Annual Planning 2015 Update

Energising Development – Phase 2

Draft Version for the Governing Board

energising development

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A. Introduction

The main purpose of this interim Annual Planning Document (update to the already approved Annual Planning 2015) is to ask the EnDev Governing Board for approval of the third tranche of results-based financing (RBF) measures under EnDev's RBF facility. In addition to the RBF measures, this Annual Planning presents one urgent up-scaling proposal for an improved water mill component in the EnDev Nepal country project under the regular EnDev modality. Its objective is to build upon the results of a pilot that was successfully developed and has demonstrated business models for improved water mills (IWM) for electrification of households and productive use units in remote areas of Nepal. EnDev believes there is scope for a market for IWM production and installation companies and local financing institutions. In addition to the RBF measures and the IWM up-scaling, this Annual Planning proposes budget neutral extensions for the projects in Rwanda (RBF), Madagascar and Mozambique. Both the IWM up-scaling and the Mozambique and Madagascar extensions are under the condition that further core funding of EnDev materialises.

As the RBF approaches are an integral part of the EnDev portfolio, projects from the two earlier rounds are administered and presented as components of aggregated EnDev country projects. This 3rd round of RBF proposals called however for regional projects which are difficult to administer under single countries. These proposals are therefore presented and administered as new EnDev projects. As in earlier planning documents, the RBF approaches are presented in sub-chapters with a slightly different structure from the regular EnDev proposals. These sub-chapters constitute updated versions of the originally presented concept notes. For further reading the detailed and elaborated full proposals for each RBF project are included as annexes to this Annual Planning.

This updated Annual Planning also provides a short summary on the actual status of the ongoing RBF projects from the first two rounds, as well as a forecast for up-scaling proposals expected towards the end of 2015.

B. Status of the RBF facility

B.1 Progress of round one and two RBF projects

Most **round one** projects are making good progress. Two (Ethiopia and Bangladesh) are still struggling contracting the financial institutions (FIs) but have identified ways to overcome this. The RBFs in Benin, Rwanda (solar), Tanzania and Vietnam all have incentives in the market. Rwanda minigrids is supporting applicants with the development and improvement of their applications/business plans, which as expected are of insufficient quality in their first versions. FIs in these countries are, where applicable, contracted. For **Rwanda minigrids a one year budget neutral extension is suggested**, reflecting the project development and implementation time anticipated for the minigrid entrepreneurs. Since the two RBFs of Rwanda are handled by the same FI, the **same extension would be logical for the Rwanda solar RBF**. Tanzania meanwhile shows already potential for up-scaling. This will be evaluated in more detail at the beginning of next year.

Laggards in this first tranche are the Ethiopia and Bangladesh projects. In **Ethiopia** the procurement of financing institutions proves an exceptional challenge. Financial offers received are even after intensive negotiations considerably above the benchmark as well as the budget. EnDev Ethiopia and HQ recommend **revising the strategy** towards the Benin model, i.e. GIZ handling the FI tasks. Should negotiations with new MFIs prove fruitful this could be integrated later on. Through this revision the project can finally move forward with implementation and further delays can be avoided. Much of the preparation work is already completed and the Call for Proposals (CfP) for companies/cooperatives could be published on a short term. A budget neutral extension of the project might be necessary, but EnDev proposes to evaluate this a year after the start of implementation.

In **Bangladesh** tough discussions between the project, IFC and IDCOL[1] have led to an agreement on the implementation model of the RBF, which slightly deviates from the original proposal. IDCOL as main partner of the RBF prefers to pay a single uniform incentive per system, whereas EnDev would have liked to link the size of the incentive to the performance of the system, as it was foreseen at the proposal stage. After several discussions it was now agreed to start with only one fixed subsidy of USD 20 for any sold system below 10 W that provides at least 1800 lumen-hours and fulfils other defined technical requirements. After further delay because of administrative issues a grant contract with IDCOL is now finally signed end of April 2015. On this basis, **EnDev plans to proceed with the project**. A budget neutral extension of the project might be necessary here as well, but again EnDev proposes to evaluate this a year after the start of the implementation.

In **Benin** the third component, **RBF for street lighting, might have to be abandoned** because of government starting a heavily subsidised programme for 15,000 streetlights. Both of the other components are in the market. EnDev proposes **not to reallocate budgets at this point in time** but evaluate the results of the two remaining components in a year. More details on the progress of the individual round one RBF projects are provided in table B.1 below.

[1] IDCOL (Infrastructure Development Company Limited) and IFC (International Finance Corporation, World Bank Group)

*Table B.1: Status update on **round one** RBF projects.*

Bangladesh, picoPV
The RBF is considerably delayed, as it took several months to negotiate the precise incentive mechanism and the size of the financing. This has been settled now, with an adaptation (simplification) of the intended mechanism from EnDev side. Further delay occurred because of contracting reasons, i.e. the settlement of an existing IDCOL contract and the lack of a project proposal from IDCOL. End of April 2015 the contract with IDCOL was finally signed and the RBF can start.
Benin, picoPV, water pumping, street lighting
PicoPV The picoPV RBF is in the market: three companies have been contracted and are selling lanterns, six more contracts are pending. First incentives were disbursed in December 2014.
Water pumping The RBF water pumping has published a first Call for Proposals (CfP) and negotiations with private companies have started.
Street lighting The RBF street lighting is facing a government programme (in design) that largely subsidises the procurement of 15,000 streetlights. This will most probably compromise the basic conditions for the street lighting RBF to such an extent that it will have to be abandoned.
Ethiopia, cookstoves
EnDev Ethiopia faces considerable challenges identifying and selecting suitable FIs. An open CfP and elaborate explanations led to offers that were exceeding by far both the reserved budget and the benchmark from the other RBF projects. Negotiations proved unsuccessful. EnDev Ethiopia recommends a strategy revision with respect to the FIs. In Oromia several newly interested (in ICS and RBF) MFIs were identified. In Tigray however no such MFIs could be identified so far. EnDev Ethiopia proposes to follow the Benin model, i.e. GIZ to take over the FI role, in order to prevent additional delays. If negotiations with the MFIs prove successful certain tasks can be handed over.
Rwanda, picoPV and minigrids
PicoPV Limited capacities at the selected FI (contracted in July 2014) slowed down the process considerably. This capacity gap was addressed through technical assistance from regular EnDev budget. Contracts with private companies were signed in December 2014, first disbursements of incentives is expected for March 2015. A complicating development is the offering of parallel up-front and non-conditional grants to the same partners from WB and SNV, reducing attractiveness. This might significantly reduce RBF outcomes (and expenditures) whereas better coordination and alignment could effectively increase success of all parties' activities. This was addressed at country level. As a result SNV and RBF approaches are now aligned. A certain risk of WB-ESME prolongation of grants still exists.
Village grids The same FI is handling the minigrid and the picoPV RBF. Hence, capacity challenges are the same. Capacity constraints also occur at minigrid developers' side, requiring extensive support preparing applications and business plans. The project provides for that and – with assistance of EnDev – nine applications are in preparation. Also in the minigrid sector, other projects (by GVEP, FONERWA) offer (or plan to offer) up-front non-conditional grants for entrepreneurs, reducing attractiveness of RBF. Discussions with GVEP are ongoing. Considering the long lead and construction times of minigrid investments, especially with relatively inexperienced local project developers, a cost-neutral extension till June 2018 is needed.

Tanzania, picoPV
Tanzania RBF is performing well and fast. There has been no significant delay in any of the implementation steps. Disbursements to companies have already been made from September 2014 onwards, a second CfP was published in February 2015. The project has created a lot of positive attention in Tanzania and beyond. Companies are pro-actively commending the approach and ask for replication. There is already a serious **potential of scaling up** the project and including additional geographic areas (e.g. the South, or as far as Mozambique).
Vietnam, domestic biogas
Implementation already started in June 2012 continuing the existing approach in Vietnam. In January 2014 the revised RBF scheme was introduced in six pilot provinces. Currently RBF Vietnam is well on track. Incentives have been paid to households in 35 provinces and to companies in the 5 pilot provinces (of the improved RBF) and deliver outcomes. Next to companies installing masonry digesters, composite digester companies have been contracted. Due to the complexity and volume of the work involved, and the need for more discussion in some provinces, it was decided to upscale the improved RBF to 18 provinces in 2015, instead of the initially planned 30. The rest will follow in the final step. The strong uptake of the sales of composite digesters suggested to reduce the incentive paid to the companies. However, due to existing contractual agreements with GoV the incentive cannot be reduced in 2015. This will be done in 2016, when a new administrative phase is initiated.

The **RBF round two projects** were initiated in May 2014 and are by now some 10 months into implementation. Naturally, these months were characterised by activities to set-up the project implementation structure. Hence, the project teams have focused on identifying suitable financial institutions (FIs) to work with, developing RBF operation manuals as a basis for calls for proposals to FIs, discussing and setting criteria for private sector company selection as well as minimum quality standards for supported technologies. In addition, all projects are setting up in parallel their monitoring and verification systems on the ground. It is observed that **round two projects**, taking advantage from the experience gathered in the start-up of the round one projects, are moving forward faster with two of the RBFs in Kenya (jointly), and the project in Nepal close to contracting the FIs. Peru[2] faces the challenge of identifying FIs with sufficient appetite and strength but is into contact with one promising candidate. The Kenya minigrid project is, following the proposal, engaged in discussions on the regulatory framework. When these are successfully concluded, identification of FIs will start. EnDev management will closely monitor the further development of round two projects.

B.2 Launch of third tranche

At the 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 10 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.

Based on 6 concept notes selected by the evaluation committee the respective project teams have developed 6 full proposals that were submitted by 14th November 2014. The evaluation committee

[2] EnDev-Peru has been negotiating with various financial institutions during the second half of 2014, several of which showed interest initially but lost it later. Mostly, banks put forward two arguments: (1) their operational cost will be higher than what they hope to gain from the project; (2) neither the institution nor their staff has the proper monitoring experience. As of end of January 2015, Caja Arequipa, a rural bank, had approved to host this RBF in its finance section but was awaiting approval from its board.

discussed the proposals on 26th November 2014 and gave conditional approval for 5 projects. Conditions and suggestions were communicated to the projects, which submitted their updated proposals early 2015 fulfilling the conditions set by the evaluation committee to satisfaction.

