBF claims.

The response to this efficiency question essentially evaluates how the projects have performed along a set of parameters that they can choose to maximise the efficiency of their M&V systems. Table 24 below lists these 'choice parameters' in the left column, and distinguishes them from the external determinants of M&V costs in the right column, both from the viewpoint of projects.

Table 24: Key determinants of monitoring and verification costs at project level

Cost-influencing choice parameters in M&V systems	*External determinants of M&V costs*
• Efforts and resources for building or buying M&V capacity • Division of M&V tasks (internal vs. external, single vs. multiple IVAs) • Verification methods, tools and subjects: paper trail, phone and field; end users and RBF participants • Sample sizes for verification • Reporting frequency and detail (partially)	• Minimum levels of fraud prevention required by donors • Complexity of the incentivised product • Know-how of IVAs available in the market, IVA prices • Geography and RBF target area (for field visits) • Reporting frequency and detail (partially)

Source: Particip desk and field analysis of M&V systems.

Efforts and resources for building or buying M&V capacity

The required expertise for M&V depends on the envisioned complexity of these processes. The verification systems range from highly complex cases with multiple stakeholder types, coordination mechanisms, verification methods and tasks (e.g. Kenya ICS & picoPV) to relatively straightforward phone and field checks as in the Peru SWH or the Rwanda projects. As shown in Table 23, one verifier workday thus costs significantly more for Kenya ICS than in Rwanda. If the verification process is simple, the experience from projects shows that hiring a number of enumerators, individually or through a company, plus some initial and refresher training is generally sufficient.

Division of M&V tasks

The monitoring function is divided between the RBF projects and FIs. The extent to which FIs are responsible for progress reports and other monitoring functions varies across projects. Yet, the projects remain ultimately responsible for compiling all monitoring information that is shared with EnDev's central unit. Efficiency gains from dividing the monitoring function are thus limited.

In contrast, dividing the verification function may improve efficiency in specific circumstances. Multiple types of agents were hired, for example, by the Rwanda projects (phone vs. field verifiers), Vietnam bio-gas (individual verifiers vs. a company responsible for sampling) or Kenya ICS & picoPV (one company but with many different verifier and researcher types specialising in sub-functions). Such multi-agent setups can be efficient if the verification requires a set of differentiated skills and it would be too costly to contract the most expensive skill category for all tasks. However, this needs to be carefully weighed against the additional transaction costs and training needs which increase with the number and types of verification agents. Alternatively, the verification process can be divided between internal and external staff. This can make sense in cases with multiple incentives such as Peru ICS. There, the implementing actor verifies claims based on complex outputs (e.g. product innovation and certification) whereas the external IVA verifies the large number of subsequent sales transactions.

Verification methods, tools and subjects

When choosing verification methods, a common challenge for efficiency is to determine the extent of fieldwork, especially if distinct IVA rates are paid for field and phone verification. The cases of Rwanda and Vietnam biogas in Table 23 show that large cost differences exist; field checks are 10 and 30 times as costly as phone checks respectively. Something similar holds true for Kenya ICS & picoPV, where the total budget for field verification is more than twice as large as for phone checks (not shown in the table), despite the much larger number of the latter.

From a viewpoint of statistical uncertainty which merely looks at the number of transactions, verification over the phone is as good as in the field. However, field visits may potentially have a higher reliability since the verifier themselves corroborates product installation rather than the end user who could, theoretically, collude with the RBF recipient. However, the slight increase in reliability rarely seems to outweigh the additional costs of field visits. For verification/fraud prevention, field visits are somewhat more effective, but far less efficient.

One argument for maintaining field visits to end users and RBF participants is the additional data, relative to phone checks, that can be collected for project management, design and evaluation. Surprisingly, this function has barely been developed. Most field verification questionnaires are not much more comprehensive than the phone checklists. As argued below, the variable costs of extending the time for a field interview would be small relative to the fixed costs of locating the end user in the field (long travel distances, transport costs, unsuccessful surprise visits, overnight stays, etc.).

To maximise efficiency, projects thus have two options. The first is to strictly adhere to the verification function and cut down on field visits. Even if the project maintains a smaller number of field visits, the costs can at least be reduced by not visiting customers in very remote areas; the verification sample does not need to be perfectly representative. The second option for projects is to keep or even enhance field checks but collect additional data for complementary purposes (see further below).

Sample sizes

Finally, one may consider reducing verification costs by optimising sample sizes. Table 25 below presents calculations of the required verification sample in % of the claim size. The table illustrates that the required sample size for verification depends on three parameters:

- The claim size, e.g. number of sales reported by a recipient per quarter;
- The expected share of ineligible units per claim, for instance, reported sales that actually did not take place, which reflects how much the project 'trusts' its participants;
- The tolerated error margin, indicating how averse projects are towards the risk that they refuse payments for actually correct transactions or pay incentives for actually ineligible transactions.

Table 25: Required verification sample in % of claim size

Maximum tolerated error margin: 5 percentage points					
Claim size / Expected % of ineligible units	20 units	50 units	100 units	250 units	500 units
5%	80%	60%	43%	23%	13%
10%	90%	74%	59%	36%	22%
20%	95%	84%	72%	50%	33%
Maximum tolerated error margin: 10 percentage points					
Claim size / Expected % of ineligible units	20 units	50 units	100 units	250 units	500 units
5%	50%	28%	16%	7%	4%
10%	65%	42%	26%	12%	7%
20%	80%	56%	39%	20%	11%

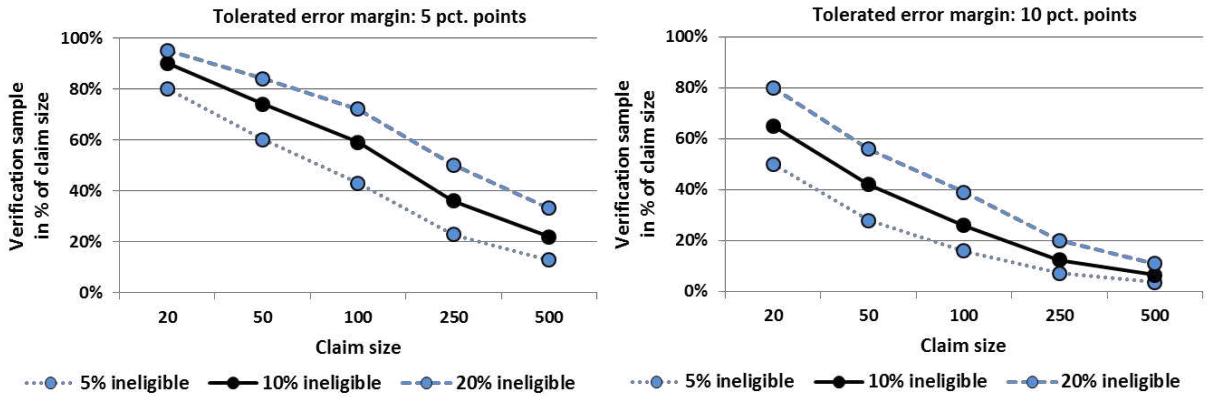
Notes: Cell entries show the required size of the verification sample in % of the claim size given the expected % of ineligible units in the claim, claim size and a fixed confidence level of 95%.

Source: Standard sample size calculations by Particip using http://www.raosoft.com/samplesize.html.

For example, the interpretation of the shaded cell (59%) in Table 25 is as follows. If a project receives a claim of 100 units, of which it expects 10 units to actually be ineligible, and is willing to tolerate an error margin of 5 percentage points, then it should verify a sample of 59 units. With this sample size, the project can be 95% sure (=confidence interval) that the true number of ineligible units in the claim is between 5 and 15. The selected verification sample thus correctly represents the true proportion of eligible units in the full claim within the tolerated error margin. In the worst case, at most 5 of the 100 transactions in the claim would be misclassified for incentive payments.

Assuming a given level of trust in RBF participants (expected % of ineligible units), Table 25 shows that a project could potentially cut down its verification costs in two ways. It could attempt to bundle claims into larger ones (e.g. for several quarters or across participants) or simply accept a larger error margin in incentive payments. This is illustrated in Figure 4 below. The effect of claim-bundling is represented by moving towards the right along the horizontal axis within the same graph; the effect of tolerating larger error margins is visible by moving from the left-hand to the right-hand graph.

Figure 4: Variation of required verification sample size in function of claim size and error margins



Source: Sample size calculations by Particip presented in Table 25.

At a tolerated error margin of 5 percentage points, the bundling of claims only reduces the required verification sample below 50% of the claim if the claim size reaches between 100 and 250 transactions, depending on the level of trust. In practice, not all RBF projects can potentially reach this claim size. As long as projects remain relatively risk-averse in their incentive payments, the full 100% verification applied by most projects (sum of phone and field checks) is thus well justified. From the examples in

Table 23, only Cambodia ICS uses a much lower verification sample, which is also justified since claim sizes in this project are considerably larger than in others.

For most projects, the only realistic way to reduce verification shares below half of the reported transactions is to tolerate a larger error risk in incentive payments. Interestingly, the risk would increase in both directions fraud risk or unjustified refusal of incentives, but would leave average payment correct (at least in expectation). Hence, the toleration of a higher error margin would allow the projects to save on verification costs without increasing total incentive disbursements[76].

RBF participants with many ineligible transactions identified during verification could be concerned about the possibility that the selected sample, *by chance*, includes more errors than the unverified part of their claim. The projects should then argue that there is no systematic error in average payments over time, and the safest way to avoid random errors in one particular claim is to report 100% correct transactions.

Enhanced use of the current M&V systems for the purposes of project steering, evaluation and impact monitoring

As mentioned above, the current efficiency of verification methods, tools and subjects could be improved in two ways. Projects can strictly concentrate on the verification function and rationalise especially field visits. Alternatively, they can enhance their data collection in a way that it is useful for complementary purposes (e.g. project management and evaluation). This sub-section deals with the second option and looks at potential synergies of M&V with these other project functions.

A common pattern is the very limited availability of systematic data that would help both the projects themselves and evaluators to better understand how specific RBF interventions work. RBF claims contain mainly information on the incentivised transactions, and most verification tools for end users provide, at best, information on product purchase, functioning and use. Several implementing actors also conduct their own market intelligence about the technology (Tanzania picoPV, Vietnam biogas, Cambodia ICS, etc.), but usually not specifically related to the RBF. While all these data may be useful for a conventional EnDev project, it tells little about the specific mechanisms of an RBF-supported EnDev intervention. Projects would benefit from information that fills this gap since it would allow them to target their efforts more effectively to the most crucial activities, or reduce less effective support strategies.

The claim and verification systems could be enhanced through different data collection tools. Only the phone verification is less adequate for this purpose because the interviewees are less willing to talk to strangers, are impatient and rarely allow the verifier to capture the back-story. In contrast, field questionnaires can be more easily expanded. Surprisingly, the current field verification tools suggest that many on-site interviews do not take longer than 15-30 minutes. Locating a client, in contrast, can easily take 1-2 hours (or even various attempts if the person is absent), with sometimes long travel distances in remote areas. Compared to these fixed costs, doubling the interview time would hence not greatly increase the total costs per contact. Questionnaires of one hour or more are also common in household surveys. The experience of Cambodia ICS with its energy user survey for verification shows that more comprehensive field questionnaires are a real option. In general, field verification becomes

[76] For example, Vietnam biogas started with average verification costs per installed biogas digester of approximately 3 € (from Table 23 - half of the installations verified over phone, the other half on site). If the project expects that 10% of the reported installations actually disqualify, then widening the tolerated error margin from 5 to 10 pct. points for a claim of 50 installations would reduce the required verification sample from 37 to 21 installations. The saved verification costs per claim would be (37-21)×3 € ≈ 50 €, or 1 € per reported installation.

even more relevant for understanding the RBF if questions can be included on how access to the RBF technologies has improved on the ground level. Possible topics include consumer awareness of the technology, distribution channels in the villages, availability of similar products from alternative providers, access to consumer finance, etc.

Another, even more important aspect is data on supply-side actors. Companies, in contrast to end users, are the recipients of incentives, and RBF intervention logics largely evolve around changes in the market behaviour of firms. Therefore, additional data from companies would allow projects and evaluators to better identify which specific aspects of RBF lead to successful market transformation, and how. One possibility to collect supply-side data is through regular beneficiary visits foreseen in the verification schemes. The projects in East Africa (Rwanda, Tanzania PV, Kenya ICS & picoPV) show good practices around how this can be done. These projects, or their IVAs, regularly visit the firms' central offices using structured or semi-structured interview guidelines. Another option (not much used yet, except in Rwanda) is to ask for additional business variables in the RBF claims. In comparison to the time firms spend on, often manually, compiling long customer lists it should be relatively quick for them to answer a few additional questions each quarter. Key variables of interest could be the use of RBF incentives, investment and changes in human resources, working capital and distribution channels, financing, costs and prices, improvements in business models or market knowledge.

A final question is whether M&V could be further developed in a way that impact monitoring, rather than simple project monitoring, could be performed at the project level (EQ 1.12). Impact monitoring refers to continuous data collection with the purpose of identifying 'high-level' effects of the RBF such as market efficiency, private sector finance raised, and income generation. So far, impact monitoring is done mainly at the central level of EnDev in the form of KPIs[77]. A decentralised approach would only be justified if projects could collect better data at reasonable costs relative to the centralised status quo.

To summarise, the response is that project-level MEVA systems do not easily adapt to fully-fledged impact monitoring in a way that they would clearly outperform EnDev's centralised KPI approach. This has three main reasons.

Firstly, current MEVA systems include only a limited number of variables; additional data collection to improve on the centrally calculated KPIs would be costly for the projects. Secondly, enhanced impact monitoring at project level would require a close match between MEVA and baseline indicators, but in the current setup, these links are weak. The two data sources do not always cover the same market levels or use different indicators, which complicates the traceability of result variables over time. For KPI monitoring at central level, this is not an issue. Most KPIs are calculated based on the numbers of incentivised products and RBF recipients, which are, by definition, zero in the baseline. Thirdly, the attribution of changes in result variables to the RBF is a challenge. At the project level, it is often difficult to know, for example, how business variables of RBF recipients would have evolved without the intervention. In the absence of rigorous attribution strategies, the projects would not perform much better in this respect than the existing KPI calculations.

[77] For the KPIs, each project provides base figures on data collected from companies regarding job creation and private sector investment, for example. CO_2 emissions, in contrast, are automatically calculated per technology at central level through the EnDev monitoring system. In the absence of detailed data on a wide range of variables from all participants and end users, simplifying assumptions are used to calculate the values of the KPIs.

6.5 Conclusions on monitoring and verification

Relevance of the collected data for MEVA functions

The design of existing MEVA systems reveals that their specific purposes and the information they are expected to deliver are not always consistently defined. On the one hand, the data collection for verification is often more comprehensive than what is strictly needed for fraud prevention. On the other hand, the claim and verification data, which are at the heart of MEVA systems, provide little guidance to projects and evaluators, which specific elements of the RBF work well and how.

If MEVA is strictly reduced to M&V, the data do provide all the relevant information. Especially for verification, the information obtained from RBF participants and end users is more than sufficient to minimise potential fraud through RBF claims. Project monitoring is, to a large extent, informed by the same data. As long as most logframe indicators and KPIs are derived from the numbers of incentivised transactions and beneficiaries, these data are adequate.

Effectiveness of existing verification systems

The current verification systems are very effective in detecting non-eligible transactions in the claims. They systematically verify, in many cases even all transactions through different channels/methods and strictly corroborate compliance of RBF participants with the high standards for claiming incentives. In the first quarter, the participants especially needed time to learn about reporting and data standards.

Efficiency of monitoring and verification systems

While the M&V systems are effective, they have not yet optimised their efficiency. The fraud prevention function is fulfilled at high costs (between 3 and 5 € per verified transaction at the IVA level alone). The large numbers of verified transactions are explained by a high risk aversion towards potential fraud, as well as small claim sizes. The latter, which is caused by the high frequency of claims and the sometimes slow initial RBF uptake, also prevents many IVAs from realising potential economies of scale. The overall number of cases submitted for verification is thus unnecessarily large in some projects, but also split in inefficiently small packages. Moreover, the additional costs of field visits are high compared to the modest gains in reliability relative to phone checks. Some projects have found ways to deal with these challenges by grouping claims, reducing verification samples for some recipients in function of their past performance, and by rationalising field visits.

7 Lessons and Recommendations

After some years of RBF implementation, a summary of lessons learnt should help further enhance adaptive management of ongoing RBF projects and shape future RBF approaches. The lessons learnt emanate from the findings and conclusions of the MTE exercise and relate to RBF effectiveness, market transformation though RBF and to RBF management. Lessons learnt are also informed by stakeholder consultations undertaken at the occasion of the field visits of the evaluation team. Lessons learnt are meant to be "action oriented", as they form the basis for recommendations to further enhance the adaptive management approach for the ongoing RBF projects and for future programmes in RBF.

7.1 RBF effectiveness

The evidence from the projects reveals that the "harvest" time of most RBF projects has just begun. While the MTE is necessarily drawing on incomplete data, this portfolio review has clearly shown that RBF can be most effective when specific circumstances and design aspects are taken into account.

7.1.1 Designing effective incentives

The projects try to understand the market barriers and target the incentives towards their removal. Their experience is very diverse but a number of findings can be formulated.

- There are barriers hindering market development that the project design does not address. Among them are policy insecurity, market distortion by other donors, other market participants or government regulations, and information deficits due to a lack of reliable data to assess the market. Market barriers further downstream the value chain turned out more restrictive than expected.
- Cost and profitability issues are not the only barriers. A project also needs to foster firms' learning experiences in the market and their knowledge about distribution models, partners and technology.

Incentive design is an art rather than a science. Even those projects that have very good market intelligence and relationships with the participants and the policy makers need to take decisions regarding incentive design based on gut feeling rather than scientific proof.

Lesson: Designing effective incentives requires more considerations of market barriers, stakeholders and target groups than of incentive levels.

The analysis gives no clear indication that incentive levels were determinants for project success. While the challenges in the Rwanda and Kenya projects might be posed by incentive levels, there is no clear indication that these are the most important challenges. Rather, the following questions arise: Are the right players addressed by the incentive? Are these players open to the opportunities provided by the RBF? Often, and in particular if their core business is in other areas, they are too preoccupied with other business opportunities, or paying particular attention to energy access does not resonate with their organisational setup.

Refined incentive structures, like in the case of the Peru ICS project, where five different steps in the product life cycle are separately incentivised, provide promising learning opportunities. One such lesson is that it is highly recommended to provide a link to the final result, which is the use by customers. The experience from this project shows that RBF incentives for I&D failed to kick-start innovation among low-capacity firms, but have boosted existing innovation processes among well-prepared firms, resulting in high-quality stoves.

Lesson: The decisions of whom to incentivise and what results to incentivise are pivotal strategic choices.

The discussion as to whether or not upfront payments make the RBF more effective were strongly debated in those projects that required significant upfront investments by the companies before the revenues could flow. Examples are projects that include product development (e.g. Peru and Vietnam ICS), or that include mini-grid construction. In the first round of the Bangladesh appliance project, the incentive is split into tranches: two go to the manufacturers and one to the solar retailers. This has the effect that RBF recipients receive part of the RBF incentive (70 percent) up-front in the sense that the products are not sold to end users at the time of warehouse verification. However, no early amplification of activity was observed in the RBF recipients in this project.

Generally, upfront payments may be required to make RBF effective but they also bring the risk that the results chain is interrupted; while for example in Peru around 300,000 € in incentives have been paid out to potential stove manufacturers, no stove sale has been verified yet. This demonstrates that these approaches can be extremely risky for the RBF, potentially not showing any viable outcomes.

Lesson: Incentives have provided geographical signalling, and companies have followed.

Some projects have attempted to provide geographical signalling where they found that national or international companies need to be attracted to a specific region or country. This has been mostly successful. RBF has been able to signal to these groups that an attractive market is developing. This was evident in Tanzania's Lake Zone, but equally in the Peru projects or the stove importers in Cambodia. The project participants in Tanzania and Cambodia confirmed that RBF did not influence their coming to the region, however, because of the presence of RBF they knew that a critical mass of suppliers would come to the region. They then moved either because they wanted to take advantage of this opportunity, or because they thought that demand build-up would be easier if conducted by more than one player, or both.

Recommendation: Focus on the stakeholders and the barriers that they are faced with before determining the incentive level.