This third round again contains successful proposals from major EnDev implementing partners, namely from SNV, HIVOS and from new partner CLASP (the Collaborative Labelling and Appliance Standard Program, manager of the Global LEAP Awards programme, promoting the use of energy-efficient off-grid appliances). Important difference with the earlier two phases is that this round explicitly called for regional projects searching for added value in terms of effectiveness and efficiency.

B.3 Progress on RBF learning

As the linkage between RBF round one and RBF round two staff for experience exchange and document exchange has proven to add value to the inception phase of the RBF round two projects, EnDev management will ensure to include RBF round three project teams accordingly. The joint RBF Wiki has been extended to incorporate RBF round three. After project teams and EnDev management have been using the platform for more than a year, it is planned to analyse its usage and adjust the structure to make it even more user friendly and demand-oriented.

Early lessons on the RBF facility are compiled in the text box below. In addition, EnDev shared some of its early lessons with a wider audience during an ESMAP brainstorm webinar early April 2015. Main lessons presented there by EnDev were:

- EnDev's experience (so far) suggests that RBF can be most successful if it is flexibly embedded in a larger, more comprehensive package of market or sector development support. Such a package consists of technical assistance to companies and financial institutions, of joint development of sector and market strategies with the main actors, and instead of only RBF has the opportunity to use a suite of financial support instruments over the time of the intervention. In such a package RBF can fit as a prominent instrument, but seldom as an exclusive one. The situations in which RBF can act as a single driver for market development are rare. This has to do with the typical energy access markets that EnDev works in, with small and often weak private companies, within weak business and financial environments.
- RBF is communication, over and over again. Understanding RBF goals and strategy, understanding the rules of delivery and payment is crucial for ownership and a successful RBF project, otherwise the intervention faces the risk of other donor programmes crowding out the RBF, or companies investing but not fulfilling the verification demands.
- RBF is a front loaded programme. All rules and structures have to be designed up front and duly communicated to all actors: to implementing agencies, NGO's, private sector, FIs and government. Designing and explaining the rules of the game takes time, as does designing contracts, verification structures, incentives, etc. Getting contracts with private sector in the market a year after approval proved no exception.
- Understanding the dynamics of markets, the design of a market development hypothesis is key and at the same time extremely difficult. Nevertheless, most incentives are based on a viability gap between costs and prices consumers are willing to pay and that changes over time. Most practitioners are not used to this way of thinking, illustrating the need for simple design tools.
- The complexity of M&E and verification should not be underestimated, especially when going into bigger numbers, and especially with moveable OTC products like lanterns and cookstoves. Exchange with other RBF and RBA practitioners will be very valuable.
- Striking the balance between a reasonable prevention of fraud and the costs for verification is important; projects are making use of a mix of methods of physical field checks and phone checks, accepting that a 100% check is not possible.

Learning from EnDev RBF Implementation
Emerging Lessons as of early 2015

- Throughout EnDev RBF implementation, we are keeping track of emerging problems, solutions and progress – as far as possible in light of the desired low overhead budget – in order to transfer practical lessons to similar EnDev projects and extract general learning issues for later use beyond the RBF window.
- This early learning is necessary, because the daunting sum total of (i) the ambitious general EnDev rules (access effect + high subsidy efficiency without sacrificing sustainability standards) plus (ii) the specific rules and objectives added for the RBF window (high speed + ex post payments + maximum 20% overhead costs incl. TA + firm- and market-level development outcomes) is challenging. It is clear that these many performance criteria would have to be balanced against each other for optimal overall aid performance (GIZ 2009).
- Due to the pragmatic, target-oriented approach of EnDev, this learning process focusses on "How-To" questions which arise during project design and implementation. During early project progress, comparative case studies and qualitative focus group discussions seem best suited to this "action learning" agenda.
- While RBF incentives are "tail-heavy" by definition, RBF transaction costs are "front-loaded" by necessity: The latter is because contracts on several levels have to be detailed, adjusted to local conditions, explained to private sector pipeline candidates, negotiated with contractual parties and key stakeholders, and signed. These contracts need to be more detailed than in other ODA projects of comparable size, because the strict (and fast) payment against results requires a fully transparent and largely automatic process, which needs to be fully understood by all players in advance.
- This necessarily results in long delays between project inception (and early transaction cost peaks) on the one hand, and eventual achievement of the first significant results (and then disbursements) on the other hand. The ratio of results (and incentive disbursements) to overhead cost (an important efficiency measure) therefore remains (close to) zero much longer than in other ODA interventions.
- The length and implications of this RBF-inherent delay have been underestimated by practically all EnDev RBF stakeholders. This makes early-stage learning more valuable than for other ODA modes of delivery.
- Most project teams agreed that the design of their RBF incentive and contracts is determined strongly by the typical size and type of pipeline firms that can be identified (which in turn is affected by the targeted sub-sector), and that project progress (and probably success) will strongly depend on the degree to which the RBF concept fits the "vision" and capacity of at least one or two local firms who can act as "RBF champions" or "first movers". This is probably the **main success factor** identified to date.

- However, in most EnDev projects (and in fact in most RE-based Energy Access programmes around the world), energy access typically requires working with small firms, who often not have neither the financial nor the technical capacity to reach the desired results completely without upfront guidance (TA) and funding (FA). To address the latter, several firms have borrowed money once they have signed an RBF contract and seemingly secured a right to future RBF payments. This raises the question what to do with firms that do not meet the RBF payment triggers and/or suffer from the sometimes longer than expected payment and mitigation process typical for new RBF projects – which can easily push firms into insolvency.
- Next to firm performance, the success factor that has most clearly emerged from implementation to date is the permanent, local presence of an experienced task team leader and/or task team which can react to local challenges, navigate the difficult negotiation phase, keep Government and other donors aligned with the RBF objectives (to do no harm, at the least), and – most crucial – make sure at all times that the (often new and difficult to understand) implications of RBF are really understood by all stakeholders.
- Of the many performance indicators listed above, most project teams seem to rank **effect** (access), **speed** (by project end) and **service sustainability** the highest, maybe due to EnDev's general focus on access (output) performance. This introduces the risk that the additional market development objective of the EnDev RBF window becomes of lower importance to project teams. This may be a natural effect of pragmatic day-to-day management – they seem to be tomorrow's problem.
- Related to the discussion above, it seems that the specific relation between "Viability Gap" and "Market Development Hypothesis" is not fully understood by many RBF practitioners (both inside and outside the EnDev RBF window). Our analysis of the EnDev proposal process and early implementation suggests that methods like the one proposed by iiDevelopment, taking into account the quantified fully loaded costs and estimates for consumers' willingness to pay, to estimate RBF incentive levels and structures can be a helpful tool for a deeper understanding of the desired market development effects and a more evidence-based handling of possible incentive readjustments (say, in projects where initially chosen prices result in slow disbursements).

B.4 Evaluation of the RBF facility

With regards to the overall evaluation of the EnDev RBF facility portfolio good progress has been achieved in the second semester of 2014. Preceding the selection of a consulting company based on a European tender process that took place in the first half of 2014, a first meeting of the reference group chaired by DFID was held in October 2014. This reference group for the evaluation of the RBF facility, consisting of five experts with a diversity of skills representing a range of stakeholder institutions, was established as an independent quality control mechanism to assist in the technical steering of the evaluation process as well as to ensure the legitimacy, integrity and credibility of the evaluation to a broad stakeholder audience. During the first meeting the tender process as well as

the detailed set-up of the technical evaluation grid used for the consultant selection was presented to the reference group by EnDev and next steps were discussed and agreed on.

The contracting of the selected consulting consortium for the evaluation, consisting of Particip GmbH and XS-AXIS Consulting, was concluded in January 2014 and the consultants subsequently took up their work. 19th January 2015 the EnDev management team and the consultants held a kick-off workshop to initiate the evaluation. The presentation of an inception report and the overall evaluation methodology is expected by 31th of March 2015 and will be discussed during a second meeting of the reference group. An “internal process review” as the second deliverable of the evaluation is scheduled to be completed in the second half of 2015.

C. General decisions on the RBF facility

The table below contains an overview of all RBF measures already approved in the Annual Planning 2013 and 2014 Updates as well as the new measures presented in this 2015 Updated Annual Planning. In combination, these constitute the entire **portfolio of the EnDev RBF facility** (see table C.1).

Table C.1: EnDev RBF portfolio in three tranches and their budgets

Country	Title	RBF Budget
Tranche 1 (already approved)		
Benin	Three Off-grid PV Market Segments to the next level	EUR 3,060,000
Ethiopia	Improved Cookstoves	EUR 1,542,000
Rwanda	Sustainable Market Creation for Solar Lighting	EUR 3,400,000
Rwanda	Sustainable Market Creation for Renewable Energy Village Grids	EUR 1,891,000
Tanzania	Rural Market Development for Solar Pico-PV, Lake Zone	EUR 1,541,000
Bangladesh	Output-based Pico-PV System Development	EUR 3,214,000
Vietnam	Creating a Market Driven Biogas Sector	EUR 3,740,000
Tranche 2 (already approved)		
Kenya	Building sustainable and affordable credit lines for small systems in rural areas	EUR 2,800,000
Kenya	Market creation for private sector operated minigrids	EUR 2,075,000
Kenya	Higher Tier Cookstove Market Acceleration Project	EUR 2,060,000
Nepal	Sustainable Hood-stove Market	EUR 1,675,000
Peru	Getting to universal access in thermal energy services in Peru	EUR 2,040,000
Tranche 3		
Cambodia, Laos, Vietnam	Market Acceleration of Advanced Clean Cookstoves in the Greater Mekong Sub-region	EUR 4,096,000
Kenya, Tanzania, Uganda	Biogas Business Boost Benefitting Farmers (4B-F)	EUR 3,870,000
Malawi, Mozambique	Access to modern cooking energy for poor and vulnerable groups in Mozambique and Malawi	EUR 1,258,000
Bangladesh, Kenya	Accelerate the uptake of off-grid solar technologies with Results Based Financing	EUR 4,110,000
Mozambique, Uganda, Sub-Sahara Africa	Grid Densification Challenge Fund	EUR 4,421,000
Evaluation		
Additional funds reserved for accompanying evaluation of the RBF facility (RBF1-3)		EUR 1,027,475
Preparation and Knowledge		
Preparation and Knowledge Budget RBF 1-3		EUR 1,029,472
Sum		**EUR 48,849,947**

With the approval of the tranche RBF three projects, and the funds reserved for the evaluation, the DfID contribution to EnDev's RBF facility is now fully committed.

First, second and third tranche funds are signed off by DFID management, promissory notes via the Bank of England have been deposited.

Given the novelty of RBF and the limited possibilities for EnDev to influence expenditure of projects which is directly tied to private sector performance, it is likely that projects will not disburse fully. EnDev management therefore proposes to analyse a possible **shift of funding between disbursing and non-disbursing projects of the first tranche to January 2016.**

D. Overview about planned country activities in 2015 under EnDev 2

The total budget of the second phase is currently EUR 226.4 million. Below, an overview of country activities is provided. Table D.1 gives an overview of ongoing and unchanged projects (compared to the previous Annual Planning 2015 document). Country activities that are foreseen to be extended without up-scaling are presented in table D.2. Table D.3 presents **one country activity that is proposed to be scaled up (condition to availability of funding)**. Table D.4 finally presents the **proposed new regional activities under the RBF3 tranche**.

*Table D.1: Ongoing country activities under EnDev 2 **without changes***

Country	Activities	Project Duration		Funding	Planned outcomes on HH level
		Start	End	in EUR 1,000	in persons
Bangladesh	solar, stoves, solar-RBF	06/09	06/17	[3)4)] 21,214	5,000,000
Benin	grid, solar-RBF	10/09	06/17	7,160	406,415
Benin	stoves	10/09	12/17	4,000	800,000
Bolivia	solar, stoves, grid	10/09	06/16	11,400	637,000
Burkina Faso	stoves	10/09	06/16	4,500	800,000
Burundi	solar, stoves	09/10	06/18	3,200	130,000
Cambodia	biogas	12/12	06/16	2,000	58,515
Ethiopia	solar, stoves, grid, stoves-RBF	01/10	06/17	18,137	1,562,750
Ghana	grid	01/10	05/16	[3)] 3,150	(1180 SMEs)
Honduras	solar, stoves, hydro	10/09	12/18	8,130	[5)] 225,710
Indonesia	solar, hydro	05/09	07/18	11,960	172,000
Indonesia	biogas	12/12	12/15	1,150	20,000
Kenya	solar, stoves, minigrids	07/09	06/18	19,435	6,550,000
Liberia	solar, solar dryer, stoves	05/12	05/17	3,200	50,500
Malawi	solar, stoves	12/12	12/16	[3)] 3,000	725,000
Mali	solar, minigrid, BCS	01/13	12/17	3,000	100,000
Nicaragua	solar, stoves, grid	10/09	12/18	8,130	[5)] 225,710
Peru	solar (SHS + SWH), stoves, grid	06/09	06/18	16,390	1,206,500
Senegal	solar, stoves, minigrid	04/09	6/16	Up to 12,870	865,000
Tanzania	stoves, solar-RBF	12/12	06/17	2,041	226,970
Uganda	stoves, r.e.	04/09	03/16	8,000	534,000
Vietnam	biogas	07/13	06/17	3,740	275,000

[3] Only EUR 500,000 of additional funds are guaranteed, the remaining is subject to availability of global funds.
[4] This includes additional co-financing from DFID earmarked for solar lantern activities.
[5] This target is 50% of the target for the Central America activities.

*Table D.2: Country activities intended to **be extended** without up-scaling*

Country	Activities	Project Duration			Funding	Planned outcomes on HH level
		Start	Old end	New end	in EUR	in persons
Madagascar	stoves	12/12	03/15	06/16	300	47,500
Mozambique	solar, stoves, hydro, grid	10/09	12/15	06/16	10,800	321,000
Rwanda	biogas, hydropower, solar-RBF, minigrid-RBF	10/09	12/17	06/18	15,490	1,028,634

*Table D.3: Country activities intended **to be scaled up***

Country	Activities	Project Duration		Funding in EUR 1,000		Planned outcomes on HH level in persons	
		Start	End	Old funding	New funding	Old target	New target
Nepal[6]	hydro, grid	05/09	06/18	6,415	6,965	240,637	248,437

*Table D.4: Regional activities **as additional projects (RBF 3)***

Country	Activities	Project Duration		Funding	Planned outcomes on HH level
		Start	End	in EUR 1,000	in persons
Mekong (Cambodia, Laos, Vietnam)	stoves	03/15	02/19	4,096	600,726
Kenya, Tanzania, Uganda	biogas	03/15	02/19	3,870	128,940
Malawi, Mozambique	stoves	03/15	02/19	1,258	640,000
Bangladesh Kenya	off-grid solar	03/15	02/19	4,110	1,111,200
Mozambique, Uganda, Sub-Sahara Africa	grid densification	03/15	02/19	4,421	200,000

[6] Conditional to availability of EnDev core funding

E. Forecast for Annual Planning 2016

Due to lack of secured EnDev core funding up-scaling proposals have been held back in this planning document. Also in the previous Annual Planning 2015 document projects have focussed on keeping their infrastructure intact, whereas some have been (partly) up-scaled conditionally. If additional funding is secured before mid-2015 then

a) conditionality of already approved up-scalings will be lifted, and

b) the following up-scaling proposals will be tentatively submitted for the Annual Planning 2016:

- Bangladesh
- Benin
- Bolivia
- Burkina Faso
- Cambodia
- Ethiopia
- Indonesia
- Kenya
- Tanzania
- Madagascar
- Mozambique
- Senegal
- Uganda

In addition, a new country measure in Colombia, transferring experiences from EnDev Peru, is under consideration.

Such a large number of up-scaling proposals will introduce a much stronger competition for funds than in earlier EnDev phases. Further strengthening its **Management for Results** approach, striving for maximum impact and transparency, EnDev will therefore revisit and evaluate its up-scaling criteria before the Annual Planning 2016.

In further absence of secured funding, EnDev infrastructure will be scaled down starting mid 2015.

F. Up-scaling proposals

This chapter presents 5 summarised proposals for regional RBF projects from the third round in EnDev's RBF facility, as well as one proposal for up-scaling under regular EnDev rules. Complete full proposals of the RBF projects can be found in the Annex to this updated 2015 Annual Planning.

Regional (RBF): Bangladesh, Kenya

Promoted technology		solar			
Project period	old		**Budget (EUR)**	old	
	new	03.2015 – 02.2019		new	4,110,000
Target groups		Poor households and SMEs			
Lead political partner		Bangladesh: IDCOL; Bangladesh National Board of Revenue Kenya: Ministry of Energy; Kenya Rural Electrification Authority			
Implementing organisation		Collaborative Labelling and Appliance Standard Program (CLASP)			
Implementing partner		Local private sector and global manufacturers			
Coordination with other programmes		**Bangladesh:** IDCOL Solar Home System Program, IFC Lighting Asia **Kenya:** IFC Lighting Africa; Kenyan Rural Electrification Program			
Summary of key interventions and outputs		• Market development of off-grid solar PV systems and appliances			
Targets		**old targets**	**new targets**		
Energy for lighting / electrical appliances in households		0	1,111,200	people	
Cooking/thermal energy for households		0	0	people	
Electricity and/or cooking/thermal energy for social infrastructure		0	0	institutions	
Energy for productive use / income generation		0	0	SMEs	
Project manager		Matthew Jordan (CLASP): mjordan@clasponline.org			

RBF for solar PV "Accelerate the uptake of off-grid solar technologies with Results Based Financing"

RBF Key Performance Indicators (KPI)	**Target**
People gaining access (EnDev counting method)	1,111,200 (new access) 268,920 (enhanced access)
EUR per person gaining access	3.5
t CO_2e emissions avoided (over the lifetime of the products sold during project)	61,786
EUR per t CO_2e emissions avoided	62.31
Private sector leverage ratio	4.1
Jobs created	1,900
Enterprises created	-
Technologies deployed	240,000 solar home systems 300,000 appliances

1. Project area context

Off-grid renewable energy technologies like picoPV and solar home systems (SHS), as well as minigrids offer cost-effective, high-quality, and reliable modern energy services to the billions of non- and under-electrified consumers at the base of the pyramid (BoP). Quality assured and highly efficient off-grid appliances like light emitting diode (LED) lighting, televisions (TVs), fans, and refrigerators, accelerate markets for off-grid energy systems. Energy service, not energy supply, characterizes the demand by people.

For example in Bangladesh batteries and solar PV panels account for approx. 58% of the total cost of a SHS. Quality-assured, appropriately designed, affordable, super-efficient off-grid appliances maximize the benefits of energy service while minimizing the costs of the energy supply needed to run them, enabling BoP consumers to move up the "energy access ladder" at least cost.

Both countries are considered to act as entry markets to their respective regions. Therefore, this project targets those two in order to achieve a market change that reaches out beyond the borders of Bangladesh and Kenya.

2. Sub-sector and technology focus and rationale

Despite the market potential of off-grid appliances to reach large consumer groups, a stronger, more dynamic and competitive global market is needed. The project targets the global off-grid solar industry by facilitating market entry in two key countries (Bangladesh and Kenya) which have a strong outreach function into their respective geographic region. The project aims to reduce early mover risks for SHS companies in the countries and off-grid appliance manufacturers on a global level. It will do so by providing **(1)** clear signals to off-grid solar companies about the availability and relative quality of off-grid appliances and **(2)** clear paths to market for manufacturers of off-grid appliances.

The RBF incentive will reduce the risk on both demand and supply side of the market, while only being paid upon results reported by local private sector companies and verified independently (see for more details chapter 3). Results are the crucial indicator to prove that both market sides respond to the project as anticipated. Based on the results incentivized by RBF, BoP households and businesses will gain new or enhanced access to modern energy services.