It is highly important to select the recipients of the RBF very carefully, as a group as well as individually. Does the incentive really have enough influence on their behaviour to bring them to ultimately sell the product on the market? How many steps in the supply chain need to be established, who is most likely to establish them and what are the necessary conditions for that? Incentivizing specific products is a particular risk when significant local investment is required, such as in the development of local production, or in the lump sum investment in a mini-grid. They are also risky for the investors who stand to lose significant shares of their working capital if the projects fail technologically or for regulatory or market reasons. These objects require refined and staggered incentive structures in order to reduce the risk to private investment. Nevertheless, it is not clear that this is sufficient, and the risk to RBF remains. They require that large sums go to a few individuals and this takes place long before development results are achieved. Rewarding upfront risk-taking is also not fully in line with an orthodox RBF philosophy.

Recommendation: Keep testing different incentive designs and allow some degree of variation in the existing projects as well as in new projects.

Expanding on the recommendations regarding targeting the incentives to the poor and vulnerable, the EnDev RBF is still full of untested opportunities. EnDev is strongly encouraged to keep exploring different setups and incentive designs. In particular, the mechanics of combining incentives targeting different groups of recipients have not yet been explored to the fullest. Other aspects that might be worth exploring are the question of whether RBF can be used to reduce risks through insurance and credit risk facilities, or how it can be combined with providing longer-term services like fuel supply for

cookstoves or maintenance services. Last but not least, it is highly recommended to explore more thoroughly how RBF can support the three functions of the financial sector (management of funds, provision of commercial loans for growth, provision of consumer loans for reducing the affordability barrier). For any of these analyses it is recommended to also include the RBF-type experiences from the other parts of the portfolio of EnDev and its partner organisations, in particular GIZ and SNV.

Recommendation: Assess the feasibility of the programme logic in light of the potential project duration.

Complicated setups and investment chains that are necessary for investments or new product developments might not be realistically terminable within the intended four year project duration. Developing a cookstove business including a new product and a retail chain, for example, seems challenging for a four-year project, in particular when accounting for the time required to setting up the project and qualifying participants. However, incentives can be lowered only slowly and with extensive communication with the market participants. Therefore, a minimum time and communication effort level is important. For some incentive designs, a slow phase-out might not be possible. Similarly, ensuring the financial and technical viability of a mini-grid faces the same hurdles and is even more constrained by the limited project duration.

7.1.2 Determining an appropriate incentive level

The projects have used different methods to determine the level of the incentive.

Lesson: There is a minimum incentive level. Incentive levels should be reduced over time in order to phase out the projects.

The incentive should at least make up for the transaction costs that are caused by the RBF. If the incentives that are offered are too low, participation in the project will suffer.

The aim of RBF projects is to lead to a self-sufficient market at a higher level of sales and turnover than prior to its inception. This market will have to function without the RBF incentives. The phase-out of these incentives should therefore be planned strategically rather than stopped abruptly.

Lesson: The potential damage and windfall profits from high initial incentives might be overestimated if corrective action is taken rapidly.

Projects were invited to define incentive levels through one of three mechanisms: estimating the viability gap, auctions, or a “price finding phase”. As long as the project is able to react quickly enough, the price finding phase might be the preferred measure. It also allows for increasing the incentive if it is found to be ineffective. The downside to this is that prior to its adjustment, the incentive might be too high. This risk is minimal as in the beginning of a project the number of claims is small, meaning that only a negligible number of participants receive the higher level incentive before the adjustment. Therefore, as the number of participants increases, the overall effect on costs is minimal.

Lesson: Auctions are a market-based mechanism for the determination of incentive levels but also have disadvantages.

Auctions can build markets and provide a high degree of insight and market transparency. They are mechanisms to understand what incentive level is required from the viewpoint of the participants. However, they are also connected to their own set of challenges. Managing an auction requires significant effort in and of itself. Auctions have many potential adjustment points that can be decisive for their effectiveness and efficiency. Initially, auctions can also result in very high incentives. This is par for the course but might be difficult to accept for project managers with limited budgets. Auctions and tenders

also require that the participants are fully aware of their internal cost structures. If not, their bidding strategies might not lead to sustainable growth outcomes.

While there is the hope that with increasing liquidity in the market, the phase-out of the incentive is possible, experience seems to indicate that this requires significant oversight and management.

Overall, the ambition is that the efficiency of the whole RBF package benefits from the lowest possible incentives. This can only be assessed at the time of the final evaluation.

Recommendation: Find a good balance between adjusting incentives quickly and communicating reliability to the participants.

While erring on the side of a too-high incentive might be the more preferable error, it is not good for project efficiency, and it injures the private sector through windfall profits. But damage will be limited where rapid adjustment is feasible. This can be explicit or implicit, for example through flexible payment components, like bonuses, added premiums for special services or the options to remove caps later on.

Yet, it is important that these are communicated to the recipients transparently, so that there is no reason for them to lose interest in the project due to credibility issues, and no potential for legal conflicts.

7.1.3 Mini-grid projects and RBF

Lesson: RBF cannot solve all the challenges that mini-grids are exposed to.

The two mini-grid projects reviewed have had little take-up but significant policy impact so far. It is due to its nature that the financial viability of each mini-grid is a long-term challenge (i.e. 6-7 years). In addition, mini-grids tend to be associated with high TA needs to build up local capacity or provide technical expertise for planning and installation. Last but not least, of all technologies promoted by RBF, mini-grid projects are subject to the highest level of regulatory uncertainties and grid extension risks. It can be a risk to base a project design on governmental projections and favour one specific mini-grid technology (e.g. in Rwanda the pico-hydro village grids). Changes in regulatory frameworks can foster and/or hamper project implementation and make adjustments necessary (such as shifting away from the focus on pico-hydro towards solar and other renewable energy technologies). For the take-off of the mini-grid sector, the private sector development needs supportive framework conditions, working capital and a profitability perspective.

A lesson learnt from the projects reviewed is that RBF projects are struggling with the broad scope of challenges that mini-grid projects are exposed to. For example, mini-grids can be bought and sold, including in a BOT (build-operate-transfer) or BOOT (build-own-operate-transfer) setup. In these cases, the recipients of the RBF might have to change between RBF tranches, leading to legal challenges with ownership transitions, risks and liabilities. Transfer rules might be uncertain in the RBF, which could further discourage investors.

The RBF projects targeting mini-grids disburse a one-time fixed payment after successful commissioning. Further incentives are only paid for operating connections after prior verification. In the case of Rwanda, the verification and payment of financial incentives are terminating one year after commissioning. Yet in Kenya, the verification of the claimed results can last up to one year after the foreseen end of the RBF programme period in June 2018. In spite of the overall rather high subsidy levels (70% in Rwanda and 50% in Kenya), the requirement of keeping records of electricity sales, customer complaints, SHMG system performance and the fact of being submitted to regular checks even beyond the project implementation period, might discourage potential project developers.

In addition, the instalments had to be pre-financed from other donor funds. This basically means that the RBF funds are used to pay back ODA loans. As most providers of such loans are reporting energy access connections and the GHG emission reductions resulting from their projects, this leads to double-counting.

Overall, the experience shows that the nature and the design rules applied by this RBF Facility can hardly provide for a stand-alone and effective support mechanism for mini-grids. The evaluation team has therefore general reservations regarding whether or not a stand-alone mini-grid RBF designed along the guidelines for this programme can work, due to the clear needs for TA, pre-financing, and long payback periods. None of these can be provided in conformity with the rules of the current setup of the RBF Facility.

Recommendation: Reconsider mini-grid RBF projects; potentially long-term (and/or forgivable) loans, policy advice and technical assistance are more important for mini-grids.

Many other financiers are looking into this sector and making the experiment more costly than benefit-prone. If mini-grid electrification is considered a promising avenue, providing a more comprehensive support package - including advice to the government, negotiations (e.g. of concession agreements) with the existing utilities, loans and guarantees for pre-financing, and results-based incentives - can lead to better support and more effective de-risking than a stand-alone RBF. Having these components in one single project would combine the benefits of grant approaches (which reduce the affordability and cost effectiveness barriers) with the performance-enhancing benefits of results-based approaches – and go significantly beyond a stand-alone RBF possible under the current EnDev RBFF guidelines. It also reduces the risk of double counting as well as transaction costs on the side of the donors or participants.

7.1.4 Multi-country projects

Lesson: There is no automatism for transnational synergies even if country projects are bundled into multiple country projects.

The third call of proposals for the EnDev RBFF explicitly requested multiple-country projects to test the wider impact of RBF measures on technology/ product sectors beyond country by country projects. Some projects created broad regions (e.g. covering countries in both Asia and Sub-Sahara Africa). However, in all these projects, the implementation is mainly undertaken on the national level (even in the Mekong cookstove and the African biogas projects). There is no automatism for transnational synergies.

Lesson: Avoid selection criteria with unclear logic for affecting project efficiency or effectiveness.

Looking at the portfolio, there might be a bigger benefit to the overall programme in letting country offices propose projects in the design that they most favour. Transregional lesson-learning can be facilitated by EnDev HQ. If self-directed lesson-learning in clusters is more effective or efficient, this should be supported with additional learning grants.

Recommendation: Provide learning opportunities beyond regional cooperation in the multiple-country projects.

Part of the rationale for multi-country projects seems to be that learning can be facilitated within the same project. Participants can be active in more than one country. This has been confirmed by the Mekong cookstove project, where manufacturers from Vietnam now export to Cambodia through the cookstove auction. However, this does not require them to share an EnDev budget line. These advantages could also be supported through the EnDev mechanism directly. While harmonisation of the

admission criteria of participants might be too complicated, a first step might be closer cooperation of projects that target the same technology in different markets.

7.2 Market transformation through RBF

7.2.1 Common barrier framework

Lesson: RBF projects can remove market barriers but they need to be clearly understood, and the right RBF tool needs to be designed. In addition, not all market barriers can be addressed by RBF.

The incentives are designed to address the barriers that limit the markets from developing. These barriers can lie at the level of the supply chain, but also at the level of end-users, financiers, importers or policy makers. Having a joint understanding, terminology or framework of analysis for the barriers would make it easier to structure, systematise and compare markets so that typical incentive structures can present/act as RBF-style answers for typical barriers constellations.

Lesson: A number of barriers cannot be addressed through RBF. In particular, these include a lack of working capital, a lack of customer awareness and expertise, and barriers that take long to mitigate.

The RBF projects have not been very successful at leveraging working capital or consumer loans, or at reaching broader levels of awareness, for instance, on cooking or biomass in the public beyond existing levels. The reason is that the RBF relies on the businesses themselves for these activities. They are in a growth phase and will be raising awareness with their limited group of direct consumers, but not through more general outreach and education. Some projects, like the Cambodia stove auction, have understood this and have worked on addressing this issue. This is a pervasive challenge though, and could be addressed more easily if a discussion at the EnDev level took place regarding how to complement the efforts of participants more effectively with general market preparation tools that address all barriers holistically.

Lesson: The role of MFIs is uncertain. In some projects they might be able to provide financing for the rural poor, but attracting their attention to small loans is difficult.

In some projects, MFIs have the potential to become an effective instrument for addressing two key concerns of retailers; to improve consumer finance for the rural poor and act as distribution channels in rural areas. However, participation of MFI so far has been lower than expected. MFIs in Kenya, for example, are not financing any of the three RBF technologies. In Cambodia as well, retailers could not yet cooperate with MFIs on the financing of cookstoves. Solar on-lending to rural retailers seems too costly for financial institutions, even with RBF.

Recommendation: Allow variations in the incentive design.

Such solutions could lie in variations in the incentive design. It is worthwhile to test incentive structures and their variations. But on the other hand, some more traditional ODA approaches, including capacity building, awareness campaigns, policy advice and working with the financial sector through partial risk guarantees or revolving funds might also be solutions to some of the challenges that the RBF projects are experiencing.

Recommendation: Agree upon and utilise joint barrier terminology, build an "RBF for Barriers" Handbook.

It is recommended that EnDev, in the context of its knowledge management programme, develops a standardised tool for the analysis of market barriers. A possible framework is the Theory of No Change[78]. This framework has been built on an analysis of market transformation processes. It proposes six generic barrier types (lack of interest, lack of awareness, lack of expertise, lack of affordability, lack of cost effectiveness, lack of access to the technology) that can apply to up to five stakeholder groups (users of a technology, suppliers, financiers, policy makers, utilities). Using such a framework like a checklist helps get a systematic and standardised assessment of the market barriers.

EnDev is building an important body of knowledge on how to address barriers with RBF. The framework could build the basis for a manual that codifies the experience of the EnDev RBF by mapping appropriate RBF designs to these barriers, explaining the relevant caveats, exit strategies, TA complements and amenable policy frameworks. As a "cook book for market transformation" this can be a very meaningful contribution to the global discussion on RBF and market transformation, and of course also help guide future RBFs.

7.2.2 Attracting stakeholders

Lesson: It has been easier to interest new technology businesses than the retail mainstream.

In particular in the least developed countries, projects have not (yet) managed to introduce new technologies through mainstream distribution and retail networks. RBF-supported picoPV products and cookstoves are typically sold through company-owned retail networks. Projects that tried to incentivise financing through financial institutions were generally unsuccessful so far. Whether this is a systematic result is unclear at this point, it might be indicative of the youth of the portfolio. However, it does address the difficulty of integrating the technologies into the existing general retail systems, and the mainstream markets for energy appliances.

It can be conjectured that it would be easier to reach a sustainable market size and distribute cookstoves and lights to the masses, if they would be available at outlets where the target group normally shops. Building up separate distribution and retail networks is perhaps not the right strategy for reaching a mass market and can provide an additional, artificial barrier for market scale-up. The "normal" retail networks, meanwhile, sell non-RBF supported lower quality products. In Tanzania's Lake Zone, uncertified "Chinese" replicas are available at street markets and can be picked up in passing, while the RBF-certified products are available only at specialty outlets.

Recommendation: Try to really understand and address bottlenecks in the distribution channels.

In order to reach the mass market, distribution systems must reach the mass-outlets. Most of the time, neither the market knowledge of the importers nor that of the EnDev teams reach deep enough to understand at what point in the retail chain the certified RBF-eligible products can be fed into those systems. However, by tapping into these systems, which have established last mile distribution, larger markets can be tapped more easily. This will require including new stakeholders. It might also potentially require approaching consumer education through non-RBF tools to complement market creation.

[78] Theory of No Change, Christine Wörlen, 2011.

7.2.3 Beyond the low hanging fruit: targeting the RBF to the poor (Leave No One Behind)

Lesson: RBF helps businesses grow following a market logic. If not directed otherwise, they will pick the low-hanging fruit.

RBF can help businesses becoming more resilient and robust, but they still tend to pick low-hanging fruit because they are simply more profitable and easier to reap. This is a lesson drawn on the basis of the various interviews conducted within this MTE. RBF should aim to push businesses further for serving the base-of-the-pyramid markets with refined incentive designs if the RBF contributes to enhance their solidity and market exposure. So far, however, the evidence suggests that none of the RBF projects have been able to direct the market participants towards providing more goods, services or benefits specifically to poor and vulnerable tiers of the population. This is more difficult than just serving those tiers that are "ready" in terms of being aware of the technology, having sufficient funds to afford it and having access to the distribution outlets that are easy for the suppliers to serve. Reaching poorer and vulnerable groups requires extra effort in overcoming physical distances, but also in overcoming additional affordability and knowledge barriers.

It must be concluded as a lesson learnt that overall, the RBF is not designed to reap the higher-hanging fruit. The challenges start with the questions around how to incentivise the last mile and go all the way to the difficulties of providing MEVA-ready customer data. The technologies that can help the poor and vulnerable groups are typically retail technologies that can also be handed on between households and thus might be harder to track than long-term installed higher-tier technologies. Targeting the incentives according to sociodemographic or geographic criteria has been tested in only few cases, but there are opportunities to expand these tests to other projects.

The EnDev RBF monitoring system is already paying close attention to collecting data on gender (see Chapter 4.3.3). However, none of the projects has taken measures to differentiate gender aspects. The energy business is very technical and in many places dominated by male entrepreneurs (except for ICS). Some projects track how many of the jobs created are held by women. However, no project takes specific measures to support women or women entrepreneurs within the recipients or the energy users. It might be possible to take a more active stance in this respect.

Lesson: Measuring inclusive market transformation is difficult.

Stoves may look trivial but market transformation for stoves is very difficult. While improved stoves do provide multiple benefits, stove stacking makes them difficult to measure. They are closely linked to social and cultural as well as seasonal aspects, so that stove markets are big but slow to change. Often they are also poorly documented and dominated by informal sales structures. This is an extreme case but in other cases as well, it is hard to measure market transformation. For example, an analysis of the baseline for the PV projects was difficult because the Lighting Africa-certified products are better documented so that they seem to constitute a larger part of the market than they actually do. The potentially larger segment of lower-quality products is too poorly documented for an assessment. Almost all projects are affected by this challenge.

Recommendation: In future approaches, and in revisions of the existing incentive system, test more approaches that target the incentives towards poor and vulnerable groups, as well as women.

So far, this has not been an explicit requirement for a pro-poor approach for the RBF project proposals. But it might be taken into consideration for the next call for proposals to target the incentives more

specifically to the poor[79]. This might also include more targeted and refined incentive structure, e.g. by geography (as in Kenya) or by other parameters, like the credit-worthiness of the customer to support the inclusion of the poorest and non-credit worthy into the formal economy. Ongoing projects are constantly fiddling with the incentive structure and are encouraged to do so. So, a recommendation would be to consider more systematically to what extent incentives could be adjusted for an enhanced geographic or poverty targeting.

Other RBF systems and many social programmes have collected expansive experience with RBF/ output-based aid (OBA)-approaches that give incentives directly to the poor. The absence of such approaches in the current system is noteworthy. The MEVA system and the associated administrative effort for the participants might be a reason for this. Still, these systems could be considered in the EnDev RBFF as well, drawing on the lessons provided by experience (and accessible through the Global Partnership on Output-Based Aid).

Recommendation: For an RBF project to tackle poverty alleviation cooperation with social programmes is an option worth exploring.

The presence of social programmes, as demonstrated in the Peru cookstoves case, significantly alters the market dynamics for private sector suppliers because they often constitute a significant share of the market. Cooperation with such programmes is an interesting option for accessing an initial market.

7.3 RBF management

7.3.1 Project set-up and resources

Lesson: Projects need to be well prepared and have sufficient resources for the required TA tasks.

The evaluation revealed that RBF projects generally faced insufficient business capacity on the side of the recipients and third party fund managers. Projects also had to deliver significant policy advice. Not all of this was factored into the agreements in the original conceptualisation between EnDev and DfID, and was not considered sufficiently in project budgets. Projects needed to find other funding sources to make the RBF effective. While this makes the RBF a high value-for-money programme, the numbers are not reflecting the real situation.

Lessons resulting from the strong need of additional technical assistance are the following:

- Firstly, it is a prerogative that an RBF programme setup is based on already existing market knowledge; its programme design, management, and monitoring structures should be built on already existing structures as far as possible. The RBF programmes should ideally be implemented through an existing energy access programme framework. If this had not been for the EnDev RBF Facility, its implementation option would have failed.
- Secondly, capacity building must be designed in a highly flexible manner; it must be ensured through an RBF management team that is highly proficient in sector-specific matters.
- Thirdly, innovations in technologies and products introduced with RBF generally require new marketing and distribution channels as well as awareness creation. Their development and introduction must be specifically supported through RBF (if no other support scheme is covering this aspect).

[79] When doing so the market maturity should be considered though. In a nascent market (e.g. Benin in the beginning), pro poor targeting could come after a minimum level of supply side development and market penetration has been reached.

- And lastly, while verification is certainly a core activity of RBF management, it should also not lead to a diversion from other important tasks, such as the further development and adjustment of incentive designs or networking with (potential) project partners.

In all cases, the RBF projects would be hardly feasible as standalone projects without an overall programme framework (at least under the given programme setup). Adhering to the 20/80 RBF rule[80], the RBF programme would not have been in a position to set up the projects to the stage that they are now, i.e. where an implementing organisation and participants are prepared to launch the project and yield first results. Particularly in view of the general need to stimulate demand, the original focus on 20% was an overly limiting factor in appropriately initiating and facilitating market transformation.