3. Outline RBF incentive design and implementation

The RBF project is closely linked to the Global LEAP Awards – a competition for off-grid appliances with the objective to stimulate innovation. The purpose of the RBF incentive scheme is to accelerate both **a)** the global supply side focussing on appliance manufacturers´ entry into the off-grid market and **b)** the import and distribution of appliances on national level by SHS companies. Each Global LEAP Awards competition will be followed by an associated RBF incentive project targeted at reaching out into the Kenyan and Bangladeshi market. On a first-come first-served basis, a discrete number of companies will be incentivized to act as early movers in procuring Global LEAP Award winning or finalist products.

The RBF incentives functions as a modified Advanced Market Commitment (AMC); they will stimulate a desired market response by the companies that are best positioned to convey them to BoP consumers when bundled with SHSs. The project team expects to set the per-unit incentive between 10% and 40% of the average wholesale unit price of similar products (thus making outstanding

products more affordable to early-movers), contingent upon factors such as RBF funding availability, feedback from market actors, project learnings, etc. Experience with on-grid market incentives indicates that this range is generally large enough to inspire purchaser action but small enough to mitigate free-ridership. The option of reducing the incentive level in the second round of each award will be assessed based on market feedback and lessons from first round impacts and subscription.

To inspire sufficient RBF subscription and to contribute to learnings, we anticipate making a substantial pool of RBF funding available for TV products identified through the inaugural round of the Global LEAP Awards. Larger RBF funding pools may be made available for subsequent rounds of the Awards after lessons learned from the first cycle of RBF has been incorporated into the project.

CLASP will be the principal implementer of the project contracting third-party institutions to conduct special tasks as e.g. RBF monitoring. US DOE is the primary sponsor of the Global LEAP Awards competitions in which the RBF-eligible off-grid appliances will be identified. IFC's Lighting Africa and Lighting Asia teams will support the project through targeted industry matchmaking, market development, and policy advocacy efforts.

CLASP will as well act as the RBF financial institution (FI) at the outset, with the opportunity to adjust later in the project period if necessary. If a suitably interested and capable FI becomes apparent, CLASP will consult with EnDev regarding the possibility of a strategy change. Funding commitments from US DOE and/or other sources to support successive rounds of Global LEAP Awards competitions will be the most significant factor in determining the scalability of RBF activity that can be undertaken by this project.

4. Summary of expected impacts

The project expects to achieve the following impacts (for outcomes see KPI table above):

- Reduced pre-modern energy expenditure between 1.6 and 3.5 USD per month and household
- Improved quality of lighting
- Improved quality of life
- Improved security through lighting at night
- Facilitation of more social and educational activities

5. Strategic fit and alignment with national policies

Both targeted countries have a complex policy and institutional framework in the energy sector in place. The project aligns well with existing national policies for energy access and use of renewable energies as well as technical standards. Following a bottom-up approach coordination with other ongoing programmes and initiatives is important, therefore, the project has identified and consulted the most important programmes and institutions during project preparation.

Bangladesh:

- IDCOL Solar Home System Program
- IDCOL Technical Specifications for Solar Home System
- Sustainable and Renewable Energy Development Authority (SREDA)
- Bangladesh Solar and Renewable Energy Association (BSREA)
- IFC Lighting Asia (Bangladesh)
- EnDev Bangladesh

Kenya:

- IFC Lighting Africa (Kenya)
- Kenya Renewable Energy Association (KEREA)
- Off-grid Solar Companies
- Kenyan Rural Electrification Program
- National Climate Change Response Strategy (2010)

6. Risk mitigation

The overall risk of the project is assessed as low while the general influence the project has is high due to thorough planning steps, monitoring and verification systems as well as foreseen flexibility to adjust to any unusual situations.

While the project does not face any high risks, the following medium level risks have been identified and suitable risk mitigation measures developed:

- Under-subscription to RBF: this risk will be mitigated by price finding and market assessment activities in the project inception phase.
- Policy risk related to import duties: the project will work together with local policy makers and stakeholders to mitigate as far as possible.
- Financing risk related to private sector companies‘ access to finance: this risk will be thoroughly assessed in the inception phase, and mitigation measures developed.
- Impact of exchange rates on RBF/project value: this will be closely monitored, refinements to RBF made when necessary.
- Climate and environmental risk: Waste electric equipment: Global LEAP Awards will require supply chain commitments.

7. RBF Budget

		EUR
1	Human resources and travelling	0
2	Equipment and supplies	0
3	Funding financing agreements/local subsidies	3,850,000
4	Other direct costs	50,000
5	**Total direct costs (sub-total)**	**3,900,000**
6	Mark up costs/administrative overheads/imputed profit	210,000
7	**Cost price**	**4,110,000**

Regional (RBF): Cambodia, Laos, Vietnam

Promoted technology		stoves			
Project period	old		**Budget (EUR)**	old	
	new	03.2015 – 02.2019		new	4,096,000
Target groups		Lower income households			
Lead political partner		Cambodia: Ministry of Mines and Energy (MME) Laos: Ministry of Science and Technology (MoST) Vietnam: Ministry of Agriculture and Rural Development (MARD)			
Implementing organisation		SNV			
Implementing partner		-			
Coordination with other programmes		Advanced Clean Cooking Solutions (ACCS) project			
Summary of key interventions and outputs		Market development of advanced clean cookstoves			
Targets		**old targets**	**new targets**		
Energy for lighting / electrical appliances in households		0	0	people	
Cooking/thermal energy for households		0	600,726	people	
Electricity and/or cooking/thermal energy for social infrastructure		0	0	institutions	
Energy for productive use / income generation		0	0	SMEs	
Project manager		Jason Steele: JSteele@snvworld.org			

RBF for advanced clean cookstoves "Market Acceleration of Advanced Clean Cookstoves in the Greater Mekong Sub-region"

RBF Key Performance Indicators (KPI)	**Target**
People gaining access (EnDev counting method)	600,726
EUR per person gaining access	6.37
T CO_2e emissions avoided (over the lifetime of the products sold during project)	541,013
EUR per t CO_2e emissions avoided	7.08
Private sector leverage ratio	1.26
Jobs created	300
Enterprises created	100
Technologies deployed	120,255

1. Project area context

The regional RBF project focuses on three countries (Cambodia, Laos, and Vietnam) located in the Greater Mekong Subregion.

In all three targeted countries, biomass energy is highly significant: In Vietnam it is 27% of total final energy consumption, in Cambodia 72%, and in Laos 68%. In total, approximately 80% of all biomass energy is consumed in the residential sector – mostly for cooking.

Cooking with solid fuels (wood and charcoal) in traditional stoves has particular effects on the health of people as smoke contributes to high levels of household air pollution (HAP), which can lead to a number of deadly diseases. It is currently estimated by the World Health Organisation (WHO) that Cambodia, Laos, and Vietnam have combined 65 million people that are exposed to HAP. In Vietnam this has led to about 45,500 HAP related deaths per year, in Cambodia to 11,876 and in Laos to 5,716.

In terms of global and local environmental impacts, an estimated 77%, 87%, and 67% of all biomass consumed in Cambodia, Laos, and Vietnam, respectively, is from non-renewable resources constituting a significant factor for greenhouse gas emissions.

2. Sub-sector and technology focus and rationale

SNV in Cambodia, Laos, and Vietnam already implements the **Advanced Clean Cooking Solutions (ACCS) project** to bring to scale the distribution of improved cookstoves (ICS) that are efficient, safe, and significantly reduce particulate matter emissions. Through its market research and consumer acceptability activities there is considerable appetite among households for upgrading their cooking equipment. Primary reasons to invest in an improved cookstove are savings on fuel costs, improved health and inherent savings on time. In addition, the Global Alliance for Clean Cookstoves (GACC) also completed market research studies in all three countries, which clearly show market potential but lack of clean cookstove options beyond those cookstoves that have incrementally improved efficiency but without any health impact.

With 90% of the households in this region using (in part) biomass fuels for cooking, the scope of the potential (theoretic) demand for ICS runs in the millions. The technical market potential for improved cookstoves in Cambodia, Laos, and Vietnam are 2.4 million, 1 million, and 12.8 million households, respectively. In Cambodia under the ACCS project, market research was further conducted to understand the market potential for advanced biomass cookstoves at a price point of USD 100. This research resulted in a market potential of approximately 100,000 households with the willingness and means to pay.

In each country, existing market structures for cookstoves and distribution networks for other products can be utilized: **a)** In Laos access to over 200 cookstove retail shops, **b)** in Cambodia established working relationship with four distributors with their own distribution networks that stretch into both urban and rural areas of 6 provinces and Phnom Penh, and **c)** in Vietnam working relationships with manufacturers of rice husk gasifier stoves.

Currently "higher tier" improved cookstoves are not commercially available in any of the three countries. To date, manufacturers of these new generation stoves have focussed on African markets and in some cases South Asia, but have ignored Southeast Asia. On the local distributor side, companies are quite small and lack financial liquidity. Many companies back off from or have not got access to working capital loans to purchase inventory, especially for more expensive and innovative products.

3. Outline RBF incentive design and implementation

To overcome the challenge of needing to be able to predict market dynamics to define the incentive level, the project follows a market-based approach to ensure effectiveness of the project. At the core of the RBF design is

(i) a competitive tendering process amongst cookstove producers and

(ii) regular auctions of cookstoves to local stove distributors.

Both, cookstove producers and distributors, will receive a share of the total RBF incentives provided. The purpose of the RBF incentive to producers is to trigger aggregated demand and facilitate larger shipping volumes. The incentives are to cover the inherent economic risk. The purpose of the RBF incentives to distributors is to facilitate the purchase of small volumes at competitive prices and incentivize them to further develop their market outreach.