It is challenging though to determine an "appropriate" TA proportion for several reasons: market development and capacity constraints between markets so that a one-size-fits-all rule is not possible. Moreover, the scope and quality of cross-fertilisation and cross-subsidisation with other relevant initiatives differs. Economies of scale also influence the required proportion of management and TA costs. As a rule of thumb, at this stage of the evaluation, the evaluators would presume that a management and TA proportion (including verification) between 20% and 40% over the entire lifetime of a project would be a realistic assumption. Management costs should decrease over time and it may be worthwhile to consider a phasing approach such as e.g. allowing a management proportion of 50% during the first year of implementation with a gradual decrease over time to say, 15%.

Recommendation: Be more thorough at project preparation and to allow more flexible budget adjustments according to specific project needs.

Programme management budgets need to be adjusted to a realistic level. This is particularly important for those projects that cannot draw on complementary EnDev or third party funds. However, projects should be wary of scope creep; there is no need for focused capacity building workshops. Separate project preparation and research budgets could be foreseen after the basic RBF concept has been approved. It should cover systematic and in-depth stakeholder consultations and market research.

In general, higher level accompanying measures for a sustainable market transformation are required, such as support for (commercially viable) testing, piloting and R&D. It is evident that these cannot be covered by RBF. RBF management should therefore aim to ensure that, if needed, appropriate accompanying measures are facilitated to support sustainable market transformation.

We recommend the consideration of an extension of the start-up period in the project design, not only in immature market settings. This can include an early-stage idea competition for a limited amount of grant funding (e.g. 80,000 €) that is used to analyse the market, identify barriers and design an innovative and effective RBF mechanism that builds on the experiences of RBF for low carbon energy access collected so far. This process should be open to as many different types of stakeholders as possible, including local banks. It should also be open for the conclusion that the closer look at the market has highlighted that an RBF in this market does not make sense. After the design phase, the projects can then compete for additional EnDev funding (or other funding sources) at a broader scale.

Alternatively, beginning the projects with an up-front capacity building component or building on an existing capacity building project is an option. It could also help to draw on a larger pre-selection of firms prior to the RBF contest and on measures of pre-contest capacity building (e.g. for formalising a business). The contest could also remain open for a longer period, which may help to ensure a sufficiently researched market analysis and a well-developed design phase. This implies that RBF

[80] Envisaging at the outset of RBF programme implementation that management costs should be limited to a maximum of 20% of the overall budget earmarked for a specific RBF project.

management structures need to be set up in a way that facilitates such capacity building (i.e. sufficient resources available for capacity building and/or sufficient leverage through other programmes; sufficient time to ensure capacity building).

Testing the RBF approach in a pilot project can be a highly suitable option to formulate and fine-tune the design of the full RBF and establish the most appropriate implementation structures. Building on previous project intelligence to design the RBF approach and going the extra mile to actually test key elements of the RBF design in a pilot project can considerably reduce uncertainty about the setup of the full RBF project.

7.3.1 Involvement of a financial institution in project implementation

Lesson: Expectations with respect to the financial sector involvement have not been met.

The delegation of RBF management to a financial institution has not been successful or where it has had some success, it has consistently given reason for questioning its comparative advantage.[81] Each project context and setup is different and the most appropriate institutional setup depends on the specific markets where RBF is introduced. The efficiency gains and effectiveness from managing the RBF through a financial institution need to be identified for each specific project and country constellation. Relevant criteria for whether or not an external fund manager should be chosen are efficiency, effectiveness, access to the target group, potential synergies with other initiatives and the potential for a sustainable engagement of the institution in promoting low carbon energy access after the project ends, as well as the existence of a suitable and capable institution. RBF projects that spend too much of their scarce capacity building resources on selecting and securing a financial institution for RBF should be avoided; resources may be better used for capacity building and market advisory to participants, for example.

Recommendation: Be more flexible and systematic in stakeholder engagement planning.

The delegation of RBF management to a financial institution should not be a requirement. The involvement of financial institutions requires deeper and more consistent stakeholder engagement planning from the outset. This helps to avoid overly long contracting processes. Part of the delays can be avoided when relevant decision makers of financial institutions are involved in the process as soon as possible. During the “engagement process”, RBF management needs to have a good understanding of the decision-making processes within financial institutions. Enhanced stakeholder engagement planning is not only required for the financial sector, but also for other private sector stakeholders. RBF projects need to be aware of the driving forces and bottlenecks that can occur. To this end, RBF project managers need to maintain a market-oriented mentality and approach to escape the “ODA bubble” (thus avoiding a “project administration approach”).

7.3.2 Internal planning and process management

Lesson: RBF planning and management processes are continuously challenged.

The reviewed RBF projects are exposed to highly dynamic market environments which makes implementation planning challenging. The programme management and delivery budget proportion needs to be set at a realistic level. It is acknowledged that it is rather difficult to predict and assess what a realistic le-

[81] The sole successful exception to this rule is the Cambodia Stove Auction where a professional stove platform rather than a financial institution is taking on a central management function. Still, in the proposal it has been called the FMA to comply with this application requirement. Fund management in the actual implementation is however done by SNV.

vel means. However, the tendency to downscale ambition is a big challenge which needs to be addressed.

Small numbers in the first years are not necessarily a reason for concern. Growth is expected to be exponential, so that large numbers can still be reached in later years. It is understood that the ultimate targets are continuously at risk because external influences can always disrupt projects. Reduced sales targets, however, might send the wrong signals to the project team, the stakeholders and recipients of the RBF, rather than motivate them to aim for higher goals and improve sales.

Recommendation: Allow to spend time and resources on preparatory and accompanying market research and adjust implementation periods to the maturity of the market.

This lesson highlights the challenge of how long it takes to phase in and phase out an RBF system. Can RBF support be limited to four or five years as a standard implementation period? Different market maturity, newly developed cookstoves in Peru vs. task lights in Tanzania, for example, already plausibly justify different implementation durations. In addition, the review made clear that these refined tools require intense preparation, which needs time and resources. Poorly prepared projects should calculate more time between the (official) project start and the first disbursement of the incentives. As a lesson learnt, it can be stated that a standard life time of an RBF project appears to be challenging.

Recommendation: Enhance process management and transparency.

The instrument of the yearly project review should be a sufficient approach to decide on up-scaling and down-scaling if this platform is able to establish minimum success standards. Decisions on upscaling, upscaling again after downscaling, downscaling, or phasing out should be based on agreed guidelines and predetermined decision criteria. It is challenging however, to formulate standard rules for upscaling, down-scaling or project closure.

Standard rules could be based on a *Balanced Scorecard* model incorporating sales targets, but also other criteria, such as supported technology and complementarity. We would propose to consider a *flexibilisation approach* in the future: project proposals present a realistic scenario against which the project performance will be assessed. Each year, minimum drawdowns will be agreed and reflect an annualised percentage of the overall budget forecast. If these minimum drawdowns are not utilised, the project will be closed. Contingent budget lines will be added. Their drawdown will be negotiated on an annual basis. Drawdowns could be higher than the originally envisaged maximum budgets. This would allow the introduction of a competitive element for funds and help to channel them to the project with the best uptake. Based on the evidence, the evaluators would also recommend being more rigorous in phasing out projects whose prospects are negative.

The targets for the RBF are and should be high, as something to aspire to. This too means that low sales numbers cannot be interpreted in such a way that projects need to downscale ambition levels. When in doubt, sales targets should not be reduced. Quantitative targets are not the sole responsibility of the project. Even if all aspects of project management are extremely efficient and effective and the programme logic works, external influences are constantly putting results at risk. If sales outcomes are unexpectedly low, the project should first analyse whether the incentive structure is incentivizing the right aspects. If not, the incentive structure should be adjusted accordingly. There might be situations in which the challenge lies in other aspects, for example in the fact that the market environment is so highly subsidised that an additional RBF impulse could make things worse and is not able to deliver the necessary push to reach the next level, and incentive structures and level cannot be adjusted to the necessary level. In these cases, it might be more appropriate to terminate a project and use it for lessons learnt on how and why RBF cannot work, rather than simply downscale the overall sales target. It is also recommended that incentive systems for the performance of project managers are clearly defined in such a way that ambition is rewarded over conservative target setting. Too low target setting

may result in an underperformance with respect to the market potential and should be avoided. Moreover, unrealistic ambitions for the sake of successful competition for funding during the application phase should also be discouraged.

Another approach to ensure the continuation of the most appropriate and successful RBF approaches could be to predetermine a breaking point to allow for an informed decision about the continuation, or discontinuation, of an RBF project (component). Rapid closures should be made possible and ongoing commitments annulled as soon as possible.

7.3.3 Adaptive Management

Lesson: Quality of project management matters more than anything else.

The quality of project management matters more than anything else for effective RBF implementation. Strong commitment, technical strength and a political savviness are all basic requirements for effective and adaptive programming and management. Participants' reports and discussions with the project managers can provide more insight than most other market research tools. Such knowledge is too important not to be shared more widely. Market research and close knowledge of the stakeholders, the products, and the customer preferences are of utmost importance for effective project management.

The reliance on and further deepening of a long-standing collaboration and strong institutional relationships between national project partners and RBF implementers are important success factors for effective implementation. Yet, building on top of an established programme can also have its pitfalls. Such challenges can occur if the established project staff identifies strongly with the programme and the RBF project is only seen as an addendum. In such cases, the communication of RBF and its visibility as an innovative approach may not be optimal. This aspect can affect RBF-related documentation with the risk of leading to incomplete and/or inconsistent information about RBF.

Often, companies need orientation about where to expand next, what product to market and how. RBF projects were able to attract them to specific locations, or signal to them what products are preferable as compared to lower quality products. The implementation of a comprehensive support and incentive package along the entire value chain can make the difference and foster both innovation and marketing processes. To ensure that all incentives are effective, the supplementation of the RBF Facility with intense technical support for capacity building is important. RBF participants value independent data provision, market transparency and advice backed through the RBF data collection and analysis process. In some instances, the RBF programme managers have achieved the status of a well-respected market information hub, which can be a very important service. Market information is important for the businesses as well as for the financial institutions, and it helps stabilise the market. If established RBF management structures as non-market participating entities are able to establish themselves as a trusted advisor to the companies but also to regulatory agencies and other development partners due to their deep insights into the market, they can play an important role in facilitating market transformation. This added benefit should be highly valued by Development Partners, because it helps to target funds appropriately.

Recommendation: Focus on the quality of project management and capitalise on market intelligence.

The quality of management and its exposure to the relevant renewable energy market should be a key element for the RBF project appraisal stage. Up- or downscaling decisions should also factor in the level of market knowledge and networking potential of the current RBF management. Project management should, as far as possible, focus its attention on stakeholder relations and aim to minimise administrative work. It should be considered to incentivise the programme managers to keep ambition levels high or so that they are raised rather than lowered during project implementation.

EnDev management at GIZ HQ in Germany should embark on developing and using tools and methods as minimum standards for core processes (such as appraisal processes, verification etc.). Project managers should be availed of procedural guidelines for quality assurance. RBF Facility management at HQ is also encouraged to develop appropriate standards to help projects in streamlining application, management, verification and monitoring processes as a further contribution to reduce management and delivery costs.

RBFs lead to high data volume and market intelligence. This is a real asset that should be utilised. Projects should also strive to fulfil the function of a market information hub. Additional budget for market-specific research and analysis should be provided.

By the end of RBF in the partner countries, a wealth of relevant technical expertise and lessons learnt will have been accumulated, also with the support of the MEVA system. These are unique resources that should be used for the benefit of all. Independent data provision, market transparency and advice, including to non-RBF participants, can be provided through the RBF data collection and analysis process. It is important to RBF recipients as it helps to stabilise the market. If more resources are required for this, EnDev and DfID should make them available. As much as possible, these should be documented and systematically shared with EnDev HQ. The energy wiki Energypedia[82] that was originally created within EnDev appears to be a highly suitable and a well-developed platform for this.

Recommendation: Plan and manage human resources well to ensure knowledge capitalisation.

Much of the daily implementation experience and intimate local market knowledge rests in the heads of the (few) RBF project managers who have been exposed to the market realities and who have developed networks with stakeholders on the ground. Therefore, it is crucial to provide incentives and motivation so that competent and knowledgeable staff remains within the EnDev programme. Ideally, local RBF staff would move to the government sphere and thus contribute to a sustainable capacity development on renewable energy sector development. In practice though, this has hardly happened due to a still low attractiveness of the government sphere for staff having worked in the private and consultancy sector.

In addition, it would be helpful to introduce incentive systems and reward success stronger. This recommendation mainly relates to national RBF staff. Staff working with and being exposed to market-based incentive systems should be rewarded accordingly and the traditional salary bands usually applied are not entirely appropriate for this type of work. Such rewards do not need to be necessarily pecuniary; other incentives, such as training, international exchanges, twinning with European institutions could also be highly valuable tools to attract competent national staff and to support its further capacity development.

7.3.4 Monitoring and verification

Lesson: The specific objectives and expectations of MEVA systems need to be well defined to maximise their relevance and efficiency.

Many MEVA systems have not yet optimised their efficiency, often as a consequence of lacking clarity of their purposes. Several projects have delivered good practices of reducing MEVA costs over time, which suggests that they can find creative solutions once they have a clear vision of what their MEVA systems should deliver and when they have more experience with the claim and verification processes. In general, experience shows that MEVA systems are more relevant and efficient where their specific objectives and purposes are well defined.

[82] https://energypedia.info.

As a starting point, clear expectations towards MEVA are important guidance for identifying and contracting IVA capacities in the market. Without a specific plan of how the data will be used (e.g. for verification only, impact monitoring or project management), projects have found it difficult to design claim and verification systems in the most efficient way. Verification systems can only be streamlined if projects understand how different verification methods and tools, especially field visits to end users, add value (or not) to fraud prevention or other purposes. Finally, the decision on verification samples, methods and checks cannot be taken efficiently without critically weighing the accepted level of fraud risk against the verification costs.

Recommendation: Choose from two strategy options, either rationalise data sampling, collection and management for verification, or enhance data collection at little extra cost for other purposes.

The specific purposes of the MEVA framework should be clearly and consistently defined from the outset. This is particularly important for the claim and verification processes and data, which also crucially feed the monitoring functions at project and central levels.

MEVA can have two distinct key purposes, and each is associated with a different set of feasible strategies to optimise MEVA relevance and efficiency. To summarise, projects can either strictly concentrate on the verification function and rationalise data sampling, collection and management, or they enhance their existing data collection systems at little extra cost for complementary purposes.

Given the already existing MEVA setup and its budget constraints, most projects may prefer the former option. The projects should then focus on lean and efficient sampling and data collection systems that accurately weigh the trade-off between fraud risk and verification costs. Specifically, a work plan for reducing verification costs should consider the following points:

1. When hiring different verifier types for skill specialisation and potential savings on IVA fees, weigh these gains against the increased transaction costs of coordinating multiple agents.
2. Accept higher error margins in verification to reduce sample sizes; these increase the risk of claim misclassification in both directions, but leave incentive payments correct *on average*.
3. If projects prefer to maintain their high aversion towards the 'fraud risk' end of the error margin, reduced verification samples may be coupled with higher penalties for incorrect claims.
4. Bundle small claims/impose minimum claim sizes to further reduce the total number of required verifications and to enable economies of scale for IVAs; compensate RBF recipients for the longer payment cycles by advancing a fixed part of RBF disbursements.
5. Reduce sample sizes for low-risk RBF recipients over time in relation to their verification results.
6. Screen the claims for missing or duplicated phone numbers before forwarding them to IVAs.
7. Rationalise onsite verification; reduce its proportion relative to phone checks (at least for end users in remote areas) or consider abandoning it completely after some time.
8. Use web-based and mobile solutions for claim submission and verification processes. Investing in electronic chips for geocoding (possibly procured at EnDev central level) may be an option.

If projects choose the alternative route for improving MEVA efficiency, enhancing their verification systems for complementary purposes, such as impact monitoring or theory-of-change analysis for project management and evaluation, then they should exploit ways to deepen data collection at little extra cost. This can be achieved in two ways. Firstly, field questionnaires for end users should be expanded with questions about how market penetration works at the ground level. Since the variable costs of the actual interview time are low in comparison to the high fixed costs of locating clients, this would barely affect the total per-user costs of field verification. Secondly, RBF participants should be asked to regularly include additional business variables in their claims (investment and expenditure,

costs and prices, distribution and business strategies). This would shed light on the specific channels of market transformation through RBF.

7.3.5 Exploiting synergies

Lesson: Consider the value-added of synergies.

Evidence from the field has revealed that other programmes can be a boon as well as a threat. Complementarity with other programmes needs to be monitored closely, however. There are examples where other programmes have been utilised to amplify the RBF's impact. This is useful, particularly to make up for a shortfall in TA funds. However, we have also seen that some parallel projects have the potential to delay RBF action (WB programmes on mini-grids) or crowd out the RBF.

Drawing on synergies with other (mainly rural development) projects has proven to be an important promoter for the use of specific solar technologies, such as water pumps. Synergetic linking of the RBF with existing local energy access programmes though, may come at a cost difficult to foresee at the outset. The capacity for adaptive management through EnDev can be lower in these cases as access to the implementing organisation is more indirect. Lacking critical business, marketing skills and experience are more difficult to deal with in such a setup.

Recommendation: Capitalise on the convening power of RBF/EnDev.

Due to its engagement with EnDev with extensive in-country operations, through its set up, RBF has a high profile and a strong convening power with governments, donors, private sector stakeholders and civil society. It should capitalise on this as far as possible. Resulting from this, RBF projects should coordinate closely with other relevant stakeholders at national policy and donor level. In fact, RBF has proven to be an attractive approach for donors and governments as it is working directly with the private sector without being necessarily prescriptive. Together with its knowledge and market information competence, its influence on donor harmonisation and policies should be fully exploited.

In sub-sectors in which demand through other development projects and/or public sector entities predominantly drives market development, RBF could be better linked to other development cooperation or national policy initiatives as a means to draw on mutually beneficial synergies.

It is also recommended to disseminate lessons from RBF implementation as far as possible among government stakeholders to improve the national support framework. Through EnDev, RBF as a tool can actively promote renewable energy market technology for government programmes and policies. In addition, the project itself may provide important insights for the government on how to introduce new renewable energy technologies with a comparatively high leverage effect. New technologies incent-ivised through RBF can create substantial large-scale gains for social programmes and their beneficiaries, as well as for private sector entrepreneurs.

Situations in which other projects have negative impact on RBF should of course be avoided as far as possible. If they occur, mitigation approaches should be sought pro-actively to avoid detrimental effects with respect to the given context.

7.3.6 Phasing out

Lesson: In order to manage budgets and results, phasing out strategies need to be a consideration from the start and fully worked out at mid-term.

Even RBF constitutes a market distortion. Without phasing out strategies, the subsidisation trap will continue to exist. According to the experience of the evaluators, too many energy markets are already

distorted when people grow accustomed to cheap energy. In addition, the RBF's budget is calculated for a finite level of intervention and it is important that it be managed such that it is sufficient to support the ultimate phasing out of the intervention. Qualitatively, the RBF has provided the opportunity for many retailers to provide consumer rebates, which is one of the most risk-prone subsidy situations with respect to its phasing out; it does not educate end consumers to accept high prices for premium products, even if they could afford it. It is highly recommended to consider this early on in the process.

Recommendation: Develop phasing out strategies for all projects.

It is recommended that the phasing out of the RBF project is part of the overall implementation approach and that it is systematically planned. If it has not started yet, such planning should be initiated now. Follow-up options need to be systematically assessed. The phasing-out planning should not only involve technical aspects, but also human resources deployment and knowledge management.

Phasing out approaches need to capitalise on the knowledge gained through RBF and institutionalise it so that the succeeding structure can become a trusted advisor to the companies involved. After the phasing out of RBF, the knowhow and experience of implementing organisations should continue to be available for RBF recipients and stakeholders. A repository of market data and knowledge on challenges as well as risk and opportunities can help stabilise the market transformation.

8 Annexes

8.1 Annex 1: Executive summaries of project reviews on RBF projects

In the frame of this MTE project reviews were written between October 2016 and May 2017, based on the information collected during the desk and field studies. The Executive Summary of those project reviews can be found below.

Round 1 RBF projects	
Benin	Lifting up 3 Offgrid PV market segments to the next level
Overall it can be expected that the objective of the project to attract entry of new players with best practice who can participate in shortening the overall timeline required for establishing a self-sustaining solar PV sector in the Benin will be achieved to some extent. The objective to introduce solar PV for street lights at a broader scale will not be achieved. The extent to which the objective to introduce agricultural water pumping will be achieved is still not clear. ProMaBiP can be considered as a pilot RBF project in an emerging and dynamic market setting. The project actually managed to create an incentive for more than a few companies to enter the Benin market at an early stage and thus to assure a competition among themselves in years following after year 1 (market transformation hypothesis). From hindsight, though, the initial incentive design was not optimal as it facilitated opportunistic behaviour at the level of RBF recipients. So far, the contribution of the project to develop feasible market strategies in order to start a quality oriented PV market in the country and the creation and optimisation of business-models aiming at making PV-systems available for specific consumer-groups (learning objective) is still somewhat limited. Further implementation experience will tell to what extent the learning objective will be achieved. So far, project outputs are still below expectations and a more realistic output planning is needed for the reminder of the implementation period. It can be hoped that with the dynamics of solar market development in Benin, output levels are accelerating until the end of the RBF implementation period. The verification process has caused headaches as it has proven to be time consuming and challenging to actually monitor sales. So far, impacts at the demand side are difficult to assess and it is recommended to upgrade the existing monitoring system now after first outputs have been achieved to be in a better position to actually assess the outcome of the project. At this stage a main recommendation is to focus more on facilitating the development of feasible marketing strategies as the main bottleneck in the country. To this end, the current incentive design should be re-assessed and further developed. The project should be more innovative in incentivizing state-of-the-art marketing and distribution approaches. It should also start thinking about appropriate approaches to the phase out of the RBF support.	
Rwanda	Sustainable Market Creation for Solar Lighting (picoPV)
The project intends to get companies to invest into reaching customers in poorer regions, where the highest unmet demand is, but where it is currently not possible for companies to invest due to the high cost of developing distribution infrastructure and marketing. The findings indicate that the objective of the project is achieved to some extent. In the project proposal target numbers of 880.000 beneficiaries (10% of the population) and 252.000 products sold were set. Because of the introduction of the new EnDev counting method, the targets were revised at the beginning of the year 2016 to 550,000 beneficiaries and 220,000 products sold. By December 2016, seven claims have been submitted and the Urowego Opportunity Bank (UOB) had 14 companies qualified for the RBF. 4.907 solar products were sold and 15,782 beneficiaries reached. It can be considered par for the game that the market build-up is slow and set to take off exponentially soon. In that light, it seemed premature to downscale the targets to 350,000 beneficiaries and 90,000 products sold at the end of 2016. Reasons for the slow start - it took a year until the first claim was received and disbursed – were observable: i) many companies had been supported by the World Bank First Energy Small and Medium Enterprises Support Project (World Bank's Energy Small and Medium Enterprises), and could not apply for RBF initially due to double-subsidisation, ii) the implementing partner was comparatively weak and not able to fulfil all expected tasks, and iii) the verification of the first claims was lengthy and inefficient as the data provided by the companies were of low quality.	

The project team addressed the internal challenges by taking over a greater role in fund management and coordination by allocating more staff than planned. Guidelines for donor support were set up and the verification process organised in an efficient and effective manner.

By the end of 2016, the still juvenile market for solar lighting showed signs of acceleration. More and more international companies are entering the market. The four largest market players (Ignite, Mobisol, Bboxx and Off Grid Electric) are now participating in the project. The NGO One Acre Fund is also expected to be and to make massive sales in the coming year. Further market development can be expected from the cooperation with the upcoming World Bank Scaling Up Renewable Energy Programme (SREP) as RBF incentives (grants) will be complemented with SREP loans to catalyse the market.

Still, there is no evidence yet whether consumers will get more familiar with high quality products or that prices will come down as a result of economies of scale. In spite of the positive trend on the supply side, the companies might have been cheery picking their consumers so far which might mean that slower days could come. In fact, the market potential of households in the very remote (and especially hilly) rural areas is not yet fully explored and building more sales in those areas will take time. The project should closely monitor whether the private sector alone will be able to access the last-mile-customer in the remote areas and –in case it does not- review and adjust the incentive structure to more explicitly incentivise last mile distribution.

With the upcoming closer cooperation with the World Bank Scaling Up Renewable Energy Programme (SREP) in Rwanda it is also recommended to set up a system of cost controlling that allows a clear demarcation of SREP and RBF funds.

Rwanda	Sustainable Market Creation for Renewable Energy Village Grids

This project can be considered a pilot project to test the RBF modality for creating additional electricity access in areas not covered by the National Utility through privately constructed and operated village grids.

The project creates an incentive for companies to develop innovative business models for managing, operating and extending village grids at different sizes (market transformation hypothesis).

Overall it can be expected that the objective of the project to incentivise companies to acquire the capacity to manage and operate grid as their own business or on behalf of public owners will be achieved to some extent.

One of the major challenges is to find profitable and well-designed mini-grid proposals that can be supported by incentives.

So far, project outputs are below expectations. The targets of the project proposal aimed at the construction of 25 pico-hydro mini-grids and 10 micro-hydro mini-grids with up to 18,750 persons or about 3,750 households benefitting from the projects. In early 2016, the EnDev Board approved the adjustments to 22,999 beneficiaries, 40 productive units (PU) and 40 social institutions (SI). The projects foreseen comprised of four Solar AC, 80 solar DC, six pico hydro and four distributions. By the end of the year 2016, only one project bundle with 22 solar DCs micro grids and 1 pico hydro plant were installed, and the project team suggested a downscaling to 30 mini-grids, reaching 12,300 beneficiaries, 250 PU and 40 SI to align the project's objectives to the realities of the market observed after two years (in particular with under evaluated implementation costs. Although this number is rather modest, more companies are showing interest to participate.

During the intervention, EnDev realised that the original budget planning did not cater for the reality of the sectorial/structural changes to be implemented in order to remove the barriers that restrict market development and to improve the regulatory environment of the off-grid sector. Therefore, EnDev had to shift significant resources and time from other projects (EnDev core budget) to implement activities such as policy advice and technical assistance that were not foreseen in the original RBF budget. So far, the incentive payments can constitute up to 70% of the investment costs according to the level of viability gap funding necessary for the project to be profitable. Since the level of RBF payments and the rate has not been reduced, influences of varying incentive levels on internal cost calculations and benefits cannot yet be assessed. The MEVA system was assessed and proves to be suitable for the intervention. It is executed in a realistic time frame, ensures the reliability of results and reduces the potential for fraud.

Overall, the lesson that might be learned from this project is that the RBF might not be the best-suited, or at least the easiest, instrument to address the main challenges faced by mini-grids in very young markets : i) poor ex-ante financeability (since RBF rewards results, its philosophy does not lend itself to building ex-ante investment capital), ii) long payback periods during which political risks and network expansion are increasing investment risks, and iii) the lack of profitability and productive use which is essential in making a project viable.

Therefore, at this stage a main recommendation is to shift from a focus on the results of the mini-grid component in terms of access only towards a better appreciation and inclusion of the enabling environment. Important success factors include the political framework, access to finance and market transparency, on which EnDev can

have an impact, although the RBF approach, as it was foreseen originally, might not have been the most impactful tool to support them. Hence, the possibility to act more on political advisory and TA, along with the current RBF structure, should be increased with a focus on revenue generation for mini-grids and the regulatory framework.

Cooperation with the upcoming Scaling Up Renewable Energy Programme (SREP) of the World Bank could provide RBF projects in the pipeline with pre-financing, However, RBF might not accelerate as much as expected if the SREP is delayed beyond summer 2017. In that case, there is a risk that the current output levels cannot be achieved until the end of the RBF implementation period in 2019. While the cooperation is encouraged, the project should also prepare a "plan B" to rise output if the pipeline development is slower than expected. In case SREP funds can be disbursed in time, the project has to set up a system of cost controlling that allows a clear demarcation of SREP and RBF funds, which should not be a major issue as SREP focuses on prefinancing through loan and the RBF on result based grant.

Last, not least, the project is already gathering consumer data for internal use. The information could be further pooled with information from private companies and made available to outside sector associations or research institutions to contribute publicly to more reliable consumer data.

Tanzania	Rural Market Development of picoPV Solar, Lake Zone energy access

Tanzania, together with several countries in East Africa, is experiencing a "solar off-grid" boom. The project's objective was to establish a supply chain for high-quality solar lanterns and room light systems in Tanzania's Lake Zone. An energy-service-based, capped and degressive RBF incentive is provided to the importers / suppliers of the solar systems who are expected to share it with the retailers and sales agents in the area.

The project conducted two calls for application of participating solar suppliers (and a third one on progress), with a total of 10 companies selected. These companies vary significantly in terms of the product offering and the distribution network and strategy. The original considerations regarding the incentive design had to be adjusted to fit some of these characteristics, and the degression was slowed in order to make up for some of the initial delays and some policy uncertainties. Delays were caused for example when the Lighting Africa Certifications took longer than expected. Other adjustments included the claim submission forms and the verification process.

Even if the companies vary significantly, in their product offering and distribution networks, there is intense competition by now. The market has been growing, including in terms of diversity. Customers are more aware of different products and their preferences start to diversify. Some observers already feel signs of saturation. While the companies are growing, not all of them are set up in the same way with a long-term perspective, and not all distribution systems offer the opportunity for continuous sales. If observers see that the market starts to saturate, the evaluation team would rather assume that these are limitations of the distribution systems. The market is still a long way from providing light to all, including the poorest of the poor.

While the project overall is implemented highly successfully and the RBF recipients are committed to and often successful in building up the supply chain in the Lake Zone, it was and still is exposed to a number of challenges. Among them are the political changes through government election and transition, the different business models leading to varying degrees of documentation and verification challenges, and the need to allow for a certain amount of flexibility in how RBF recipients use the incentives.

The project provides interesting lessons for other projects, in particular with respect to the added value of good market analysis, and good documentation. This is not possible with the RBF amounts, but was co-financed with other funding sources in this case.

The project team has established itself with the companies as a trusted advisor. They have maybe the best overview of what is happening in this market, and companies are grateful for any market information that they can receive. This is an important role that can help the market to become more efficient and develop faster. SNV should expand on that role in several dimensions.

Vietnam	Creating a market driven biogas sector in Vietnam

The project is managed by SNV and implemented by the Ministry of Agriculture and Rural Development (MARD)'s Biogas Programme. Since 2003, these organisations have been working together in the National Biogas Programme (NBP or BP), supporting small-scale biodigesters (up to 49 m^3) for family farms to provide biogas, fertiliser, and sanitary waste disposal. The RBF project sets out to transform the sector that has been created through the BP from a government-led and household-subsidy driven scheme into a self-sustaining commercial market for domestic biogas plants.

Formerly, farm households benefitted from a direct government subsidy. Under the RBF, the (comparatively small) subsidy will go to the Biomass Masonry Enterprises (BMEs) instead whereas farmers will finance the purchase of a digester from their own funds and (potentially) micro-credits or informal loans. As exit strategy, donor funds can

be replaced by other sources of support, specifically carbon revenues from voluntary carbon market, and potentially, the subsidy and RBF will be phased out gradually. This transition started in 6 pilot provinces, then scaled to 18, and is scheduled to ultimately reach 45 provinces in Vietnam.

While overall, the project can demonstrate significant contributions to the EnDev KPIs, it has hit some road blocks underway, and thus might not reach its quantitative and qualitative objectives during the scheduled project period. Particularly challenging were some political aspects. The change from farmer subsidy to a supply driven RBF incentive system was greeted with mixed reactions by MARD. In addition, the project was put on a halt for an extended period when the government needed to clarify the continuation of the National Biogas Programme with a phase III and the use of the carbon revenues. This period has been managed with a high level of sensitivity by programme leadership of SNV and the BP.

In addition to managing the disbursements, the Programme Office also continues to deliver a significant amount of substantial technical assistance and training, in particular to the quality controllers and suppliers. It also consistently provides improvements to the learning materials and the registration process, which now can be operated by an app. Originally, it was planned to transfer at least some of these responsibilities to the National Biogas Association. This failed. The long-term strategy for the continuation or discontinuation of the technical services is not fully spelled out at this point but most likely carbon revenues are implicitly scheduled to pay for this at least partially.

Regarding the market transformation, it can be seen as a success that construction activity continued during the hiatus. Before the start of phase III, the project could not disburse incentives, so that in a number of provinces no subsidy was paid to either the households or the BME. But even in these provinces, construction continued. The project accommodated the delay by allowing claiming the incentives, even though the pay-out could not be made, with delay, but overall this demonstrates that the market is self-sustaining on a stable level at least in some areas. Surveys have confirmed that households are interested in biogas digesters even without a household incentive. However, without subsidies, the overall construction numbers have reached a plateau and would not be rising anymore.

Vietnam is developing fast and in some areas, this might lead to a reduction in the share of families that have the "correct" number of livestock for operating a biogas digester of the qualifying size. On the other hand, larger farms might benefit from larger digester. The professional biogas enterprises serve these sectors already but cannot benefit from subsidies RBF. In addition, there are constantly new products, particularly among the prefabricated digesters, that could and should be allowed into the expanded product spectrum, so that innovation and demographic change can be accommodated and efficiency can be improved.

After the "restart" of the project in late 2016, it now enters what could be its final phase. Accordingly, the exit strategy should now be the highest priority out for all project components, keeping in mind the stabilisation of the sector as the ultimate objective.

Round 2 RBF projects

Kenya	Higher tier cookstove market acceleration

The improved cookstove market has seen in the past 5 to 10 years a marked acceleration of ICS design innovations with a growing number of companies providing industrially and semi-industrially manufactured ICS solutions.[83] Fuelled by this development, the cookstove RBF in Kenya aims to strengthen the uptake of so-called higher-tier stoves in the rural market. The RBF specifically addresses the relatively high upfront stove costs by incentivizing Lending Institutions (i.e. banks, MFIs and SACCOs) nationwide to offer affordable credit schemes for these stoves. The incentives are defined as a percentage of a stove's recommended retail price. The initial plan to have incentive levels competititively determined by market participants in reverse auctions had to be revised. Instead, geographically differentiated incentives that are uniform across Lending Institutions were determined using, among others, part of the incentives levels proposed by applicants. A complementary project component to support gasifier stoves by subsidizing pellets did not yet take off. Five pellet companies have applied, but the RBF incentives are still on hold until the status and prospects of the pellet sector are evaluated in mid-2017.

The project has received the first round of claims for credit-based sales accruing over the course of the year 2016 from five Lending Institutions. The verification process of these claims was underway at the time of writing this report. Since baseline sales of Lending Institutions are to be subtracted, it is already clear that their first-year sales clearly fall short of the project targets. Generally, RBF recipients showed few signs of doing extra efforts beyond

[83] Putti et al. (2015)

their low-level stove credits already offered before joining the RBF project. As a consequence, the project is currently in the process of revising its implementation structure and theory of change. Most importantly, stove distributors are considered to become eligible for RBF incentives, since they are more engaged in and more familiar with the relevant cookstove market. In addition, expectations are high that commercial banks will get involved in the future and use their large networks to increase the uptake of cookstove loans.

Another fundamental challenge remains in that only few stoves qualified as what can be considered as higher-tier stoves to become eligible for the RBF in the first place, which came as a surprise for local market stakeholders including the Global Alliance for Clean Cookstoves. Despite a revision of minimum requirements for RBF eligibility by the project, half the tested stoves did not pass the testing. Particularly affordable higher-tier firewood stoves, i.e. the most needed improved stoves in rural areas, are not available on the market yet.

While the initial performance of the fund manager, Micro-Enterprises Support Programme Trust (MESPT), was unsatisfactory, there are signs that MESPT has improved and is pro-actively taking up the challenge. More generally, MESPT has the potential to become a showcase to projects that involve similar fund management structures. A market-driven transformation towards a wider and sustainable adoption of improved cookstoves, however, remains a challenge that requires complementary policy interventions from different angles, including R&D, access to working capital, awareness raising and specific marketing.

Kenya	Market Creation for private sector operated mini-grids

Kenya experiences a surge in large-scale electricity grid development and small off-grid solutions, whereas little has been done to meet the power needs of the "missing middle"[84]. GIZ-EnDev/ProSolar seeks to tap into this segment via the mini-grid RBF project in Kenya. The project is focused but not necessarily restricted to the two sparsely populated northern counties, Turkana and Marsabit. Project developers can apply for RBF incentives spread across three components, namely a capacity incentive per kW installed, a connection incentive per customer connected, and a production-based incentive per kWh provided. In a first batch, two Kenya-based companies with partly international teams were selected to develop three pre-selected sites. Construction works have not yet started and first end-user connections cannot be expected before the fourth quarter of 2017. In light of slow project uptake, the evaluation questions on the project's appropriateness, performance and market-transformation potential can only be answered based on the experiences gained during its launch and preparatory phase.

The encountered challenges are, first, related to the generally harsh market environment for mini-grid developers: mini-grid policies to provide for sufficient predictability do not yet exist, the extension of the centralised grid is progressing boldly, and penetration of individual pico-solar systems is becoming increasingly competitive. Accordingly, economic site viability is harder to establish and still partly uncertain even for the first-batch sites. As a consequence, the mini-grid sector loses some of its appeal, which was also reflected in the very limited response by financial institutions, which essentially left the project with a single suitable candidate to assume the fund-managing role of implementing actor, Barclays Bank of Kenya (BBK). Contracting the bank became the second major challenge, which had to do with bureaucratic decision-making processes at BBK, but also at GIZ. Overall, the implementing organisation GIZ ProSolar had to provide considerable continuous technical guidance on financial and technological aspects to both BBK and project developers.

Despite these capacity development needs among mini-grid developers in the country, the two selected project developers are in a position to build and operate their mini-grids proficiently. Technical sustainability is also safeguarded by the demanding national Grid Code. If adhered to, mini-grids are expected to achieve service levels equivalent to SE4All Tier 5, i.e. the highest possible level.

Against this challenging background, the mini-grid RBF project is hard to imagine as a standalone project without the strong backing and co-funding of the GIZ ProSolar project. While the project's market-transformation goals are too ambitious, the project is on a good track to contribute to the learning about the viability of small-scale privately-operated mini-grids in countries with strong centralised grid development. For this purpose, the RBF project is encouraged to continue doing an extra effort in aligning its activities with the larger mini-grid interventions of other donors in the country, to critically advise potential project developers on the inherent risks in the mini-grid business, to reconsider the 50 percent cap while striving for lean, flexible and cost-efficient processes, and to systematically document findings from the different steps in project implementation for the wider energy access community.

[84] APP (2017), p.43ff

Kenya	Building sustainable and affordable credit lines for small solar systems in rural areas

Small solar products become increasingly versatile and thereby help people in off-grid rural Africa to climb "Africa's energy ladder".[85] After the rural poor adopted small solar lanterns, they now upgrade to slightly larger picoPV systems with multiple functions and services. The picoPV RBF in Kenya aims to support the uptake of these products in rural markets. The RBF specifically addresses the relatively high upfront costs of solar product by incentivizing Lending Agents (i.e. solar companies, financial institutions or intermediaries) nationwide to offer affordable and flexible credit schemes for these products. The incentives are defined as a percentage of a product's credit value. The initial plan to have incentive levels competititively determined by market participants in reverse auctions had to be revised. Instead, geographically differentiated incentives that are uniform across Lending Agents were determined using, among others, part of the incentives levels proposed by applicants.

The project has received the first round of claims for credit-based sales accruing over the course of the year 2016 from twelve Lending Agents, among them five Financing Institutions (FI), six solar distributors and one NGO. The verification process of these claims was underway at the time of writing this report. Since baseline sales of Lending Agents are to be subtracted, it is already clear that in 2016 only one major solar distributor performed in line with the project targets and contributed clearly more than half the eligible RBF sales. Generally, the rural FI recipients showed little signs of doing extra efforts beyond their low-level solar credits already offered before joining the RBF project. It is expected by project stakeholders that commercial banks will get involved in the future and use their large networks to increase the uptake of FI loans for solar products. With the recent interest rate capping by the Central Bank, banks can become an example how an RBF serves as a game changer and step in to assume risks that otherwise would be prohibitive for market players. The major game changer, however, remains the technologically enforced pay-as-you-go devices. In combination with innovative risk assessment approaches, solar companies can bring their strength to bear in terms of their familiarity with the relevant market, product design, and marketing – without having to rely on FIs.