The RBF design foresees the ICS producers who pre-qualify their ICS with the project to compete against each other on the lowest amount of incentive they need per unit of stove to send their ICS to the auctions at their own cost and risk. Once ICS are at the auction, ICS distributors compete against each other on buying the ICS. The distributors bidding the highest prices at the auction win until the volumes run out. Distributors will get an incentive for selling cookstoves to end-user. Stove producers will receive their incentive payment upon request and after verification of the sale at the auction. It is expected that at first, ICS producers will be requesting high incentive amounts to cover their risk in terms of uncertainty in auction prices from distributors. At the same time it is expected that distributors at first will bid low prices, due to uncertainty in demand and affordability on consumer side. Bidding prices are anticipated to increase relative quickly with public information on auctions, more confidence in demand and pricing, and as competition builds up between distributors. As soon as auction prices increase, ICS producers will also gain confidence in the scheme, and to become more competitive amongst each other. In conclusion, both incentive levels are expected to decrease over time. The rolling out of the auction mechanism is a phased approach in order to test the scheme and incorporate lessons learned for future rounds. The first auctions will be held in Cambodia with a small volume of ICS. Cambodia is selected due to the market intelligence already collected for "higher tier" cookstoves and potential distributers identified.

SNV will be in charge of overall project coordination and implementation of the RBF project. One key activity is the establishment of the Market Regulation Committee (MRC) on regional level. The committee will be responsible for determining stove selection criteria, volumes of ICS to be bid on by

ICS producers, setting of RBF incentive levels to ICS distributors and the timeframe for such incentive, enacting any other regulatory measures to prevent market distortion or forms of misconduct such as collusion, fraud, corruption, etc. To enact the ICS selection criteria the Stove Selection Committee (SSC) will be established to assess bids from ICS producers applying to participate in the RBF project.

Suitable financial institutions (FIs) are to be selected in a competitive manner to host the RBF funds, effect incentive payments and (co)manage the auctions. An independent verification auditor will be contracted to verify sales of ICS at auctions and consumer level.

4. Summary of expected impacts

The project expects to achieve the following impacts (for outcomes see KPI table above):

- Improvement of health for households (mainly women and children)
- More than 50% fuel savings using an advanced cookstove
- Enhanced technical and business capacity of local distributors as well as income generation
- Reduction of unsustainable use of forest resources, reduction of deforestation, and greenhouse gas emissions
- Increased capacity among local entrepreneurs, test laboratories, and governmental institutions

5. Strategic fit and alignment with national policies

The RBF project is highly relevant in regard to access to modern energy services and climate change mitigation policy. With efficiency at 2 to 4 times higher than traditional cookstoves, greenhouse gas emission reductions are conservatively estimated at an average of 1.5 tCO_2/year/ICS across all three countries. Increases in energy efficiency are a national priority in the renewable energy policies of all three countries and will contribute to the policy dialogue in each country for the development of Nationally Appropriate Mitigation Actions (NAMAs). In addition, the National Adaptation Programmes of Action (NAPA) of each country submitted to the UNFCCC support the efficient use of forest resources and the development and scaling up of low cost, clean, and efficient energy solutions as priority measures for adapting to climate change.

6. Risk mitigation

The overall risk of the project is assessed as low to medium. While the project faces no major risk, the following medium risks have been identified and suitable risk mitigation measures developed:

- Opaque market and price formation: mitigation measure to transparently communicate criteria to be fulfilled to participate in the RBF for the private sector
- Limited participation from ICS producers: mitigation measure to define selection criteria for the private sector as an acceptable quality standard that still allows many market players to qualify
- Limited participation by distributors: mitigation measure to actively create awareness and increase understanding of RBF approach
- Locally produced ICS are not distributed through distributors but directly by the producers: mitigation measure to flexibly adjust the RBF approach to the real market conditions in case a mismatch is detected
- Price collusion amongst distributors at auction: mitigation measure to actively create awareness and increase understanding of the RBF project to attract a decent number of bidders

- Capacity risks: mitigation measure to regulate the number of ICS being auctioned and hence entering the market to avoid overstretching the capacity of the market players
- Financing risks: mitigation measure to actively involve suitable financial institutions to offer micro-credits to end-users

7. RBF Budget

		EUR
1	Human resources and travelling	0
2	Equipment and supplies	0
3	Funding financing agreements/local subsidies	3,839,704
4	Other direct costs	50,000
5	**Total direct costs (sub-total)**	**3,889,704**
6	Mark up costs/administrative overheads/imputed profit	206,296
7	**Cost price**	**4,096,000**

Regional (RBF): Kenya, Tanzania, Uganda

Promoted technology		biogas			
Project period	old		**Budget (EUR)**	old	
	new	03.2015 – 02.2019		new	3,870,000
Target groups		Rural poor population			
Lead political partner		**Tanzania:** Ministry of Industry **Kenya:** Ministry of Energy and Petroleum (MEP), Renewable Energy Directorate **Uganda:** Ministry of Energy and Mineral Development (MEMD)			
Implementing organisation		HIVOS			
Implementing partner		SNV			
Coordination with other programmes		Africa Biogas Partnership Programme (ABPP)			
Summary of key interventions and outputs		• Market development for small-scale biogas digesters in East Africa			
Targets		**old targets**	**new targets**		
Energy for lighting / electrical appliances in households		0	0	people	
Cooking/thermal energy for households		0	128,940	people	
Electricity and/or cooking/thermal energy for social infrastructure		0	0	institutions	
Energy for productive use / income generation		0	0	SMEs	
Project manager		Jean Marc Sika: jmsika@hivos.or.ke			

RBF for biogas "Biogas Business Boost Benefitting Farmers (4B-F)"

RBF Key Performance Indicators (KPI)	**Target**
People gaining access (EnDev counting method)	128,940
EUR per person gaining access	28.23
T CO_2e emissions avoided (over the lifetime of the products sold during project)	1,719,200
EUR per t CO_2e emissions avoided	2.12
Private sector leverage ratio	5.12
Jobs created	1,504
Enterprises created	30
Technologies deployed	-

1. Project area context

HIVOS and SNV have experience with implementing domestic bio-digester programmes in Africa since 2008. The main challenges biogas programmes face in Africa are prices of construction materials and labour, disperse population, lack of credit facilities, low level of private sector development and lack of knowledge about the technology. As a consequence technology up-take and market development advance at a low pace.

The Africa Biogas Partnership Programme (ABPP) implemented by HIVOS in East Africa monitors a significant share of the biogas market. In 2013 the highest sales numbers were reached in all countries: Kenya (4,800), Tanzania (3,800) and Uganda (2,000). The withdrawal of the subsidy has thrown back market development by 2.5 years into a fragile state. Particularly in Uganda, where the biogas market was just picking up, the decline was very dramatic (-75%), whereas Kenya and Tanzania experienced a painful, but less dramatic reduction in the range of -30% to -40% in annual sales in 2014.

2. Sub-sector and technology focus and rationale

The traditional fixed dome biogas digester is the best known and distributed plant. Constructed properly, the installation has proven to be cost effective and extremely robust with a lifespan of 20 years. However, a good installation requires well-trained masons.

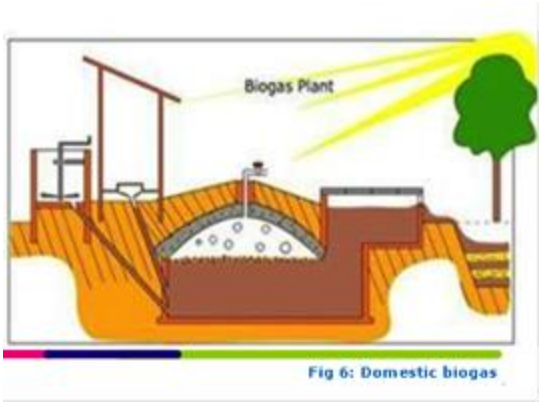

Fig 6: Domestic biogas

New bio-digester designs are entering the markets in the region. They are typically pre-manufactured, quicker to install and the quality of workmanship is less critical. Lifetime of new – in particular – the flexible tube-designs, however, is lower or not yet properly tested.

Markets are becoming more competitive with a wider range of products available and a need to strengthen after-sales-services to ensure high quality of installations. Although investment costs for the new designs are yet close to the dome models, economies of scale are expected to have a significant impact on prices. Some companies have already started to invest into larger production facilities.

3. Outline RBF incentive design and implementation

There will be two RBF incentives entering the market:

- Credit Sanctioning Incentive (CSI) to stimulate availability of affordable credit and
- Quality Plant Incentive (QPI) to stimulate good after-sales service and customer care.

The CSI is designed to stimulate both demand and supply side of the credit market. Therefore it is composed of **a)** a compensation for lowering the interest rate and **b)** an incentive for investing in the developing and marketing of a biogas loan product. Over a period of 4 years the incentive is declining as the Mirco-Finance Institutions (MFIs) and Savings and Credits Cooperatives (SACCOs) reduce their transaction costs and gain experience and confidence in the loan product. Following a pilot phase, the (possibly adjusted) CSI will be offered for reversed auctioning to interested financial institutions.

In view of the large geographic variation the auction will be area-specific (low-, mid- and high-density areas).

As a basis for the QPI, biogas SMEs will visit installed biodigesters 3 months and 12 months after commissioning. During these visits, plants are inspected for proper functioning and households, where necessary, are assisted in the proper operation and maintenance of their installation. Correct execution of the after-sales visits will be checked by the Customer Service Centres (CSC) and, if necessary, by the programme visiting the installation. Positive results of these checks reported to EnDev will trigger incentive payments. Over the four year project period the biogas SMEs will bear an increasing share of the costs of after-sales-services – reaching 100% in year five.

The project will be implemented parallel to the Africa Biogas Partnership Programme (ABPP), a multi-actor sector development programme that equally aims to develop the market for domestic biogas digesters: the programme is called “Biogas Business Boost Benefitting Farmers” (4B-F). The 4B-F will provide the incentives for the private sector actors, such as the biogas SMEs and financial institutions. The national implementing agencies host the National Domestic Biogas Programmes, who coordinate, facilitate and implement the biodigester sector and market development activities and will incorporate the RBF project into their daily work. They will work together closely to implement the regional RBF approach.