While the initial performance of the quasi-financial fund manager, the Micro-Enterprises Support Programme Trust (MESPT), was unsatisfactory, there are signs that MESPT has improved and is pro-actively taking up the challenge. More generally, MESPT has the potential to become a showcase for projects involving similar fund management structures and to contribute to the desired market-driven transformation in the small-scale renewable energy financing sector.

A transformation towards a market-driven, wider and sustainable adoption of small-solar systems seems to take place such that one of the project's future challenges will be to guarantee that RBF incentives continue to add value, e.g. by focusing its attention on harder-to-reach areas.

Peru	Getting to Zero Energy Poverty: Closing gaps in access to thermal energy in Peru

This project has two components: (1) Solar Water Heaters and (2) Improved Cookstoves.

Component 1: Solar Water heaters

The intervention "Market Acceleration for Solar Water Heaters in Peru" is implemented by the financial institution *Caja Arequipa* together with GIZ/Energising Development (EnDev) Peru. It is expected to run for a period of four years.

The solar water heater (SWH) component seeks to develop a sustainable market for SWH in Peru and increase access to (clean) energy, especially for people in rural areas. Broader learning objectives include, among others, knowledge gains about how to best upscale local markets and build a rural market for a relatively expensive technology.

The intervention offers an RBF package of three different per-unit incentives: sales incentives to SWH retailers, credit incentives to microfinance institutions (MFIs), and incentives for good functioning of installed SWH to retailers. The sophisticated incentive design efficiently balances multiple challenges in market transformation and its geographic signalling towards rural market works.

The implementation structure functions well. EnDev conducted an RBF pilot project for SWH, which successfully tested the general setup as well as the incentive scheme. This experience has demonstrated, at an early stage, the suitability of certain key elements of the planned setup. Consequently, the proposed design of the full RBF only had to be adjusted in a few dimensions ex post. The financial institution (implementing actor) was changed; the verification process has been regionally divided for coverage through two external agents; and the RBF package

[85] Africa Progress Panel (2017), p.25

shifted more weight towards sales and credit incentives. The identification and contracting process for the financial institution was complex and led to a one-year delay in project inception. In contrast, the selection of RBF recipients and the verification process have by and large run smoothly. The support framework by the national government included few specific references to SWH until end of 2016, but all possible efforts have been made by EnDev to engage with public policy stakeholders.

A total of 15 SWH retailers and five MFIs from different regions have been selected for the intervention so far. A small number of 'first movers' account for a large share of RBF uptake. This is related to the firms' varying level of preparedness for the RBF, in particular in terms of business capacity and pre-RBF efforts of entering rural markets. The retailers were more uniform regarding the existence of relationships with international SWH manufactures and (lack of) consumer finance solutions.

The MFI sector was from beginning on much better positioned in rural areas, but still lacks experience with the SWH technology and its retailers, which explains the slow RBF uptake by MFIs. Larger FIs had a similar lack of technological expertise, much less rural presence than MFIs and showed generally little interest in taking the role of the implementing actor.

At the user level, it is inherently difficult to specifically target poor and vulnerable groups, given the high price of the chosen technology. However, EnDev takes some initiatives to reach the poor (e.g. using national service centres as showroom for retailers in remote areas). Productive users account for 10% of all sales and may potentially reap substantial economic benefits from the technology, as shown by a case study on a milk producer in rural Arequipa.

Improvements in SWH access exhibit sharp regional disparities. The Puno region leads with more than half of all sales, followed by the Arequipa region. There has been almost no activity yet in the Northern region around Cajamarca. These results are explained by the fact that Arequipa and Puno differ in characteristics and accessibility of rural markets, whereas in the Cajamarca region, the incentivised vacuum-tube SWH still have a weak market position relative to flat-plate models.

Market barriers are slowly being reduced. After only eight months, it is not surprising that market expansion into rural areas is still tentative for most retailers, and that cost obstacles remain high. However, at least the first movers have actively begun to identify distributors and seek cooperation with MFIs, although actual effects will only become visible once these collaborations are fully in place. For other retailers, these attempts are still scattered and will need more time to be integrated into a coherent business strategy for rural markets. Regarding consumer finance, there has not been much progress yet except from the only MFI already participating in the pilot RBF.

The original market transformation hypothesis has been enhanced. While it initially emphasised the high costs of strengthening sales and lending channels, different knowledge barriers (e.g. about potential distribution partners, sales channels and potential market returns in rural areas) matter more than expected. The project pursues a double strategy to reduce these knowledge barriers through technical advisory on the one hand, and financial incentives that act as a temporary risk mitigation mechanisms for learning about markets on the other.

The intervention provides learning experiences for its RBF recipients, as well as for EnDev about the RBF approach in general. Some of the key lessons include:

- The broad regional variation in market characteristics can serve to 'test' the same RBF instrument in different settings within the same country.
- The donor requirement of contracting financial institution was difficult to comply with and has created some inefficiency in project implementation.
- MFIs may become an effective instrument for addressing two key concerns of retailers: to improve consumer finance for the rural poor and act as distribution channels in rural areas.
- The level of preparedness for the RBF varies substantially across RBF recipients; additional technical advisory is needed to initiate market entry of still inactive retailers and MFIs.
- Retailers understand that rural markets can be cost-effectively tapped through external agents with a strong rural base (e.g. distributors, MFIs, cooperatives).

Finally, the analysis has led to a set of recommendations for the current RBF and similar projects in the future (based on the evidence collected and lessons learnt), such as:

- Pay attention to local variation in the market context and to financial sector constraints in the initial context analysis.
- Connect RBF recipients with distribution channels and business partners.
- For SWH markets in the North, support RBF recipients with advisory to develop market entry strategies and sustainable distribution models; consider including heat-pipe models in the RBF.
- Introduce regional variation in RBF incentives starting in phase 2.
- Foster the productive use of SWH and its external visibility.

Component 2: Improved Cookstoves

The intervention "Innovation and Development Fund for Portable Cooking Stoves (FIDECOP)" is implemented by the NGO *Soluciones Prácticas.* It was initially approved for an implementation period of two years until end of 2016 and has recently been extended until June 2017.

FIDECOP seeks to boost the market value chain of firewood portable improved cooking stoves (FPICS) through innovation, production and sales. This objective is achieved through three major activities: an innovation and development (I&D) contest for FPICS, enhancement of the commercial capacities of stove producers, and promotion of FPICS sales. As a broader learning objective, besides demonstrating the effectiveness of the approach, the intervention aims to show that profitable business opportunities for FPICS exist, which justify investments in product innovation and the market more generally.

The intervention offers a comprehensive RBF package of incentives along the entire value chain. Five different financial incentives are provided for product innovation and certification, business development, production and sales. Implementation has recently progressed to the last phase (sales).

The implementation structure is adequate and largely efficient. The implementing organisation and fund manager, *Soluciones Prácticas*, benefits from its experience in innovation for development, with renewable energies and the private sector. For FIDECOP it has gradually reduced its initial emphasis on technical support and now relies stronger on market mechanisms in the spirit of RBF. The intervention does not require any financial institution as fund manager or implementer, and the verification process is efficiently divided between internal staff and an external agent. Relevant local stakeholders have been involved in all RBF phases (except for the lack of direct government support to the innovation contest), and EnDev actively seeks cooperation with national ministries to promote FPICS in social programmes and the national support framework more generally.

By creating and introducing a new technology virtually from the ground up, the RBF started on the basis of an unusually early stage of market development. As a consequence, implementers have encountered firms with low business capacity and market experience, which has required them to provide substantial guidance and capacity building to RBF recipients. The stakeholders also accepted that the success of this highly innovative but non-standard RBF approach would be uncertain. These uncertainties have largely been resolved.

FIDECOP has clearly achieved its learning objectives and most of its intended results for product, business and market development. It has shown that profitable market opportunities for FPICS products exist and that these can generate high returns to investment in innovation. RBF for I&D has proved an effective approach to overcome barriers to innovation by facilitating learning experiences for entrepreneurs in the market. The intervention has created awareness of the FPICS technology among RBF recipients (about its market potential), end user beneficiaries (about product benefits) and the public sector (e.g. inclusion of FPICS in social programmes).

The RBF has substantially accelerated existing innovation processes of a selected group of well-prepared entrepreneurs, although it failed to induce innovation activities among the majority of stove producers with low business capacity in the country. Similarly, participation in the sales phase has remained limited to the winners of the contest. Nevertheless FIDECOP has managed to introduce (and start establishing) a new ICS technology in the market in an efficient manner, with an overall budget of less than 1 million €. The seven winners of the contest have developed new portable stoves, with considerably higher quality than many existing models of (fixed) ICS.

Limited business capacity has been a major hurdle to widening the participation of stove producers and even affected some of the selected RBF recipients. Fortunately, RBF recipients have visibly enhanced their capacities for innovation, business planning and production as a result of business development incentives and TA. The key remaining challenge is to build sales capacity among entrepreneurs, particularly in terms of target market identification and setting up new distribution channels. RBF recipients are only tentatively starting to leave their core markets, get to rural clients directly and expand to new regions. Progress in these directions is uneven across RBF recipients. While some still lag behind, others have clear strategic visions and adequate capacities to implement them. These first movers provide good practices on marketing strategies and distribution channels.

One particularity in Peru is the presence of national social programmes with ICS components that serve the poorest districts and families. While the free provision of ICS by the government constitutes price distortions in the poorest market segments, it also opens up new market opportunities from reaching these end users through wholesales to social programmes. FIDECOP entrepreneurs, by focusing on the moderately poor, exhibit a high degree of complementarity with social programmes targeted to the extremely poor. EnDev actively promotes the inclusion of FPICS in social programmes. The first public tender of FPICS by Peru's national school feeding programme has been recently launched.

The intervention provides a rich set of learning experiences for its RBF recipients, as well as for EnDev about the RBF approach in general. Some of the key lessons include:

- RBF incentives have been crucial in mitigating innovation and market risks, and their impacts have been

amplified through capacity enhancement for stove producers.
- The success of RBF for I&D depends on a set of initial market conditions that are largely satisfied in Peru but potentially not in other RBF countries.
- Firms can be directly incentivised to invest in capacity building, but the success of these measures depends on how they are delivered
- Market barriers further downstream the value chain turned out more restrictive than expected.
- The demand structure for FPICS is fragmented, requires differentiated business strategies and thus complicates market positioning for entrepreneurs.

Finally, the analysis had led to a set of recommendations for similar RBF approaches, based on the evidence collected and lessons learnt:

- Thoroughly identify market barriers and capacity constraints in the baseline study, as well as their implications for contest and RBF design;
- Allow enough time for capacity building among entrepreneurs prior to the innovation stage, potentially with support of EnDev;
- Keep the conditions of the innovation contest as flexible as possible to ensure high participation;
- Connect RBF recipients with national distribution channels and international partners;
- Continue to foster the adoption of FPICS technologies by social programmes and public clients;
- Disseminate lessons from FIDECOP among government stakeholders to improve the national support framework.

Round 3 RBF projects

Kenya, Uganda, Tanzania	Biogas Business Boost Benefitting Farmers (4B-F)

Overall it can be expected that the objective of the project to foster supply and demand of bio-digesters in Kenya, Tanzania and Uganda through the provision of loan incentives to Micro Finance Institutions (MFI) and to biogas construction enterprises (BCE) will be achieved to some extent.

4 B-F can be considered as a pilot RBF project in an emerging market setting. The project actually managed to create the Quality Plant Incentive (QPI) for biogas construction companies to install functional, high-quality digesters with an efficient after-sales-service and a Credit Sanctioning Incentive (CSI) where MFIs or SACCOs provide their clients with biogas loans that render the high (up-front) investment cost of a bio-digester affordable for famers (market transformation hypothesis). In hindsight, the project is increasingly successful in linking the construction of biogas plants with a functioning after-sales-service. The biogas construction companies are more and more understanding that a good after-sales-service is helpful for market penetration and allows them to attract new customers. On the financing side, the project so far has not succeeded in attracting a lot of MFIs to actively participate in the programme. With the new hub approach that was started in 2016, the project team tries to bring supply and demand together. SACCOs are becoming aware of the new finance product and are starting to sell biogas loans to their customers. So far, the contribution of the project to provide an opportunity to money lending companies to increase their disbursement of loans and/or lower interest rates is somewhat limited. As the project links a quality assurance system to the incentives paid out to the biodigester construction enterprises, the first findings indicate that this approach leads to a higher functionality of bio-digesters (learning objective).

Further implementation experience will tell to what extent the learning objective will be achieved, in particular how private companies will adapt to the yearly decreasing incentive levels, while trying to increase their construction rates. It will also tell in how far the cross-border knowledge-exchange at regional level will lead to uptake of better technologies, their replication and expansion to other potential applications.

So far, project outputs are still below expectations and a more realistic output planning is needed for the reminder of the implementation period. It can be hoped that with the new hub approach, output levels are accelerating until the end of the RBF implementation period. The existing (old) resource-intensive paper-based independent verification process is in the process of being replaced by a new App-based process which will allow the National Implementing Agencies to interact directly with the customer service centre as well as the RBF recipients and thus to shorten the lengthy verification procedure.

At this stage a main recommendation is to continue to optimise the internal flow of communication to avoid delays and potentially double-work. A new institutional set-up should be discussed and eventually put in place giving more autonomy to the National Implementing Agencies and thereby further discharging the workload of the African Biogas Partnership Programme headquarters in Nairobi. The project team should also systematically analyse all opportunities for an enhanced efficiency of the Credit Sanctioning Incentive. It should be investigated why Banks and larger financial institutions are showing no interest in the CSI and why no more SACCOs are participating in the scheme. The results should be the basis for a revised CSI design, which should thereafter be

piloted.	
Cambodia, Vietnam, Laos	Market Acceleration of Advanced Clean Cookstoves in the Greater Mekong Sub-region[86]

In all three countries, cooking with fuel wood on basic stoves is common. While in Vietnam a three-bar stove is considered the baseline in the relevant tiers of the population, most people in Cambodia operate with improved cookstoves (with the Traditional Lao stove), and with stove stacking.

The Stove Auction regional proposal intends to expand end-users' access of improved cookstoves on the higher tier levels (also known as Advanced Biomass Cookstoves) that are significantly cleaner and more fuel efficient than biomass stove alternatives. It uses a Results-based Financing (RBF) Scheme that aims to increase private sector participation in the fledging market for this stove type.

The project has defined contextualised performance criteria stoves need to pass to be eligible for participation in the programme.

By the end of 2016, the stove auctions in Cambodia and Vietnam were in full operation, testing different auction designs. Both are designed to have market participants of the supply and demand side dynamically determine RBF levels that are required to stimulate market participation from different actors.

In Cambodia, all implementation partners have been selected successfully, 4 manufacturers are supplying stoves to the auction, and 10 local distributors are registered for retailing of stoves to end-consumers, with additional manufacturers and distributors being brought to the programme on a continuous basis. Auctions have been conducted since March 2016, initially in a pilot format by SNV itself, and since October 2016 by an implementing agent (FI in EnDev terminology), C-Quest Capital LLC, who is managing the day-to-day operations of the Stove Auction. Two incentive payments are provided: The manufacturers/importers/sellers receive a guaranteed price for their stove products consigned to the auction mechanism, made up of the payments from the retailers who participate in the auction as buyers, and the RBF incentive covering the difference between Guarantee Price and auction price, if the auction price is less than the Guarantee Price. The distributors can claim an incentive for independently verified stove sales, depending on stove type retailed, as well as a bonus incentive for end-user training provided. The auction trading platform is set-up as a business model in which stove sellers and buyers pay a fee for their participation, with the goal that a sustainable structure / market platform remains after the project ends.

In Vietnam, the auction is managed directly by SNV. Partners for the Independent Verification have been found in the form of the Vietnamese Women's Union, and RBF recipients in the form of local stove manufacturers are participating in the auction. Auctions have been conducted on a weekly basis since July 2016. The RBF incentive consists of a premium for the stove producer per independently verified stove sale. Its height is determined at the SNV-Vietnam -based auction platform where "Options for RBF incentive" are tendered (as opposed to Cambodia, where physical stove products are auctioned). After the auction, manufacturers can prove the sale and claim the incentive within a predefined time interval during which the RBF options are valid before they expire.

The two applications of the RBF tool, in the form of auction mechanisms, thus differ significantly. Implementation has progressed further in Cambodia than in Vietnam. Both teams are continuously involved in improving project development and implementation design to dynamically adapt to market challenges, and both auctions need to become more competitive, for example through a higher number of regular participants. An important difference consists in the type of RBF recipients: In Cambodia, the stove importers are internationally operating manufacturers with tested models, and they as well as the local distributors are used to collaborating with international aid mechanisms. In Vietnam, the project tries to strengthen local stove manufacturers and distributors, which requires that the team not only focusses on the market development aspects of the auction, but also needs to deliver technical assistance regarding stove design, and some of the participants suffer from delays due to technical development and certification needs.

In a number of respects, the RBF design is highly appropriate to overcome some of the typical barriers to market transformation. In particular, it provides clear signalling to the producers and distributors, as well as market-based mechanisms for developing their respective corporate strategies. This includes the signal that there is a now local market in both countries for a technology that previously was virtually unknown there. On the other hand, so far, the typical barriers to market growth have not yet been overcome: Rapid growth of the market is hampered by the

[86] Project developments until end of 2016 have been considered for this review. As the approach for Laos was still under discussion during this period, the field visit and most of this review relate to the Cambodia and Vietnam implementation only.

lack of working capital for distributors, and the reluctance of the traditional supply chain for stoves or kitchenware to sell advanced stoves. The IVA process in Cambodia is paying significant attention to how the households use the stoves. It is recommended to separate user surveys from incentive verification, as is done in most other projects, in order to arrive at more representative surveys (if needed) and implement more efficient and targeted verification.	
Bangladesh, Kenya, Tanzania, Uganda, Rwanda	Accelerating the uptake of off-grid solar technologies with RBF
Bangladesh is a leading off-grid electricity market with over five million Solar Home System (SHS) units sold to date. This electricity, however, is often merely used to power lighting devices, with other appliances often requiring too much power for the small systems. The international NGO CLASP seeks to tap into this segment via the off-grid RBF project, which has been launched in Bangladesh and which is likely to be expanded to countries in Eastern Africa in a next project phase. Companies eligible to participate in the RBF should either be manufacturers selected as finalists of the Global Lighting and Energy Access Partnership (LEAP) Awards on off-grid appliance excellence or solar retailers that get engaged with these manufacturers. In the first RBF round in Bangladesh, finalists of the 2013-14 Award (manufacturers) and Partner Organisations (POs) of the solar energy access intervention IDCOL. Incentives are paid in three tranches: the first two are paid to the appliance manufacturers upon verification that products were purchased by, and delivered to the off-grid solar retailers, whereas the latter receive the third tranche upon verification that the products have been bought by end users. The project design has been fine-tuned in an extensive inception phase, which provided a good basis for the ensuing implementation phase whereas stakeholder consultation was deficient, which created some unawareness of the IDCOL POs market challenges and their level of business sophistication. The design included a number of features innovative for the RBFF and, in principle, appropriate for a market-driven development of the targeted off-grid appliance sector. However, the first round experienced a very slow uptake of products. At the time of the Mid-term Evaluation in early 2017, i.e. one year after its start, merely five percent of its target sales and 0.5 percent of the overall target sales have been achieved. While the project expects to sell mostly to households without any electricity source, it is likely that a non-negligible share of end users of these early sales have already owned an SHS and partly even a TV. It seems premature to say whether this slow progress is due to an inappropriate incentive design, to the solar retailers, manufacturers and products eligible in the first RBF round or rather to other factors not related to the project design. These mainly include strong headwinds experienced by POs in their core SHS market due to competition from open-market retailers, from governmental programmes on electricity grid extension and free SHS distribution, as well as market saturation. In any case, it seems recommended to thoroughly examine this question as part of the inception phase for the upcoming second RBF round. Part of the encountered problems may, for example, be avoided for that round if the finalists of the most recent Global LEAP Awards 2016-17 will also be eligible.	

8.2 Annex 2: Clusters

According to the Inception Report and Concept Note for this evaluation, it was expected that looking at projects in smaller groups ("cluster") would provide deeper level insights. While initially the idea was to look at technology-specific clusters, it became clear that there are additional suitable criteria for classifying projects that might lead to valuable insights for continued project implementation and future design-related decisions. One reason for reconsidering the clusters was that some of the originally envisaged clusters would have been very small. Clusters should have a minimum size so that the comparison within and between clusters is meaningful.

In the following, a number of clusters are introduced that are not including all projects of the portfolio. The clusters are intuitively clear, or have been identified during the work on the MTE. Therefore, the cluster-specific analyses were typically integrated in the respective chapters and discussions in the main body, in some cases even implicitly, for example for the clusters "Round 1, 2, 3" or for the technology-specific clusters. The following discussion serves as a summary of the clusters that have been used within this evaluation and the results of these analyses are integrated in the respective chapters of this report that deal with the respective questions.

In order keep the report volume at an acceptable level, cross-referencing rather than repetition of tables and reference to the chapters of the main body is used wherever possible.

The Concept Note reviewed the option of defining these groups by using the so-called qualitative comparative analysis approach (QCA). While this remains a sound approach, it was found that the effort necessary to provide the data basis would have been high and it is very likely that the result would be very similar to the more intuitive clusters that are proposed in the following. If by the final evaluation, the added value of this – very demanding – technique becomes clearer; it can still be taken into consideration.

8.2.1 Clustering by competitive calls (Rounds 1, 2, 3)

Cluster characteristics

The Rounds with a detailed overview of all RBF projects have been differentiated in the portfolio overview (cf. Chapter 3.1, Table 1 and Table 2). The projects have low within-group variation and strong between-group variation with respect to:

- Start of the project implementation,
- Implementation progress,
- Other criteria expressed in (cf. Chapter 3.1, Table 2) including multi-country vs. single country implementation,
- Mix of Implementing Organisations,
- Incentive structures (Round 1: mainly sales incentives, Round 2: often micro finance, Round 3: unconventional schemes).

They have strong within-group variation with respect to

- Technologies,
- Countries,
- Project size.

Utility for decision making and potential learning

This clustering is used almost on a daily basis in the operations of the EnDev. It can also provide an underlying structure for many of the other clusters.

Clustering can help to detect to what extent common denominators for project design can have an impact on relevance, effectiveness, efficiency and impact (Round 1: absolute openness with respect to technologies and implementation approaches; Round 2: filling the gaps to complement the strategic orientation of RBF; Round 3: innovative approaches with multi-country ambitions).

So far, it can be stated that, more than anything else, the individual tailoring of RBF projects matters. Overarching cross-project ideas for RBF project design do not really matter. RBF remains a market-based approach; blueprints of whatsoever kind (with respect to technology, regional aspects or project size) do not exit.

8.2.2 Clustering by implementing organisation and level of integration in EnDev programme

Cluster characteristics

GIZ is the main implementer of the EnDev initiatives and operates the EnDev country offices which are often also the implementers or the RBF projects. In some cases, e.g. Rwanda, GIZ implements under EnDev non-RBF and RBF projects on the same technology, in this case mini-grids. Therefore, the embeddedness varies between projects implemented through the GIZ-EnDev structures and others.

Another dimension of the "embeddedness" is the question who is in charge of the fund management, whether the project implementer or a third party. The corresponding clusters are reflected in Chapter 3.1 (cf. Table 9**Fehler! Verweisquelle konnte nicht gefunden werden.**).

Overall, five implementing organisations are active with budget responsibility in the EnDev RBF Facility are presented in Chapter 3.1 (cf. Table 5 or Table 6). Two organisations (CLASP and Hivos) are implementing only one project each. It is possible to aggregate these into one cluster, or even collapse them together with Practical Action into a joint cluster of smaller agencies. The biggest agency is GIZ with ten projects. SNV implements four projects.

They have low within-group variation and strong between-group variation with respect to:

- Age/Rounds (cf. Chapter 3.1, Table 6),
- Technology (cf. Chapter 3.1, Table 7), and
- Integration in EnDev portfolio (GIZ projects are well embedded, others not).

They have strong within-group variation with respect to countries (cf. Chapter 3.1, Table 8).

Utility for decision making and potential learning

For these clusters, it is hard to formulate expectations on the within-group and between-group variation. Interesting dimensions for analysis are the efficiency of fund management, the incidence if any of mismanagement and the sustainability of the market development or the mechanism (e.g. in the case of the stove auction).

As discussed in Chapter 6.1.1, it is the implementation organisation that matters. Relevance, effectiveness, impact and sustainability positively correlate with the (i) specific technical knowledge available at the level of the implementing organisation; (ii) previous market exposure and experience of key staff involved; (iii) the level of transparency with respect to decision making procedures at the level

of the implementing organisation; and (iv) the amount of management resources and leverage with other programmes ensured through the involved implementing organisation.

8.2.3 Clustering by technology

Cluster characteristics

Technology clusters have been discussed in the Inception and Baseline Reports of the evaluation project. They are not as straightforward as they seem, as e.g. a "solar" cluster might include technologies as diverse as task lights, water pumps, street-lights or mini-grids. In fact, Chapter 4 and 5 of this report cover the different technology clusters when looking at the direct and indirect effects of RBF.

Utility for decision making and potential learning

Technologies imply different user groups, different purchasing rationales including but not limited to different uses and energy services, and different levels of commitment of the purchaser to the project. For the current report, four simple clusters have been formed (biogas, mini-grids, ICS and solar products including solar water pumps and appliances). Table 10 and Table 11 give information about the size of the clusters. Cluster should provide insights with respect to common features of sub-sectors. Common features - such as suitability of the mini-grid technology for the RBF approach - are discussed in Chapters 4 and 5. The findings indicate e.g. that mini-grid projects were not able to prove additionality to the existing or ongoing activities in the countries. This does not deny that the projects achieved some results, including through Technical Assistance (TA) that they were offering to the other projects, but it certainly affected their effectiveness and efficiency.

8.2.4 Clustering by recipients or results (including retail technologies vs. non-retail technologies)

Cluster characteristics

Several clusters can be formed with respect to the incentive structures, as highlighted in Chapter 5.2.2. One such type of cluster is based on the recipient of the incentives. Typical recipient types are the distributors, the importers, the manufacturers, the suppliers and the microfinancing institutions. As projects can incentivise more than one group of recipients, they can belong to more than one category.

A somewhat coarser clustering with respect to the technologies can be framed by simply differentiating between retail and non-retail technologies. This will then require a closer definition and split up of some of the existing clusters. For example, to the degree that the Peru projects provide incentives for institutional cookstoves, or the Benin project for solar street lights.

A closely related clustering would be according to the results that are incentivised (cf. Chapter 5.2.2, Table 21). Typically, such results are the sale of a technology, the provision of a loan or the importation.

The within-group variation will be smaller than for technology clusters with respect to

- The value chain,
- The user group and participating stakeholders,
- The affordability and financing challenges,
- The relevance of the policy environment,
- The role and type of product quality standards and assurance,
- The relevance, role and type of after-sales services and warranties.

It will be bigger with respect to

- The technology, and
- The energy service (cooking, lighting, pumped water).

Overall the clusters will be bigger as there are only two clusters of around six to 12 projects.

Utility for decision making and potential learning

Clusters will provide insights into the barrier removal effectiveness and market building effect of RBF. The utility for decision making is mainly discussed under the Chapter 5.2. More than anything else, the focus should be on the main bottlenecks for market development with respect to retail and non-retail technologies. The last-mile-problem remains the single most important challenge for market transformation; retail-related challenges (and suitable incentives) can be compared to non-retail-related incentives (with respect to the efficiency and leverage of incentives).

Within-group diversity is expected to be comparatively low with respect to the mechanisms and incentive structure, which increases the value of this clustering for understanding incentive mechanics. On the other hand, understanding the impact of incentive combinations in this cluster will be limited. Within-group diversity will be significant with respect to technologies, but this is helping this cluster to deliver valuable generalizable results.

8.2.5 Clustering with respect to their relationship with the larger market framework

Cluster characteristics

This evaluation has also created a grouping with respect to the interaction that projects have with their market and policy framework. In Chapter 5.1.1, four groups were postulated and discussed:

- Projects that are completely embedded in government programmes (Vietnam biogas);
- Projects that are cooperating with existing TA programmes;
- Projects that compete with financing (e.g. World Bank) programmes, RBF/projects and other programmes e.g. of financial assistance;
- Projects that are “the only game in town”.

Utility for decision making and potential learning

This is a clustering that might need some refinement but helps to understand the preconditions for RBF to be successful, such as (i) the embeddedness of RBF in national programmes, (ii) the cooperation with other TA (donor) programmes and (iii) the compatibility with other financial assistance programmes. Comparing projects within and between these clusters will help develop better projects in the future, even if within-group variation on many aspects will be very high.

8.2.6 Clustering by incentive level finding mechanism

Cluster characteristics

The call for proposal already identified three ways for defining the "correct" level of the incentive, as described in Chapter 5.2.4:

- A "price finding phase",
- Auctions and tenders and
- An estimate of the viability gap.

It is assumed that these are providing different efficiency levels, but the time series so far were too short to quantitatively analyse this. It is highly recommended to conduct such an analysis in the terminal evaluation when more data will be available.

Utility for decision making and potential learning

This clustering can be very helpful in devising an appropriate incentive design and structure in specific market contexts. The findings on the "right" incentive level are presented in Chapter 5.2.5.

8.2.7 Cluster with respect to additionality

Cluster characteristics

Last but not least, this MTE has provided a first proposal to assess additionality. This can be found in Chapter 4.1.2. The three clusters that the evaluation has tried to distinguish are:

- Market development was already ongoing, and baseline sales were significantly different from zero.
- Market development was not noticeable, and after the project the sales were lifted to the level of the RBF sales for products of this quality.
- Market development was not noticeable, but is now significantly higher for product of this quality.

Utility for decision making and potential learning

This is a highly relevant clustering for understanding the various ways in which RBF can be used to influence its environment. However, as additionality is notoriously hard to define, this clustering would require some more analysis, some more definition and some hard criteria in order to clearly distinguish between the three groups and understand how and why to classify projects as one or the other.

While within-group variability will be rather high, this allows to more closely track the pathways to impact under given scenarios.

8.3 Annex 3: Additionality of picoPV projects

A comparison of the sales of the four picoPV projects in Table 27 displays that Kenya is one of the best-developed solar markets in Africa, with more than 1.7 million picoPV products sold over the last two years and yet no RBF sales, followed by Tanzania with close to 850,000 sales and Rwanda with 300,000 sales.

Overall the market penetration seems to be highest in Benin with 16% of the sales, followed by Tanzania with 3% of the total sales, followed by Rwanda with 2%. However, the first ranked, the Benin "market" is fluctuating strongly, and about 2/3 of the RBF results were not sold on the "market", so that the figures in this instance cannot be taken as a reflection of the influence of the RBF on market development. The stark contrast between the Eastern African projects highlights what RBF is able to do in different market settings. Tanzania ranks second with a market share of 3% although in Tanzania the number of total sales dropped dramatically from the first half of 2016 to the second half of 2016, probably due to uncertainty of the political environment. The third ranked market in Rwanda shows a juvenile market with steady improvements on the side of the RBF sales and Kenya ranks fourth with no sales so far.

Table 26: Comparison of total Lighting Africa sales and RBF supported-sales of the picoPV technology[87]

Country	Technology	LA Sales July- December 2015	LA Sales January - June 2016	LA Sales July - December 2016	Total LA Sales (July 2015 - December 2016)	RBF sales until 2016	% of RBF to the total LA Sales [1]
Kenya	Pico PV	472,612	561,604	666,881	1,701,097	0	0%
Benin	Pico PV	28,076	172,634	2,800	203,510	32,672	16%
Rwanda	Pico PV	84,724	129,779	89,161	303,664	4,907	2%
Tanzania	Pico PV	473,009	187,694	185,073	845,776	24,028	3%

Notes: Percentage of RBF sales until 2016 could only be compared with the total Lighting Africa (LA) sales between July 2015 and December 2016 as semi-annual data between January and June 2015 wasn't available.

The comparison of RBF sales to the total Lighting Africa (LA) certified sales in Rwanda and Tanzania proves that in Rwanda and in Tanzania RBF sales increased from 0% to 4% in Rwanda and from 1% to 5% in Tanzania by the end of the year 2016. The fact that the RBF project in Tanzania as a regional project was even able to increase its market share to 5% of the national market while at the same time the total Lighting Africa sales were decreasing, clearly proves that RBF is accelerating the Tanzanian Lake Zone market even though the absolute market is still at a low level. In Tanzania, it was estimated, that about 10,500 pico-solar applications are sold annually in the project's Lake Zone region.[88] No independent data are available for the Lake Zone. There are non-RBF-supported market activities ongoing but the larger players are part of the RBF and have confirmed that they came to the Lake Zone under the influence of the RBF project. Potentially, the project was also instrumental for product quality in the market through its support for the LA certification scheme.

[87] Global Off-Grid Solar Market Report. Semi-Annual Sales and Impact Data. 07/-12/2015, 01/-06/2016 and 07/-12/2016.
[88] Pg, 41. Project Evaluation – Draft. Mid-Term Evaluation. Evaluation of the RBFF within EnDev. RBF Rural Market Development of picoPV Solar in Tanzania. Table. 11.

Table 27: Comparison of RBF sales to the total of Lighting Africa-certified sales in the country[89]

Country	Technology	Total LA Sales (Both Certified and Non Certified) 2015 and 2016[1]	RBF Sales until 2016	% of RBF to Total LA Sales	LA Certified Sales 2015 and 2016[2]	% of RBF to LA certified Sales
Kenya	Pico PV	1,701,097	0	0%	874,415	0%
Benin	Pico PV	203,510	32,672	16%	N/A	N/A
Rwanda	Pico PV	303,664	4,907	2%	180,587	3%
Tanzania	Pico PV	845,776	24,028	3%	579,979	4%

(1) Total Lighting Africa Sales figures were tabulated for July 2015 to December 2016. The sales figures for January to June 2015 could not be included as they were not available.

(2) The Lighting Africa Sales for Certified Products were tabulated for July 2015 to June 2016. The Sales figures for the period July- December 2016 was not available.

[89] Global Off-Grid Solar Market Report. Semi-Annual Sales and Impact Data. July – December 2015, January-June 2016 and July-December 2016.

8.4 Annex 4: Calculation basis for Table 20

In order to increase the traceability of Table 20, we include its calculation basis here.

			Target			Achieved		
Round	Country	Technology	Incentive budget	Technologies deployed	Average	Disbursed incentive	Technologies deployed	Average
1	BEN	Pico-PV	€ 2,400,000	187,000	€ 12.65	€ 345,035	33,232	€ 10.38
		Solar Water Pumps		2,500				
		Solar Street Lights		262				
	RWA	pico-PV	€ 2,200,000	220,000	€ 10.00	€ 19,344	4,907	€ 3.94
		mini-grids	€ 1,071,000	3,750	€ 285.60	€ -	775	€ -
	TZA	pico-PV	€ 2,200,000	105,000	€ 20.95	€ 382,176	24,028	€ 15.91
	VNM	biogas	€ 2,750,000	55,000	€ 50.00	€ 1,262,475	31,276	€ 40.37
2	KEN	pico-PV	€ 2,062,950	120,000	€ 17.19	€ -	-	€ -
		mini-grids	€ 1,550,000	4,500	€ 344.44	€ -	-	€ -
		ICS	€ 1,522,000	100,000	€ 15.22	€ -	-	€ -
	PER	SWH	€ 1,490,000	26,000	€ 57.31	€ 216,893	296	€ 732.75
		ICS					-	€ -
3	KHM + VNM	ICS	€ 2,598,268	120,255	€ 21.61	€ 64,483	1,260	€ 51.18
	Africa	biogas	€ 2,911,915	21,490	€ 135.50	€ 18,158	779	€ 23.31
	BGL	off-grid	€ 2,925,700	540,000	€ 5.42	€ -	-	€ -

Comment: Rwanda und Kenya mini grids are calculated on the basis of connections.

8.5 Annex 5: List of evaluation questions

OECD DAC criterion	No	Evaluation question/judgement criterion
EQ 1	**Final RBF structure compared to business case assumptions**	
Relevance	1.1	Has the context and its suitability for the RBF approach been properly analysed and was this basis used for the design of the RBF?
Relevance	1.2	Did the RBFs collaborate and coordinate with the local stakeholders (policy makers, private sector, other local and international agencies, financial institutions)?
Relevance	1.3	Did the RBFs' activities and services complement the existing support framework for the target sectors in the country or was there (detrimental) competition?
Relevance	1.4	Did the intervention adjust to changes in the market environment and policy framework?
Relevance	1.5	To what extent have the envisaged implementation structures been suitable for the intervention?
Effectiveness	1.6	What was the final nature of the interventions and what factors influenced the design (incl. forms and types of subsidies)?
Effectiveness	1.7	What challenges were experienced in setting up final RBF structures aiming to support market transformation?
Efficiency	1.8	How was the incentive determined and to what effect (project level and comparative)?
Effectiveness	1.9	How do different mechanisms for determining the type and level of incentive compare with respect to effectiveness?
Impact	1.10	How and to what effect has the introduction of the RBF influenced the positioning or presence of other programmes in the country relevant to these sectors?
Impact	1.11	Have (potential) intended and unintended impacts been duly formulated with the design?
Impact	1.12	To what extent has impact monitoring been incorporated in the design of the projects?
Effectiveness	1.13	How did the level of incentives compare across the portfolio, including with respect to effectiveness?
EQ 2a	**Private sector response**	
Relevance	2a.1	Was the RBF design appropriate to overcome existing financial sector constraints for energy access?
Effectiveness	2a.2	What was the quantitative uptake of RBF incentives, by type of business (i.e. manufacturing, import, retail, service, financing)
Effectiveness	2a.3	How many private sector actors (i.e. equipment supply chain and financiers) benefitted from the RBF's services and subsidies, to what extent and to what effect?
Efficiency	2a.4	Was the level of incentive offered appropriate? Needed?
Efficiency	2a.5	To what extent was the financial sector prepared for and capable to launch and implement RBF?

OECD DAC criterion	No	Evaluation question/judgement criterion
Sustainability	2a.6	To what extent do market participants appear to be considering their investments/participation/change of business practices as long term commitments?
Sustainability	2a.7	To what extent do market participants, including financiers, ensure capacity enhancement required for long term involvement in RBF?
Impact	2a.8	To what extent does RBF decrease or increase the risk to private sector business to enter the field?
Impact	2a.9	Have competitors been hurt and if so how (say, inferior products losing market share)?
Impact	2a.10	To what extent have there been undesired effects (corruption, gaming)?
EQ 2b	**Consumer response**	
Effectiveness	2b.1	Has there been any change in demand for the subsidised clean energy products observed?
Impact	2b.2	Who are the main beneficiaries?
Impact	2b.3	In what way are vulnerable groups included?
EQ 3a	**Market changes through and post RBF**	
Relevance	3a.1	To what extent did the original market development hypothesis prove to be correct, and to what extent did it need to be adjusted during the implementation of the project?
Effectiveness	3a.2	To what extent have the identified market barriers been removed by the RBF?
EQ 3b	**Sustainability of product use by consumers**	
Effectiveness	3b.1	Has there been any change in demand for the subsidised clean energy products observed?
Impact	3b.2	How far has access improved due to the project compared to parallel other access improvements in the country?
Impact	3b.3	Have there been systemic changes (e.g. at the local/ regional/national government levels) regarding policies regarding clean energy?
Impact	3b.4	What have been the secondary development benefits of improved access to consumers? E.g. on climate change mitigation, economic development and gender?