4. Summary of expected impacts

The project expects to achieve the following impacts (for outcomes see KPI table above):

- 21,490 women benefitting,
- Reduced workload for women and children 4,349 people,
- Reduced indoor air pollution exposure for women and children 85,960 people,
- Reduced deforestation by an equivalent of 17,221 ha,
- Improvement of sanitation for 6,447 households,
- Improved agricultural output by using fertilizer on at least 21,490 ha for 15 years.

5. Strategic fit and alignment with national policies

The RBF project is aligned to national and regional policies in place. The East African Community (EAC) comprises all three countries and seeks to expand business across the region. The common market for goods, labour and capital was launched in 2010 and last year a plan was signed to create a common currency. In this way local companies are enabled to do business across borders in the region and a supportive regional environment is step-by-step created.

The Kenyan energy act from 2006 establishes that the government will promote the use of biogas as an alternative to woodfuel and kerosene for domestic and commercial energy needs. The Kenyan Bureau of Standards (KEBS) is in the process of establishing standards for biogas systems. Also in Tanzania the development of the biogas sector is very much in line with the national policies which seek “to reduce deforestation through efficient woody biomass to energy conversion technologies & techniques” and “to promote the development and utilization of renewable energy sources”. In March 2007, the Government of Uganda (GoU) approved a new Renewable Energy Policy formulated to reinforce the Energy Policy of 2002. The overall objective of the Renewable Energy Policy is to diversify the energy supply sources and technologies in the country. One of the strategies of the Renewable Energy Policy is to promote the production and use of biogas at both household level and large/industrial scale.

6. Risk mitigation

The overall risk of the project is assessed as low while the general influence of the project is high due to the already existing programme structures of ABPP in the region.

Nevertheless, a number of risks and risk mitigation measures have been identified:

- Inability of monitoring and verification system to detect fraud – mitigation measure: introduction of several layers of monitoring and verification based on hard copies, phone checks and on-site verification
- Lack of impact on market fundamentals – mitigation measure: interest of FI in RBF confirmed and partner programme ABPP to provide branding and marketing support to trigger further market development
- Defaults on loans could lead to FIs retreat from the project – mitigation measure: project will support FIs in setting up proper repayment conditions
- RBF incentives set too high – mitigation measure: selection of appropriate price-finding-mechanism as e.g. reverse auctioning

The project faces a serious policy risk: a governmental restriction of the activities of FI/MFIs not allowing them to play a crucial role in RBF/RBF-like projects. While being highly unlikely, it would require the whole approach to be changed. Nevertheless, the risk that this policy change occurs in all three targeted countries at once is low.

7. RBF Budget

		EUR
1	Human resources and travelling	0
2	Equipment and supplies	0
3	Funding financing agreements/local subsidies	3,639,851
4	Other direct costs	35,000
5	**Total direct costs (sub-total)**	**3,674,851**
6	Mark up costs/administrative overheads/imputed profit	195,149
7	**Cost price**	**3,870,000**

Regional (RBF): Mozambique, Malawi

Promoted technology		stoves			
Project period	old		**Budget (EUR)**	old	
	new	03.2015 – 02.2019		new	1,258,000
Target groups		Poor and vulnerable households			
Lead political partner		**Malawi:** Department of Energy Affairs **Mozambique:** Ministério da Energia			
Implementing organisation		GIZ			
Implementing partner		Concern Universal, Foundation Eduardo Mondlane University			
Coordination with other programmes		National Social Programmes			
Summary of key interventions and outputs		• Facilitate access to modern cooking for poor and vulnerable groups			
Targets		**old targets**	**new targets**		
Energy for lighting / electrical appliances in households		0	0	people	
Cooking/thermal energy for households		0	640,000	people	
Electricity and/or cooking/thermal energy for social infrastructure		0	0	institutions	
Energy for productive use / income generation		0	0	SMEs	
Project manager		Marco Hüls: marco.huels@giz.de			

RBF for stoves "Access to modern cooking energy for poor and vulnerable groups in Mozambique and Malawi"

RBF Key Performance Indicators (KPI)	**Target**
People gaining access (EnDev counting method)	640,000
EUR per person gaining access	1.9
T CO_2e emissions avoided (over the lifetime of the products sold during project)	536,000
EUR per t CO_2e emissions avoided	2.22
Private sector leverage ratio	2.6
Jobs created	224
Enterprises created	35
Technologies deployed	128,000

1. Project area context

Especially in rural areas, most households in Mozambique and Malawi use wood as primary cooking energy. However, both countries show a very underdeveloped market for improved cookstoves (ICS). The project seeks to boost marketing structures in rural areas, where 80% of the population live. It has so far proven difficult to penetrate deep into rural areas, as transport becomes more difficult and costly to reach out into sparsely settled areas with a very low-income population.

The rationale is to reach pre-identified poor and vulnerable groups that can be subscribed in national social programmes and that would otherwise not access ICS via market mechanisms. To reach these "poorest of the poor", the ICS sales prices will be substantially subsidized on consumer level. The vision is that this advanced market commitment through this RBF project will lay the basis to develop commercial and sustainable marketing structures in rural areas and boost the market rather than destroy it.

2. Sub-sector and technology focus and rationale

EnDev aims at supporting production and distribution rather than directly subsidizing product prices, as building capacity along the value chain is expected to be more sustainable than quick results achieved by cheap stoves. This works well in areas where fuel has to be bought and customers quickly see monetary savings through improved cookstoves. In remote rural areas, however, the commercial approach becomes more challenging: While EnDev has facilitated in some specific rural areas the building of commercial markets (e.g. in Kenya), a purely commercial approach often fails when extremely poor people or vulnerable groups are targeted. Especially if they lack cash income and fuel is collected. To reach these "poorest of the poor", the sales prices of ICS may have to be substantially subsidized on consumer level.

Retailing improved cookstoves in rural areas under normal circumstances would increase the price of the stoves due to transportation costs rendering them unaffordable to the majority of rural households, especially for the "poorest of the poor". Since most rural households only have extremely limited disposable income to spend, the price of an ICS – even if it seems low – is a major factor in the purchasing decision. In addition, the lack of nearby points of sale for high-efficiency stoves forms a significant barrier for the acquisition of ICS in rural areas. These facts clearly place the need for financial incentives either for the supplier or consumer side, or for both.

In conclusion, in both countries market dynamics with a network of rural sales outlets are lacking. Based on this experience it is predicted that sales agents will resume marketing (Malawi) or start marketing (Mozambique) once an advance market commitment is made through the RBF that will generate a predictable sales-related basic income for the agents. Upon this basis, they can then target other strata of the population and build a long-term market through additional sales to the rural population having access to monetary income.

3. Outline RBF incentive design and implementation

The project will support private actors in Malawi and Mozambique to buy ICS in Malawi from existing local, in Mozambique from external production centres and sell these stoves to rural households. The RBF incentives will be paid ex post against the sold and verified stoves.

In Malawi, it is foreseen to keep the RBF incentive on the stove price fixed over time for the beneficiaries of the national Social Cash Transfer (SCT) system at a 100% subsidy level of the cost of

the stove distribution. This cost does not only include the production price, but takes into account transportation, marketing, storage, etc. The RBF incentive levels for other target groups as e.g. the beneficiaries of the Public Work (PW) Programme are yet to be determined and are currently estimated around 50% of stove distribution cost. Based on experience in the pilot district Balaka, the actual costs of stove distribution will be estimated on district level.

In Mozambique, the RBF incentive will cover a main part of the real costs of imported industrial stoves that have to be assembled, transported and sold in rural areas. Nevertheless, it is foreseen that consumers will pay a certain amount as contribution and potential payment for the sale agents. The portion of the real price that has to be paid by the end user shall remain fixed. Real price changes may appear in the four years project period due to the dependence on the steel price market in the production costs of these stoves. This fact will be negotiated during the project inception phase with producers. At the end, it will be negotiated between the end users and the sales agents as the selling price will be part of their profit. However, the RBF implementer might adapt the incentive per stove in case those sales agents reach to sell the stoves for higher prices. Negotiation capacity and the competition between industrial stove producers and also between NGOs respectively sales agents will also influence the price.

In both countries, a major influencing factor in the iterative design of the RBF incentive is the assessment whether or not the market volume created is large enough to ensure sustainability. Via carbon finance it is estimated that sufficient resources will be available to keep replacing stoves at the end of their life span.

The RBF project is a complementing measure to existing EnDev activities targeting those beneficiaries that cannot be reached with the existing EnDev approach. The target groups are spatially separated which will reduce potential market distortion. While EnDev will be in lead of implementing the RBF, local private actors will be contracted to implement the project on the ground. The main actor in Malawi will be Concern Universal (CU) as one of the major players in the stove sector leveraging synergy effects with the Irish Aid funded pilot in Balaka district. As the project expands into districts where CU is not active, other NGO partners might come on board. In Mozambique the main implementer will be the Foundation of Eduardo Mondlane University (UF). CU and UF will be contracted for implementing the RBF, particularly for buying stoves, the financial management and dealings with the NGOs or sales agents including data registering, monitoring and checking. Based on the areas of implementation, NGOs and sales agents in the selected areas of the two countries will be invited to compete for the RBF.

4. Summary of expected impacts

The project expects to achieve the following impacts (for outcomes see KPI table above):

- Reduction of fuelwood expenditure
- Reduction of required collection time for fuelwood
- Reduction of indoor air pollution and related health risks
- Income generation for stove producers and retailers
- Job creation
- Mitigation of CO2 emissions
- Reduced pressure on natural resources as e.g. forests

5. Strategic fit and alignment with national policies

The project is well aligned with national priorities in both targeted countries. Following the Malawi Growth and Development Strategy II (2012-2017) the National Social Support Policy (NSSP) was formulated in 2013. A bundle of 5 National Social Programmes targeting various levels of society fall under this framework, coordinated by the Ministry of Finance, Economic Planning and Development (MFEPD): **a)** the Social Cash Transfer programme (SCT) targets the 10% households at the base of the pyramid that are ultra-poor and labour constrained, **b)** the Public Works programme (PW) targets poor households that have available off-season labour, **c)** the targeted support to School Meals Programme, **d)** the Village Savings and Loans and **e)** Microfinance. This project will start the cooperation with the SCT in 2015 in one district, and then scale up from there to other districts while exploring the options to cooperate with the other programmes. As the SCT should be expanded towards national coverage with multi-donor commitment, the total potential target through SCT alone could exceed 320,000 households (10% of the total population of over 16 million in over 3 million households).

The political framework of improved cookstoves in Mozambique is not yet as well organized and structured as in Malawi. But according to the Biomass Strategy for Mozambique (2012), the demand for biomass is responsible for the increasing deforestation and forest degradation, which have been identified as the main sources of environmental problems in the country.

6. Risk mitigation

The overall risk of the project is assessed as low while the general influence the project has is medium.

- Care has to be taken not to destroy the image of the local clay stove in Malawi as a modern technology successfully built up by the EnDev partner MAEVE, if the stove is associated with an ultra-poor target group.
- Transparency of the process is the key to the success of the RBF in social programmes, also to minimise deeply rooted jealousy intrinsic in rural societies in both countries. This will be a 'make-or-break' factor for the overall acceptance and the success of the project. Modes of delivery will have to be fine-tuned as the project develops.
- For Mozambique, a special attention has also to be drawn to the development of external factors that might influence the stove prices (steel price, shipping etc.).
- A special risk for the overall success of this RBF is the uptake of the carbon market and prices that can be obtained.

7. RBF Budget

		EUR
1	Human resources and travelling	24,000
2	Equipment and supplies	0
3	Funding financing agreements/local subsidies	1,159,200
4	Other direct costs	7,398
5	**Total direct costs (sub-total)**	**1,190,598**
6	Mark up costs/administrative overheads/imputed profit	67,402
7	**Cost price**	**1,258,000**

Regional (RBF): Mozambique, Uganda, Sub-Sahara Africa

Promoted technology		grid			
Project period	old		**Budget (EUR)**	old	
	new	03.2015 – 02.2019		new	4,421,000
Target groups		Rural households and SMEs			
Lead political partner		To be determined after competition between countries has identified national partners			
Implementing organisation		GIZ			
Implementing partner		National electricity grid operators and governmental electrification agencies			
Coordination with other programmes		To be determined after competition between countries has identified national partners			
Summary of key interventions and outputs		• Facilitate grid connections for rural population as least cost			
Targets		**old targets**	**new targets**		
Energy for lighting / electrical appliances in households		0	200,000	people	
Cooking/thermal energy for households		0	0	people	
Electricity and/or cooking/thermal energy for social infrastructure		0	0	institutions	
Energy for productive use / income generation		0	0	SMEs	
Project manager		Marco Hüls: marco.huels@giz.de			

RBF for grid densification "Grid Densification Challenge Fund"

RBF Key Performance Indicators (KPI)	**Target**
People gaining access (EnDev counting method)	200,000
EUR per person gaining access	23
T CO_2e emissions avoided (over the lifetime of the products sold during project)	160,000
EUR per t CO_2e emissions avoided	28
Private sector leverage ratio	8
Jobs created	6,000
Enterprises created	4,000
Technologies deployed	40,000 grid connections

1. Project area context

Grid-based electrification is the only technology that can typically provide tier 5[7] access to electricity for end-users and provides enough power for all energy services, including operation of machines for productive use, with maximum flexibility and convenience. Therefore, it remains the "gold-standard" for electrification. In addition, World Bank OBA and RBF energy operations suggest that grid densification may be one of the technologies that can be easiest implemented with RBF projects that aim at short duration, because the implementing companies (i.e. national utilities and rural electrification agencies) often have stronger financial and technical capacities for the business line in question than the small SME usually active in off-grid market segments.

The actual mix of generation technologies in each national grid of participating countries (or utilities if using separate mixes) determines which share of grid-based electrification can be classified as access to renewable energy. The project will ensure the direct link to renewable energy by only allowing countries to compete where the share of renewable energies in the national electricity mix is above 60%.

Traditional electrification programmes often focus on grid extension to rural areas, leaving out the opportunities for increasing access in already electrified communities. This is especially detriment to poor households, as those are the ones more likely to be locked out by high connection costs. However, the potential is enormous and investments costs can be low, as low voltage lines are already available and only the meter and a few meters of wire have to be added (plus internal wiring and appliances).

In Mozambique, electrification rates have seen significant improvement surpassing their national goal of 20% electrification by 2020 to be at a current rate of 26%. Greater scrutiny reveals that the 26% rate is not entirely accurate as the situation is aggravated by a national definition of electricity access that considers everybody living within a 30 km perimeter of the grid as electrified. This reduces any political pressure on the utility to increase access in those "electrified areas", as this would have no impact on national statistics. This creates problems for the utility, as infrastructure has to be financed and maintained, but is partly idle.

In Uganda, the Government with support from various donors puts strong emphasis on extending the national grid, which covers only few parts of the country, but connection rates cannot keep up at the same pace. Similar to the situation described above for Mozambique, there is a significant share of people without access to electricity living within sight of power lines. The Rural Electrification Agency (REA) has the mandate to facilitate the Government's mission to achieve a rural electrification rate of at minimum 22% by the year 2022, increasing the rate from 1% at the beginning of the decade.

2. Sub-sector and technology focus and rationale

National electricity grids are characterized by being natural monopolies typically run by state-owned companies. Therefore, market dynamics in grid electrification projects are so far non-existent. The existing projects have had no real price finding mechanism and relied on direct negotiation between the implementer, e.g. GIZ, and the respective utility, on a contract-by-contract basis. The objective of the RBF project is to **(i)** transform these activities into an RBF approach through introduction of

[7] "Tier 5" means advanced access. See tier systems according to the EnDev methodology, Annual Planning 2015, p. 3-5.

results-based payment of the utility after delivery and **(ii)** introduce an innovative element of competition and price finding through a reverse auction mechanism.

Working with utilities on grid densification in an RBF context has a number of advantages that reduce the usual main challenges of RBF and therefore ensure a high probability of target achievement:

- Utilities are large, state backed companies with pre-financing capacity,
- Grid-based access is a physical, non-moveable infrastructure easy to verify,
- Grid densification builds on existing infrastructure and has the potential to deliver achievements in a relative short period of time.

As a result of making the **RBF challenge fund** a competition on a regional level, it will add a more competitive element on an international level, complementing the existing competition on the national level through competitive procurement of services from electricians, materials and appliances by the utilities.

The RBF approach is pro-poor. Going into already electrified (at least 1 year ago) areas ensures very effective poverty targeting of the incentive. After such time span, all better off families will have already accessed the grid and therefore only those will benefit from the project which have so far not been able to afford the often steep connection fees (e.g. EUR 100-200 in Mozambique, EUR 65-400 in Uganda). In addition to the connection fees, households have to afford in-house wiring and its inspection by the utility or certified electricians.

3. Outline RBF incentive design and implementation

The Grid Densification Challenge Fund follows a simple, cost-effective approach with high potential to deliver target achievement in a relatively short period of time. The RBF project will make use of a reverse auctioning mechanism launching Calls for Proposals (CfP) to national utilities and rural electrification agencies.

The first tranche reverse auctioning will be launched at the beginning of the project through EnDev country projects with already ongoing work in the sub sector. In this initial stage two countries (Mozambique and Uganda) will be invited to prepare proposals. The most cost effective proposal in terms of connection costs will be successful. In 2016, the second tranche reverse auctioning is planned opening up the competition to additional Sub-Saharan African countries. Invitation of the utilities will again be through the local EnDev projects. This ensures that applications are only received where EnDev has sufficient structure on the ground to ensure monitoring of implementation. The involvement of EnDev country projects, their sector knowledge and presence on the ground also adds an additional layer of security to avoid free rides and double funding of projects.

The RBF project will be fully integrated with existing EnDev activities, therefore relying on existing structures and not requiring additional investments in staff or equipment. The approach will be very similar to current and past activities in Uganda and Mozambique, with three main differences:

- Ready-boards and energy efficient lighting will be incentivized.
- The selection of projects will depend on the outcome of a simple reverse auction process, where the different country utilities compete with each other.
- The payment of the utility of the agreed subsidy for the connections realized will be done only after delivery.

The RBF project involves four key stakeholders: GIZ/EnDev, utilities/rural electrification agencies, households and an independent audit firm.

4. Summary of expected impacts

The project expects to achieve the following impacts (for outcomes see KPI table above):

- Improved quality of health
- Reduction of social tension associated with not being able to connect to the national grid while living right next to it
- Reduction of energy expenditure in relation to lighting needs
- Improved access to information and communication means
- Improved perception of personal safety
- Increased quality and usage of lighting
- Increased time available for productive, educational and social activities
- Reduction of reliance on non-renewable energy sources

In addition, there is substantial potential for post-project outcomes (triggered by but not attributable to the project) due to the up-scaling opportunities of the fund:

- It will be open for additional donors.
- It will be highly visible (due to its challenge character).
- It can easily be expanded to other countries and regions.

5. Strategic fit and alignment with national policies

Alignment with national policies, following the principles of Paris/Accra/Busan is an inherent strength of the RBF project approach. As all individual densification projects are proposed and implemented through national utilities and in cooperation with government institutions, country systems are consistently used throughout each step of implementation.

Under the first year of the RBF challenge fund, where Mozambique and Uganda will be specifically targeted, cooperation will be established with utilities and national governments supporting their respective energy policy through the existing EnDev country projects. Similar programmes under the World Bank and DFID Uganda will prove to be an asset and concerns about additionality will be avoided through close consultation in the inception phase.

6. Risk mitigation

The overall risk of the project is assessed as medium. While the project faces no major risk, the following medium risks have been identified and suitable risk mitigation measures developed:

- Low participation in Grid Challenge Fund competition: mitigation measure through closely involving EnDev country projects and their close working relationships with utilities and governmental institutions.
- Price-finding mechanism via reverse auction not successfully replicated post-RBF: mitigation measure to properly document the approach and share information with other donors to increase chance of replication of project approach.
- Residential customers´ monthly electricity fees unaffordable to the poorest of the poor: mitigation measure to target initially two countries with tariff systems providing a solid basis for achieving sustainable access even for the poorer strata of the population.
- Utilities are not interested in the bonus incentive that comes with offering energy efficient lighting and/or ready-boards: mitigation measure to observe, if bonus incentive is taken up and adjust – if necessary – over time.
- Tier 5 access not achieved because, even after being connected to the grid, grid becomes unreliable: mitigation measure to consider as a minimum tier 4 as an achievable level which constitutes a significant improvement to the baseline.