8.6 Annex 6: Evaluation matrix (submitted in the Concept Note for this MTE)

	Relevance	*Effectiveness*	*Efficiency*	*Sustainability*	*Impact*
Evaluation questions	To what extent and how were RBF projects appropriate to support energy access through market transformation for low-carbon technologies?	To what extent and how did the approach lead to the targeted market transformation?	How efficient are the RBF approaches in delivering energy access?	To what extent can the changes induced by the RBF schemes for the private sector, the product range or the consumers be expected to last beyond the interventions?	To what extent have RBF interventions resulted in increased private sector activity for energy access, better energy access, and environmental and social improvements?
	Judgement criteria				
1) Final RBF structure compared to business case assumptions Hypothesis: It is possible to structure RBFs in the countries targeted within the approach and cost parameters set in the Business Case	***H: The chosen RBF structures are more relevant for energy market transformation in the respective country context than the original structures.***	***H: The chosen RBF structures are more effective for energy market transformation in the respective country context than the original proposal.***	***H: The chosen RBF structures are more efficient for energy market transformation in the respective country context than the original proposals.***	***H: The chosen RBF structures are more sustainable than other possible incentive designs.***	***H: With the design of RBF structures, potential impacts have been duly considered***
	Has the context and its suitability for the RBF approach been properly analysed and was this basis used for the design of the RBF?	What was the final nature of the interventions and what factors influenced the design? (incl. forms and types of subsidies)	How do (i) prices and (ii) total RBF cost per person/impact compare to international and national benchmarks?	Has the RBFF exit strategy addressed sustainability with measures and/or analysis which suggest that sustainability on market, firm and user level is probable?	How and to what effect has the introduction of the RBF influenced the positioning or presence of other programmes in the country relevant to these sectors?
	MTE-PR	**MTE-PR** **(FE-PR)**	**FE-PO**	**(IE)** **FE-PR**	**MTE** **FE-PR**
	Did the RBFs collaborate and coordinate with the local stakeholders (policy makers, private sector, other local and international agencies, financial institutions)?	What challenges were experienced in setting up final RBF structures aiming to support market transformation?	How was the incentive determined and to what effect? (project level and comparative)	How do different mechanisms for determining the type and level of incentive compare with respect to difficulties in phasing out the subsidies?	Have (potential) intended and unintended impacts been duly formulated with the design?
	MTE-PR **FE-PR**	**MTE-PR** **FE-PR**	**MTE-PR**	**FE-PO**	**MTE** **IE**
	Did the RBFs' activities and services complement the existing support framework for the target sectors in the country or was there (detrimental) competition?		How do different mechanisms for determining the type and level of incentive compare with respect to effectiveness (MTE and FE) and efficiency (FE)?		To what extent has impact monitoring been incorporated in the design of the projects?
	MTE-PR **FE-PR**		**(MTE-PO)** **FE-PO**		**MTE** **IE**

	Relevance	*Effectiveness*	*Efficiency*	*Sustainability*	*Impact*
1) Final RBF structure compared to business case assumptions (continued)	Did the intervention adjust to changes in the market environment and policy framework?				
	MTE-PR **FE-PR**				
	To what extent have the envisaged implementation structures been suitable for the intervention?				
	MTE-PR **FE-PR**				
2a) Private sector response Hypothesis: RBF ensures market acceleration and increase in product volumes coming to the market.	***H: The RBFs addressed barriers relevant for the private sector.***	***H. The RBFs effectively improved the viability of the private sector responses?***	***H: The support delivered by the RBFs was efficient in that it provided the right level of incentive to ensure efficient delivery of goods.***	***H: The improvements of the business environment are expected to last beyond the project lifetime.***	***H: The private sector delivery structure for energy access technologies has benefitted from the programme.***
	Did the RBF incentive address the relevant market barriers that the private sector facing before?	What was the quantitative uptake of RBF incentives, by type of business (i.e. manufacturing, import, retail, service, financing)	Was the level of incentive offered appropriate? Needed?	To what extent do market participants appear to be considering their investments/ participation/change of business practices as long term commitments?	To what extent does RBF decrease or increase the risk to private sector business to enter the field?
	IE **FE-PR**	**MTE-PR** **IE** **FE-PR**	**(MTE-PR)** **IE** **FE-PR**	**(MTE-PR)** **(IE)** **FE-PR**	**MTE-PR** **FE-PR**
	To what extent did new national and international private sector players/ businesses enter and invest in the market and why?	How many private sector actors (i.e. equipment supply chain and financiers) benefitted from the RBF's services and subsidies, to what extent and to what effect?	Did the private sector become more efficient in providing the subsidised goods or services that support their sales and usage?	To what extent do market participants, including financiers, ensure capacity enhancement required for long term involvement in RBF?	What has been the impact in terms of turnover and investment with the participating businesses (supply chain, financiers)?
	IE **FE-PR**	**MTE-PR** **IE** **FE-PR**	**IE** **(FE-PR)**	**(MTE-PR)** **(IE)** **FE-PR**	**IE** **(FE-PR)**
	Was the RBF design appropriate to overcome existing financial sector constraints for energy access?	Did the private sector actors, such as equipment supply chain and financiers, change their product and service offering and to what extent?	To what extent was the financial sector prepared for and capable to launch and implement RBF?		How many firms have invested in attempts to participate or perform and failed?
	MTR-PR **FE-PR**	**IE**	**MTR-PR** **FE-PR**		**FE-PR**
		Were participating firms better able to raise additional capital?			Have competitors been hurt and if so how (say, inferior products losing market share)?
		IE **(FE-PR)**			**MTEPR** **FE-PR**

	Relevance	*Effectiveness*	*Efficiency*	*Sustainability*	*Impact*
2a) Private sector response (continued)		Did participating players increase their volumes, efficiencies, sales channel set-ups, marketing measures or profit margins?			How many of the participating firms are female headed?
		IE **(FE-PR)**			**IE**
					To what extent have there been undesired effects (corruption, gaming)?
					MTE-PR **FE-PR**
					What has been the number of jobs created (disaggregated by gender)?
					IE
					To what extent have successful financing schemes been replicated by the financial sector?
					FE-PR
2b) Consumer response Hypothesis: RBF supports increased acceptance and uptake of decentralised low carbon energy products and services by targeted consumers (poor and rural populations/women/ children)	***H: Energy access is seen as attractive by the targeted consumers.***	***H: Demand for decentralised low carbon energy products has increased.***		***H: Access, the associated technologies and the associated services will be provided after the project has ended.***	***H: Energy access is improved for the targeted groups (poor and vulnerable tiers of the population).***
	What are the views regarding the affordability/ desirability/use of off-grid clean energy products (i) at large and (ii) supported by project?	Has there been any change in demand for the subsidised clean energy products observed?		To what extent do consumers see this purchase as a long term transition, or as a short term solution? Will users be able and willing to afford (i) future service/replacement of products after the end of their life-span or even (ii) increase in service quality over time?	Who are the main beneficiaries?
	IE **FE-PR**	**MTE-PR** **IE** **FE-PR**		**IE** **FE-PR**	**MTE-PR** **IE** **FE-PR**
					In what way are vulnerable groups included?
					(MTE-PR) **IE** **(FE-PR)**

	Relevance	*Effectiveness*	*Efficiency*	*Sustainability*	*Impact*
3a) Market changes through and post RBF Hypothesis: RBF results in cost reductions for clean energy products and services via efficiency improvements in production or distribution, economies of scale or increased customer awareness	***H: The chosen RBF structures are relevant for energy market transformation in the respective country context.***	***H: The chosen RBF structures are effective for energy market transformation in the respective country context.***	***H: The chosen RBF structures are efficient for the for energy market transformation in the respective country context.***	***H: The chosen RBF structures have exit strategies and are not creating over-subsidised situations.***	***H: The chosen RBF structures have had impacts beyond market transformation.***
	To what extent did the original market development hypothesis prove to be correct, and to what extent did it need to be adjusted during the implementation of the project?	To what extent have the identified market barriers been removed by the RBF?	Has there been a reduction in unit costs? (Movement along the cost curve)	Do private sector agents operate, or are they likely to operate, at the same or elevated levels after a reduction or the end of the subsidies?	Have there been market distortions (increased sale of low quality products, over subsidisation)? Or have higher standards squeezed out lower quality (and cost) products?
	(MTE-PR) IE FE-PR	**(MTE-PR) IE FE-PR**	**(IE) FE-PR**	**IE FE-PR**	**(IE) FE-PR**
			Is there evidence of increased market maturity in terms of features like increased seg-mentation and specialisation, wider uptake and saturation in any sub-markets?	To what extent has the portfolio in renewable energy financing increased at FI level?	
			FE-PR	**IE FE-PR**	
3b) Sustainability of product use by consumers Hypothesis: Through cost reductions and increased awareness achieved through RBF market viability is ensured in the long-run after following the withdrawal of subsidies after year 4	***H: The products are needed / relevant in daily life.***	***H: Increased demand will be maintained over time.***	***H: The chosen RBF approach was a cost effective approach to ensure sustainable and long-term product use by consumers.***	***H: Market demand was stimulated sustainably.***	***H: Energy access is improved for the targeted groups (poor and vulnerable tiers of the population) in the long term.***
	How are the subsidised clean energy products being used?	Has there been any change in demand for the subsidised clean energy products observed?	Could market sustainability have been more efficiently targeted through the RBF?	What is the ongoing use of purchased products after the initial period?	How far has access improved due to the project compared to parallel other access improvements in the country?
	IE	**MTE-PR FE-PR**	**FE-PR**	**IE**	**(MTE-PR) IE FE-PR**
	Is there evidence that the market uptake and consumer awareness has grown faster to a sustainable market level with RBF?	What is the outlook for market viability?		Has increasing interest among consumers in non-project regions been observed?	Have there been systemic changes (e.g. at the local/ regional/national government levels) regarding policies regarding clean energy?
	IE FE-PR	**FE-PR**		**IE**	**MTE-PR (IE) FE-PR**

	Relevance	*Effectiveness*	*Efficiency*	*Sustainability*	*Impact*
3b) Sustainability of product use by consumers (continued)					What have been the secondary development benefits of improved access to consumers? E.g. on climate change mitigation, Economic development and gender?
					(MTE-PR) **IE** **FE-PR**
					How enduring are these?
					FE-PR
					What other direct/indirect (economic and other) benefits resulting from the availability of affordable energy (say, rural markets improved via Information and Communications Technology-based daily price information, or new/better Small and Medium Enterprises (SME) due to energy access) have been observed?
					IE **FE-PR**
					Is it likely that the impacts can be sustained over time?
					IE

Note: The acronyms under each judgement criteria on show in which evaluation phase/product the JC is/will likely be covered. MTE = Mid-term Evaluation, FE = Final Evaluation, IE = Impact Evaluation, PR = (mainly in) project review, PO = (mainly in) portfolio review. Parentheses indicate that the given JC is/will be covered in the respective phase/product in minor fashion.

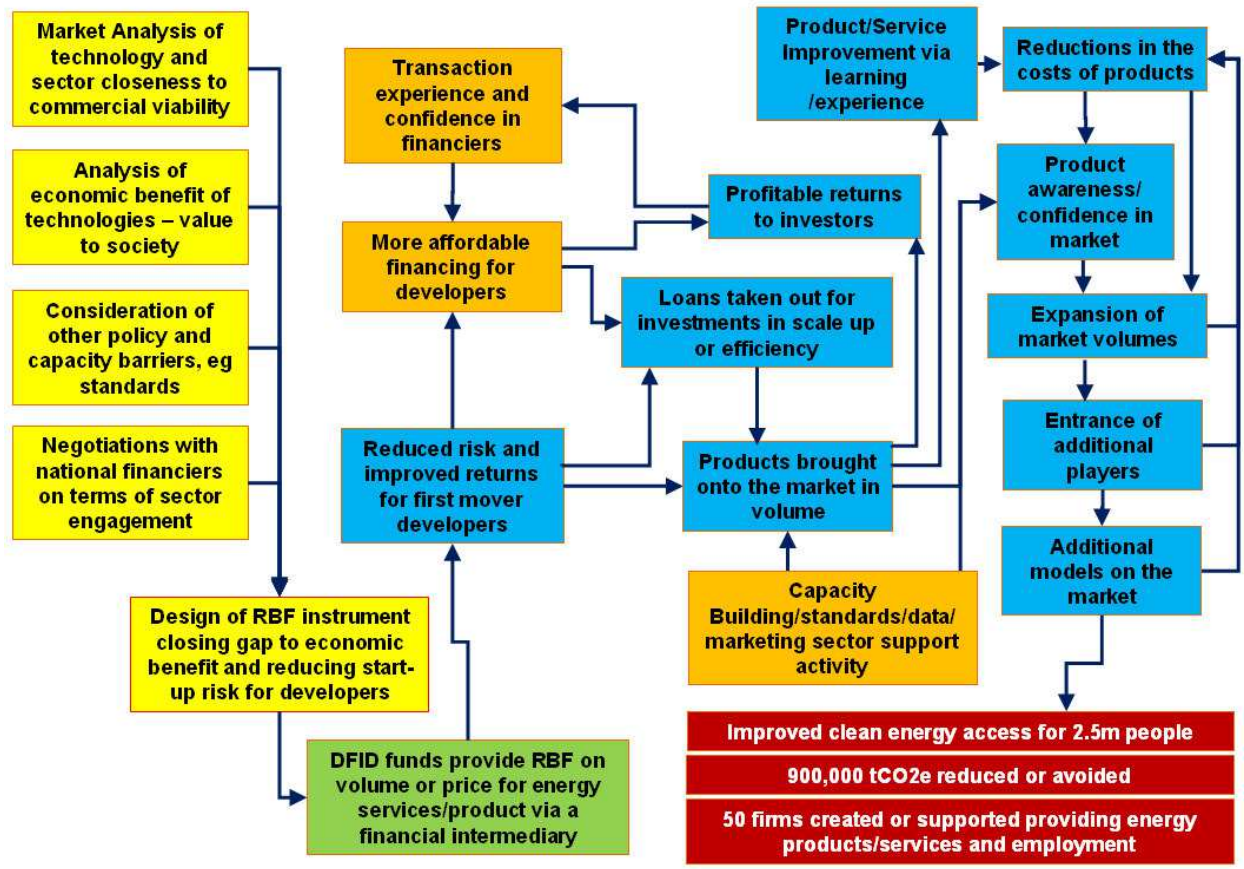
8.7 Annex 7: List of hypothesis

OECD DAC Criterion	Hypothesis	Related EQ
H 1: It is possible to structure RBFs in the countries targeted within the approach and cost parameters set in the Business Case		
Relevance	The chosen RBF structures are more relevant for energy market transformation in the respective country context than the original structures.	1.1-1.5
Effectiveness	The chosen RBF structures are more effective for energy market transformation in the respective country context than the original proposal.	1.6-1.7, 1.9 1.13
Efficiency	The chosen RBF structures are more efficient for energy market transformation in the respective country context than the original proposals.	1.8
Sustainability	The chosen RBF structures are more sustainable than other possible incentive designs.	
Impact	With the design of RBF structures, potential impacts have been duly considered.	1.10-1.12
H 2a: RBF ensures market acceleration and increase in product volumes coming to the market		
Relevance	The RBFs addressed barriers relevant for the private sector.	2a.1
Effectiveness	The RBFs effectively improved the viability of the private sector responses.	2a.2-2a.3
Efficiency	The support delivered by the RBFs was efficient in that it provided the right level of incentive to ensure efficient delivery of goods.	2a.4-2a.5
Sustainability	The improvements of the business environment are expected to last beyond the project lifetime.	2a.6-2a.7
Impact	The private sector delivery structure for energy access technologies has benefitted from the programme.	2a.8-2a.10
H 2b: RBF supports increased acceptance and uptake of decentralised low carbon energy products and services by targeted consumers (poor and rural populations/women/ children)		
Relevance	Energy access is seen as attractive by the targeted consumers.	
Effectiveness	Demand for decentralised low carbon energy products has increased.	2b.1
Sustainability	Access, the associated technologies and the associated services will be provided after the project has ended.	
Impact	Energy access is improved for the targeted groups (poor and vulnerable tiers of the population).	2b.2-2b.3
H 3a: RBF results in cost reductions for clean energy products and services via efficiency improvements in production or distribution, economies of scale or increased customer awareness		
Relevance	The chosen RBF structures are relevant for energy market transformation in the respective country context.	3a.1
Effectiveness	The chosen RBF structures are effective for energy market transformation in the respective country context.	3a.2
Efficiency	The chosen RBF structures are efficient for the energy market transformation in the respective country context.	
Sustainability	The chosen RBF structures have exit strategies and are not creating over-subsidised situations.	

OECD DAC Criterion	Hypothesis	Related EQ
Impact	The chosen RBF structures have had impacts beyond market transformation.	
H 3b: Through cost reductions and increased awareness achieved through RBF market viability is ensured in the long-run after following the withdrawal of subsidies after year 4		
Relevance	The products are needed / relevant in daily life.	
Effectiveness	Increased demand will be maintained over time.	3b.1
Efficiency	The chosen RBF approach was a cost-effective approach to ensure sustainable and long-term product use by consumers.	
Sustainability	Market demand was stimulated sustainably.	
Impact	Energy access is improved for the targeted groups (poor and vulnerable tiers of the population) in the long term.	3b.2-3b.4

8.8 Annex 8: Overall Theory of Change of RBF Facility

Figure 5: Initial Theory of Change of RBF Facility



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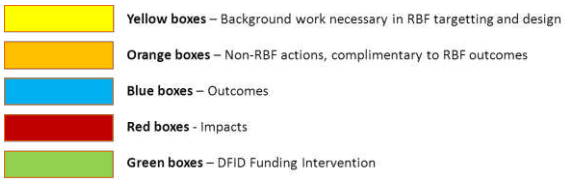

Source: DfID Business Case. It should be noted that each RBF project has its own Theory of Change which might diverge greatly from this overall Theory of Change.

8.9 Annex 9: Terms of Reference (2014) for the evaluation of the EnDev RBF Facility and Addendum to the Terms of Reference (2016)

Terms of Reference for the Evaluation of the Results-Based Financing for Low Carbon Energy Access Facility (RBFF) within Energising Development (EnDev)

1. Objective

To evaluate the Results-Based Financing for Low Carbon Energy Access Facility (RBFF) within the Energising Development (EnDev) Programme according to OECD-DAC criteria for evaluating development assistance.

These Terms of Reference (TOR) set out the scope of work, requirements and reporting procedures for a consultant (to be selected) to carry out the Evaluation of the Results Based-Financing for Low Carbon Energy Access Facility (RBFF). Given that the RBF programmes have extensive monitoring, results-reporting, independent verification and audit processes built in to them, the focus of this evaluation shall be on learning lessons regarding the effectiveness of the selected RBFs at achieving the stated aims of the programme. In addition, 2 more detailed impact evaluations shall be conducted.

The consultant will be appointed to

(i) set up the evaluation (in coordination with the projects' procedures for ongoing electronic data collection for Monitoring and Verification of RBF progress and payments),
(ii) establish baselines and will subsequently, 2015
(iii) participate in an internal process review in ~~2014~~,
(iv) conduct a mid-term evaluation in 2016 and
(v) conduct a final evaluation in 2018.

Ideally the RBFF should also be evaluated ex-post (i.e. 2 years after the completion) to allow assessing market transformation and longer term impacts and benefit. However, the budget currently available does not allow for such an evaluation to take place. A decision on this will be taken at a later time, however consultants should bear this in mind when designing their evaluation approach.

2. Recipient

The recipient of the services is the EnDev Governing Board (Germany, the Netherlands, Norway, Australia, Switzerland and the UK).

3. Background to the RBFF

The RBF Facility provides incentive payments via 10-15 country projects against results achieved in delivery and sustainable operation of off-grid clean energy products, systems and services in low income countries. A more detailed description can be found in the "Guidelines Document RBF EnDev" in Annex A. The RBF approach aims to accelerate market activity by boosting market volumes and/or returns, in order to attract private investment in more efficient production and distribution systems. This is intended to (i) help move (energy service and product) suppliers (and sector financiers, where possible) along the learning-experience curve and (ii) help move products along the cost reduction curve faster than they would normally have moved (if at all in light of market barriers) – for example via economies of scale or scope, investment in more efficient production, or bulk purchase

and distribution. As quality products (meeting the RBF minimum participation standards defined by each country project) are increasingly available on the market, it is expected that awareness and word of mouth would also drive additional demand. These effects aim to enable ongoing supply at lower cost levels after the RBF period expires, thus lowering long-term economic cost by way of providing time-bound incentives to lower the short-term financial barrier to such investments.

This application of Results-Based Financing is intended to build on and contribute to experience with Payment-by-Results approaches more widely – for example in education and healthcare sectors such as the Health Results Innovation Trust Fund, GAVI and GPOBA.

Programme funds originate from ***The UK's International Climate Fund*** in line with the scale up in climate change funding to meet UN climate change commitments, reduce poverty and tackle climate change. DFID is providing £30m in two tranches of £15m via a contribution agreement to the Energising Development (EnDev) multi-donor partnership, implemented by GIZ. The first tranche has been committed to 7 RBF components in 6 countries, while the second tranche design process has started in October 2013 and will conclude in May 2014. The selection of RBF components was done following a two-stage competitive process, outlined in the guidelines in Annex A.

Goals of the RBFF

The aim of the RBF facility within the global EnDev programme is to **(i) increase access to modern energy services in developing countries (ii) through the use of decentralised renewable energy and energy efficiency products and services, (iii) delivered via market-based approaches.**

More specifically the RBFF aims, via **10-15 RBF projects** in **at least five developing countries**, to:

- Provide **2.5 million people with improved access to energy services** via low carbon technologies
- Mitigate at least **900,000 tCO2e** through the implementation of these services
- Create, or expand (or improve the efficiency or distribution chains of) at least **50 enterprises** providing energy products and services, as well as employment
- **Leverage private investment** into decentralised renewables at a **ratio of 1:1**
- Find out if the specific Results-Based Financing applied in the DFID financed RBF facility within EnDev can present an **efficient and value for money approach** in promoting low carbon energy access in developing countries, draw conclusions from lessons learnt and develop recommendations for future applications of RBF interventions in the field of energy access.

4. Purpose and objectives of *the Evaluation*

The purpose of the Evaluation is (i) to assess the performance of the RBF Facility over the period 2012-18 against key OECD/DAC evaluation criteria, (ii) to understand and disseminate what has worked in which circumstances and why, and (iii) to derive recommendations where possible for future programmes in RBF, energy access support, climate finance and development assistance more broadly.

The Evaluation will use the **theory of change**, as depicted in Annex B, to evaluate the RBF Facility against **key OECD/DAC evaluation criteria**, including: (i) the Facility's **relevance**; (ii) its **effectiveness**; (iii) its **efficiency**; (iv) its **impact** and (v) its **sustainability**[1].

Through undertaking comparative work both (a) within the Facility and (b) through drawing on wider emerging evidence in subsidies and RBF, the Evaluation will make recommendations on RBF as an approach for delivering energy access and climate finance, specifically low carbon development. While there is limited experience on RBF used for decentralised energy markets, there is considerable experience, both North and South, in using subsidies to consumers and to the private sector in other areas, including a range of direct subsidies and other indirect forms of support to facilitate business investment and provision of services in new areas (e.g. infrastructure at large, energy efficiency and clean energy) to draw on.

The consumer perspective will also be important to consider: For example, are users satisfied, do products actually work in situ, do they continue to do so, are they considered desirable, and to what extent and for what are they actually used and what is the development impact of these uses? Factors such as these may not affect the initial subsidisation phase but may affect the future use of the clean energy access provided.

The evaluation should also seek to explore what actually takes place on the ground in the various country projects; the mechanisms involved and at least some of the reasons why things have worked as intended or not. This can include the identification of barriers, inappropriate or unrealistic expectations and assumptions and the like, as well as identify transferable good practices.

The Facility has a wide range of objectives and expectations which should be taken into account when the Service Provider makes his proposal to focusing the Evaluation in an optimal way. While the overall focus of the evaluation is on learning lessons regarding the effectiveness of the selected RBFs at achieving the stated aims of the programme, 2 deeper impact studies shall be carried out for more detailed analysis. The table below sets out the initial evaluation framework, showing the key components against which the evaluation criteria must be assessed. The framework also sets out the main hypotheses and evaluation questions that were derived from the theory of change. Consultants are expected to comment on these and propose revisions based on their knowledge and experience in the sector (and their analysis of which aspects of the Facility are the most relevant and feasible (in light of cost) to evaluate). We recommend that Consultants read the background documents "Productive Use of Energy – PRODUSE"[2] and "Social and economic impacts of

[1] According to the DAC criteria for evaluating development assistance (http://www.oecd.org/dac/evaluation/49756382.pdf) , **Relevance** refers to "The extent to which the aid activity is suited to the priorities and policies of the target group, recipient and donor", **Effectiveness** presents "A measure of the extent to which an aid activity attains its objectives". **Efficiency** "measures the outputs -- qualitative and quantitative -- in relation to the inputs. It is an economic term which signifies that the aid uses the least costly resources possible in order to achieve the desired results. This generally requires comparing alternative approaches to achieving the same outputs, to see whether the most efficient process has been adopted", **Impacts** describe "the positive and negative changes produced by a development intervention, directly or indirectly, intended or unintended" and **Sustainability** "is concerned with measuring whether the benefits of an activity are likely to continue after donor funding has been withdrawn"

[2] GIZ (2013) Productive Use of Energy – PRODUSE.Measuring Impacts of Electrification on Small and Micro-Enterprisesin Sub-Saharan Africa. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Eschborn, Germany. Available from: http://www.produse.org/index.php?lang=eng&page=5

PicoPV – State of knowledge and future research agenda"[3] as background information on possible problems and solutions of access impact evaluation.

[3] Brüderle, A., Tracy, J. and Reiche K. (2012) Social and economic impacts of PicoPV – State of knowledge and future research agenda. Draft.

	Relevance	Effectiveness	Efficiency	Sustainability	Impact
	Evaluation Questions	Evaluation Questions	Evaluation Questions	Evaluation Questions	Evaluation Questions
1) Final RBF structure compared to business case assumptions. **Hypothesis:** It is possible to structure RBFs in the countries targeted within the approach and cost parameters set in the Business Case	How well have the RBFs integrated with and enhanced the national or local supporting environment for target sectors? :	What was the final nature of the interventions? (Forms and types of subsidies) What contextual factors influenced the manner in which the intervention was designed? What challenges were experienced?	How do (i) prices and (ii) total RBF cost per person/impact compare to international and national benchmarks? To what extent was price finding utilised and appeared it to be effective, and to what extent were incentives set?	Has the RBFF exit strategy addressed sustainability with measures and/or analysis which suggest that sustainability on market, firm and user level is probable?	How has the introduction of the RBF influenced the positioning or presence of other programmes in the country relevant to these sectors? Have these programmes been positioned in a complementary and co-ordinated way?
	Source: Firms; Competitors; Stakeholders	**Source:** Business Case, Project Documents, Stakeholder, FI Records on M&V	**Source:** Literature, Stakeholders, EnDev evaluation, FI Records on M&V	**Source:** Literature, Stakeholders	**Source:** Stakeholders
	Analysis: Market Analysis; Firm-level survey	**Analysis:** Desk-based, Interviews with key stakeholders (project designers, private sector, users, village leaders, government officials...)	**Analysis:** Literature review Interview with key stakeholders (project designers, private sector, government officials	**Analysis:** Literature review, Interview with key stakeholders (project designers, private sector including low-level subcontractors and local technicians, users, village leaders, government officials...)	**Analysis:** Interview with key stakeholders (project designers, private sector, government officials, donor representatives)
2a) Private sector response **Hypothesis:** RBF ensures market acceleration and increase in product volumes coming to the market	To what extent did new national and international private sector players/ businesses enter and invest in the market? What were contributing / inhibiting factors?	What was the direct private sector uptake of the RBF? (i) Actual uptake of RBF incentives (ii) Provision of products or services Were participating firms better able to raise additional capital? Did participating players increase their volumes, efficiencies, sales channel set-ups, marketing measures or profit margins?	Was the level of incentive offered appropriate? Needed? How significant were market or firm efficiency and volume improvements against baseline?	To what extent do market participants appear to be considering their investments/participation/change of business practices as long term commitments?	To what extent does RBF decrease or increase the risk to private sector business to enter the field? Have firms been tempted to invest more than optimal? How many firms have invested in attempts to participate or perform and failed? Have competitors been hurt and if so how (say, inferior products losing market share)? How many of the participating firms are female headed? To what extent have there been undesired effects (corruption, gaming)?

	Relevance Evaluation Questions	Effectiveness Evaluation Questions	Efficiency Evaluation Questions	Sustainability Evaluation Questions	Impact Evaluation Questions
	Source: Stakeholders	**Source:** Primary and/or secondary data on sales Private sector leverage ratio	**Source:** Primary and/or secondary data on actual costs of products and services and those of competitors who don't meet RBF min standards Data on charges to the consumer	**Source:** Stakeholders	**Source:** Stakeholders
	Analysis: Market Analysis	**Analysis:** Desk based review of project documents, especially M&V records Interviews/Survey with FI and the private sector, including extension agents (retailers in case of PicoPV)	**Analysis:** Desk based review of project documents Interviews/Survey with the private sector including non-participating competitors	**Analysis:** Interviews with market participants	**Analysis:** Interview/ Survey with private sector business
2b) Consumer response **Hypothesis:** RBF supports increased acceptance and uptake of decentralised low carbon energy products and services by targeted consumers (poor and rural populations/women/children)	How far has access improved due to the project compared to parallel other access improvements in the country?	What has been the take-up and use of subsidised products? • Purchase of clean energy products • Use of clean energy products	What are the views regarding the affordability/desirability/use of off-grid clean energy products (i) at large and (ii) supported by project?	To what extent do consumers see this purchase as a long term transition, or as a short term solution? Will users be able and willing to afford (i) future service/replacement of products after the end of their life-span or even (ii) increase in service quality over time?	Who are the main beneficiaries? In what way are vulnerable groups included? What have been the secondary development benefits of improved access to consumers? e.g. on • climate change mitigation • economic development • gender • livelihoods • health Have there been any undesired impacts?
	Source: Sector data EnDev and Government data	**Source:** Project documents	**Source:** Consumers and local leaders	**Source:** Stakeholders	**Source:** Evaluators should make use of available secondary data and impact studies, which are carried out as part of the EnDev monitoring. However, we expect 2 deeper studies to be designed for more detailed impact analysis.
	Analysis: Desk based review of project documents	**Analysis:** Desk-based review of project documents	**Analysis:** Interview/Survey with consumers	**Analysis:** Interviews	**Analysis:** Desk-based review of project documents and/or additional survey

	Relevance	Effectiveness	Efficiency	Sustainability	Impact
	Evaluation Questions	Evaluation Questions	Evaluation Questions	Evaluation Questions	Evaluation Questions
3a) Market changes through and post RBF **Hypothesis:** RBF results in cost reductions for clean energy products and services via efficiency improvements in production or distribution, economies of scale or increased customer awareness	To what extent did the original market development hypothesis prove to be correct, and to what extend did it needed to be adjusted during the implementation of the project?	"To what extent have the identified market barriers been removed by the RBF?"	Has there been a reduction in unit costs? (Movement along the cost curve) Is there evidence of in creased market maturity in terms of features like increased segmentation and specialisation, wider uptake and saturation in any sub-markets?	Following the end of subsidies did companies/retailers/technicians continue to operate at the same or elevated levels?	What has been the number of jobs created (disaggregated by gender)? What are other direct/indirect economic benefits resulting from the availability of affordable energy (say, rural markets improved via ICT-based daily price information, or new/better SME due to energy access)? Have there been market distortions (increased sale of low quality products, over subsidisation)? Or have higher standards squeezed out lower quality (and cost) products? Have there been systemic changes (e.g. at the local/regional/national government levels) regarding policies regarding clean energy?
	Source: EnDev data	**Source:** Primary and/or secondary data; data on number of enterprises created or improved and data on sales	**Source:** Private Sector	**Source:** Private Sector	**Source:** Stakeholders (Consumers, Private Sector, government)
	Analysis:	**Analysis:** Desk-based review of project documents and/or additional interviews/surveys	**Analysis:** Interview/Survey	**Analysis:** Interview/Survey	**Analysis:** Interviews/Survey
3b) Sustainability of product use by consumers **Hypothesis:** Through cost reductions and increased awareness achieved through RBF market viability is ensured in the long-run after following the withdrawal of subsidies after year 4	Is there evidence that the market uptake and consumer awareness has grown faster to a sustainable market level with RBF?	What is the outlook for market viability?	Could market sustainability have been more efficiently targeted through the RBF?	What is the ongoing use of purchased products after the initial period? What is the ongoing purchase of clean energy product following the end of subsidies? Is there an increasing interest among consumers in non-project regions?	Is it likely that the impacts can be sustained over time? Have there been additional impacts? What has been the reduction in terms of tCO2e? How enduring are these?
	Source: EnDev	**Source:** EnDev, FI	**Source:** EnDev	**Source:** Consumers, Retailers, Private sector, Project Documents	**Source:** Project Documents
	Analysis Stakeholder interviews + international access data EnDev	**Analysis:** Stakeholder interviews + FI assessment	**Analysis:** Stakeholder interviews + international access data	**Analysis:** Desk-based review of project documents and/or additional interviews/ survey	**Analysis:** Interviews/Surveys, Review of project documents

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5. Scope and governance

Scope:

The scope of the evaluation encompasses 10-15 different RBF country projects within the global Energising Development programme that are initiated in two tranches over the duration of the RBF Facility.

The first tranche ("Round One Projects") has been committed to 7 different RBF projects with several different technologies and RBF approaches in 6 countries (project summaries see Annex 10 of Annex A). The call for proposal for the second tranche of RBF projects went out in October 2013 and this Round Two is expected to result in the funding for another 5-7 projects in different countries (long list of proposals see Annex C).

Due to budget constraints, detailed evaluations cannot be carried out in all countries and projects. It is expected that 6 countries are targeted for field evaluation and that 2 deep impact studies are carried out. As monitoring forms an integral part of the RBFF, evaluators will have access to very detailed data about transactions, customers/beneficiaries and companies (see also section 6 and Annex D). A decision on which countries to target shall be made in conjunction with the Steering Committee. Consultants are expected to make proposals for area of focus.

Governance:

The day to day management of the evaluation will be carried out by GIZ/EnDev.
A reference group will be established to provide guidance on the evaluation strategy. The reference group will consist of 5-6 members, including representatives from donors, development banks, implementers and research institutions and will be chaired by DFID.

The reference group will provide expert feedback and comments on the Consultants' inception report, mid-term and final reports and the overall work of the consultants.

6. Existing information sources

The consultants will have access to and are expected to make use of relevant project documents, including the business case, progress reports, the evaluability review, ESMAP and RBF reports and proposals. These documents will be provided by EnDev and DFID. A full list is provided at Annex D. Further data will need to be collected from private sector firms

(e.g. data on sales, actual costs of products and services, charges to the consumer, market analysis etc.) as baseline data. It should be noted that each RBF Country Project will produce a quite unusual wealth of user-level, provider-level and project-level data through a streamlined bottom-up monitoring process ("MEVA Framework"), because (a) such a streamlined monitoring system is needed to meet the RBF-specific challenge of continuous results verification & auditing and (b) it will allow Evaluation to apply solid, in-depth methods for the broad scale of issues lined out in this document, while remaining cost efficient. The specific MEVA systems for each RBF Country Project are under definition, but the general idea of bottom up data collection is described in an Annex E to this document ("Summary Draft of RBF MEVA Framework"). While it is clear that each Consultant will be free to propose and later implement their own, optimal mix of methods and instruments, and additional independent data generation has to be a crucial element of this, we believe that basing the overall Evaluation strategy on the bottom-up data generated regularly can greatly lower cost and/or allow deeper and broader coverage of the many hypothesis and projects to be evaluated.

7. Methodology

The RBFF represents a complex intervention, encompassing the implementation (i) of different RBF mechanisms (ii) for different energy access solutions and technologies, (iii) in different countries and varying contexts.

In the light of this complexity, consultants are expected to provide a clear description of the exact evaluation approaches and methodologies to be employed, making reference to the wider literature on evaluation of complex interventions, especially in the field of energy access via market development. It is suggested that a cluster evaluation approach using mixed methods should be taken, to identify commonalities and differences between the various projects and to enhance external validity. It should be possible to identify transferable lessons that can arise from across the full range of projects, and also perhaps aid in providing more information about why the various access solutions and financing approaches may have worked well or not.

Furthermore, consultants are expected to compare the RBF initiatives with other related programme models, to the extent possible. This could for instance include the Energy and

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Supplement to the Terms of Reference for the Evaluation of the Results-Based Financing for Low Carbon Energy Access Facility (RBFF) within Energising Development (EnDev)

Background

At the EnDev Governing Board (GB) meeting held in The Hague, December 2014, EnDev management informed the GB about the progress towards incorporating a third tranche of RBF projects into the portfolio of the RBF facility. Since then the DFID internal business case extension has been approved to commit another ten million GBP towards a third tranche of projects with a regional/sectoral approach. DFID and BMZ signed an amendment to the EnDev contract and the British promissory note was deposited with the Bank of England before the end of the year 2014.

DFID has requested and made available budget to include the third tranche of projects in the ongoing evaluation. The original ToR with its pertaining annexes remain fully valid but have to be amended in order to allow for extension of scope as per the details below.

5. Scope and governance[1]

Scope:

The scope of the evaluation will be extended to include the five regional RBF projects that have been approved in May 2015 by the EnDev Governing Board.

The third tranche has been committed to five regional RBF projects with different technologies and RBF approaches in a total of nine countries (list of projects see Annex 1 of the amendment).

Due to budget constraints, detailed evaluations cannot be carried out in all countries and projects. It is expected that a total of up to nine countries are targeted for field evaluation including at least three different regional RBF projects. The number of deep impact studies carried out remains the same. A decision on which countries to target, shall be made in conjunction with the Steering Committee. Consultants are expected to make proposals for area of focus.

10. Outputs

The following outputs are expected to be extended to the tranche three projects:

ii. **Baseline Report**, which summarizes the various initial baselines that have been measured (in case of quantitative baselines, for instance for access and impact indicators) or defined based on desktop studies. Learnings from the baseline reports of RBF round one and two projects shall be extracted to advise the RBF round three projects on proper collection of baseline data early in the process of implementation. The baseline report for the RBF 3 projects shall be completed until ~~12/2016~~ 15.05.2017.

[1] The numbers refer to the articles of the original ToR.

iii. An **Internal Process Review** of the Facility in 2015. For the round three projects the IPR shall be completed until ~~12/2016~~ 15.05.2017. The IPR shall be conducted in detail for one country per round three RBF project with an additional chapter reviewing the overall status of the project also considering progress in other countries respectively.

iv. A **Mid-term Evaluation** review following the completion of the first tranche of projects (expected to start in 2016 around 4.5 years after the start of the RBFF). The mid-term review for RBF round three projects shall be conducted in 2017 with an additional up to three in-country visits. Deadline: 31.07.2017

v. A **Final Evaluation in 2018 / 2019** after the second and third tranche of projects has been completed.

The contractor is expected to produce three accessible summaries of the key findings identified in the Internal Process Review, Mid-Term Evaluation and Final Evaluation that meet the needs of key stakeholder audiences.

ANNEX 1: RBF ROUND THREE (2015)

Countries	Lead	Title	Budget	people gaining access	€ per person gaining access	tCO2e avoided	€ per ton CO2e avoided	private sector leverage ratio	jobs created	enterprises created/ improved	technologies deployed
Cambodia, Lao, Vietnam	SNV	Market Acceleration of Advanced Clean Cookstoves in the Greater Mekong Sub-region	4.096.000 €	600.726	6,37 €	541.013	7,08 €	1,3	300	100	120.255 cookstoves
Kenya, Tanzania, Uganda	HIVOS	Biogas Business Boost Benefitting Farmers (4B-F)	3.870.000 €	128.940	28,23 €	1.719.200	2,12 €	5,1	1.504	30	21.490 biodigesters
Mosambique, Malawi	GIZ-EnDev HQ	Access to modern cooking energy for poor and vulnarable groups	1.258.000 €	640.000	1,90 €	536.000	2,22 €	2,6	224	35	128.000 cookstoves
Bangladesh, Kenya	IFC/U.S. DoE/ CLASP	Accelerating Off-Grid Solar Through Off-Grid Appliance Market Transformation	4.110.000 €	1.111.200	3,50 €	61.786	62,31 €	4,1	1.900	0	240.000 SHS, 300.000 appliances
Mosambique, Uganda + SSA	GIZ-EnDev HQ	Grid Densification Challenge Fund	4.421.000 €	200.000	23,00 €	160.000	28,00 €	8,0	6.000,0	4.000	40.000 grid connections

Funded by:

Coordinated by:

Published by:

Energising Development

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH
Registered offices Bonn and Eschborn, Germany
P.O. Box 5180
65726 Eschborn, Germany
T +49 61 96 79-0
F +49 61 96 79-11 15
E info@giz.de
I www.giz.de

Contact:

Energising Development
Dr Carsten Hellpap

E endev@giz.de
I www.endev.info

Eschborn, Germany, October 2017