- Grid electricity does not replace fuel-based lighting: mitigation measure to promote efficient lighting through the bonus system.

7. RBF Budget

		EUR
1	Human resources and travelling	56,241
2	Equipment and supplies	0
3	Funding financing agreements/local subsidies	4,132,500
4	Other direct costs	0
5	**Total direct costs (sub-total)**	**4,188,741**
6	Mark up costs/administrative overheads/imputed profit	232,259
7	**Cost price**	**4,421,000**

(Regular EnDev) Nepal

Promoted technology		stoves / hydro / grid			
Project period	old	05.2009 – 06.2018	**Budget (EUR)**	old	6,415,000
	new	05.2009 – 06.2018		new	6,965,000
Target groups		Marginalised, socially excluded and rural poor families of Nepal			
Lead political partner		Alternative Energy Promotion Centre, Government of Nepal (AEPC)			
Implementing organisation		SNV			
Implementing partner		Local Partner Organisations and Clean Energy Development Bank (CEDB), Nepal			
Coordination with other programmes		The project will contribute to the physical installation targets of the Government of Nepal's (GoN) 5 year National Rural Renewable Energy Program (NRREP), implemented by AEPC.			
Summary of key interventions and outputs **Cost efficiency (not adjusted for pre-electrification): EUR 64, down from EUR 125 for the 8 initial sites**		The proposed project will be implemented as an integrated rural community electrification and micro-enterprise development initiative using Improved Water Mill (IWM) technology. The project will provide electricity for lighting at household level and for productive use to support small business development and income generation at rural micro-enterprise level in remote areas of Nepal. The project will be implemented by using the business model, which was derived from the 'proof of concept' and piloting stages of this project. The business model and proof of concept is annexed to this proposal (UP Nepal Annex 1). At household level, the project will provide access to clean lighting, thereby reducing indoor air pollution caused by the use of kerosene lamps. Access to electricity for lighting increases time for productive activities. With higher efficiency and services from IWM electrification, the monthly income of the poor and socially excluded IWM (owner) family has the potential to be doubled. With the implementation of the proposed project 7800 women and men (6 persons x 50 households x 26 IWM units) will benefit directly. In addition, it is expected that by establishing 26 micro-enterprises, there will be 52 direct employment opportunities created by the project, leading indirectly to reduced migration. In close collaboration with AEPC, SNV aims to strengthen the capacity of local partners in the IWM sector (IWM Owners Associations, IWM kit manufacturers, micro-finance institutions and local service centres) for up-scaling IWM electrification where relevant and for ensuring a long term sustainable market.			
Targets		**old targets**	**new targets**		
Energy for lighting / electrical appliances in households		240,637	250,837		people
Cooking / thermal energy for households		148,500	148,500		people
Electricity and/or cooking / thermal energy for social infrastructure		33	33		institutions
Energy for productive use / income generation		1,050	1,086		SMEs
Project manager		Guy Dekelver, SNV, Nepal: Gdekelver@snvworld.org			

1. Situation Analysis

1.1 Energy Situation

Demand and consumption scenario: Nepal is a landlocked Himalayan country with an area of 147,181 km^2 and a population of 28.6 million[8]. It is a Least Developed Country (LDC) with a Human Development Index (HDI) of 0.428[9] and per capita nominal GDP of USD 642. Total energy consumption in Nepal in the year 2009-10 was about 9.4 million tonnes of oil equivalent (401 million GJ) of which some 87% was derived from traditional resources such as wood biomass and animal waste, 1% from small renewable energy sources, and only 12% from hydropower plants and commercial energy sources such as petroleum and fuel products. Petroleum products, which account for about 8% of the total energy consumed, require one third of the foreign exchange earnings to import.

Electricity represents only 2% of the total energy consumption in 2011-12. In the residential sector, biomass contributes about 96% of the total energy consumed. The shortage of power and frequent power outages has severely constrained the growth potential of the country. Nepal's power generation capacity of 706 MW, which is predominantly hydropower, is insufficient to meet growing demands and has led to over 14 hours of load-shedding a day during winter (low river flow) season. Nepal, which built its first hydropower plant in 1911, has an estimated hydropower potential of 42,000 MW, much of which is yet to be developed.

Electricity access: 56% of all households in the country have access to electricity (including off-grid solutions)[10]. On the other hand, 33% of households still depend on kerosene for lighting and only 2,100 out of Nepals 3,915 village development committees (VDCs) are connected to the national grid). Among five administratively defined development regions[11], the Western development region has the highest proportion of households using electricity (63%), while the Mid-western development region has the lowest (34%). As to be expected, urban areas have better access to electricity relative to rural areas (93% versus 49%)[12].

Role of renewable energy and situation of electricity: Based on the low coverage of the national grid, the increasing demand for rural electrification, the availability of alternative energy resources and the need to respond to climate change, it is apparent that renewable energy development and decentralized solutions form a critical part of the overall strategy to combat the energy crisis in Nepal. Renewable energy development is a high priority of the government as it provides an appropriate solution to remote, sparsely populated areas unviable for grid extension, while being clean, safe and environmentally friendly[13]. GoNs goal for the next 20 years is to increase the share of renewable energy from less than 1% to 10% of the total energy supply, and to increase the access to electricity from alternative energy sources from 10% to 30%[14].

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[8] 2012 estimate, Central Bureau of Statistics

[9] Human Development Report, 2010

[10] AEPC Annual Progress Report, FY 2009-10

[11] Nepal is divided into five development regions, namely, Eastern Development Region, Central Development Region, Western Development Region, Mid-Western Development Region, and Far Western Development Region.

[12] Nepal Labour Force Survey 2008, Central Bureau of Statistics

[13] See section 5.4 on co-benefits

[14] Presentation by AEPC on Scaling-up Renewable Energy Program in Nepal, 6 Feb 2011

Rural Electrification: There is significant investment in the rural electrification sector of Nepal, mainly dominated by solar home systems (solar PV) and micro hydro electricity generation in remote areas, with a total coverage of about 10% of the total population. These programmes, though heavily subsidised, are private sector oriented, and its key players have the required capabilities to manage and implement.

The current investment does not cover poorer communities in the remotest areas of Nepal as the investment cost to be borne by users is still prohibitive. For communities who have been operating Traditional Water Mills (TWMs) for centuries, there is significant potential to shift to IWM technology for improving efficiency and generating mechanical power to grind grain faster or to operate oil expellers, hullers, etc. Only a small fraction of the existing 7,000 IWMs have long shafts and produce electricity for community electrification for socially excluded and marginalised communities.

Based on a field study commissioned by SNV, 53 out of Nepal's 75 districts have potential for IWM community electrification. Taking into account that only 50% of the potential sites are in non-electrified areas there are 583 existing potential schemes spread over 35 Districts.[15] The achievable IWM electrification target is estimated at 209 units in the surveyed districts Kavre, Dhading and Sindhuli. SNV has conducted a national baseline for community electrification with IWM technology and micro-enterprise development to provide further clarity on the national potential for IWM community electrification.

Electricity produced from these units can be used for diversified economic and income generating activities and establishment of rural micro-enterprises for grain hulling, oil expelling, carpentry, milk cooling and others, in addition to lighting for households.

The proof of concept and pilot phase of the project demonstrated that diversified use of electricity at household and rural micro-enterprise level is crucial for making a community electrification project effective and widely accepted by communities. A business model has been developed that introduces a credit component, a tariff payment system, mechanical use of power at the water mill site and proper market linkages for micro-enterprises. This way, a self-sustaining revenue model and a commercialisation process are introduced in the intervention of community electrification and micro-enterprise development with IWM technology. This business model, derived from the proof of concept and pilot stages will now be used to initiate the up-scaling process of IWM electrification (IWM-E) through a full-fledged IWM community electrification project in selected districts of Nepal.

With EnDev support, SNV aims to intensify and upscale IWM community electrification by providing technical assistance to the implementing partners like Centre for Rural Technology and IWM stakeholders (IWM / Ghatta Owner Association and the private sector) to develop a reliable and sustainable community electrification solution for rural Nepal.

SNV assesses that this programme can be successfully rolled out in selected districts, given that: **(i)** there is long institutional learning of SNV and its partners in the IWM sector; **(ii)** communities have high level of acceptability of IWM technology; **(iii)** other competing renewable energy technologies (RET) (like micro hydro) are not possible in the area due to technical reasons and **(iv)** that there is strong support from key actors (including high priority setting of the government) and **(v)** having a market-led financial mechanism in place, where grants from donors (like EnDev) are being reduced and project equity and credit are increased up to 55% of the total project cost. It is by moving

[15] Final report on National Baseline of Community Electrification of Improved Water Mill and Micro-Enterprise Development, SETM, October 2014.

towards a market led approach with the introduction of credit financing and tariffs that this EnDev intervention presents an important break with the purely grant based and civil society led business as usual scenario. Towards the end of this EnDev intervention, a joint analysis will be made as per the support needs to allow scaling of IWM electrification without additional grant support.

1.2 Policy Framework, Laws and Regulations

For over two decades, the GoN has been striving to increase access to modern energy services in remote rural areas, and more recently through the enactment of national policies and plans. The policies include the Rural Energy Policy (2006), Subsidy Policy for Renewable (Rural) Energy (2009, currently under review) and the Renewable (Rural) Energy Subsidy Delivery Mechanism (2010). They provide detailed guidelines on the institutional mechanism, subsidy criteria and delivery mechanisms, including the setting up of a Renewable Energy Fund (REF). The subsidies, usually co-financed with donor funds under specific projects or programmes, are primarily aimed at supporting low income rural households to access environmentally friendly energy services. Other relevant energy sector policies include the following: Hydropower Development Policies (1992 and 2001), Water Resources Act (1992) and Electricity Act (1992), Nepal Electricity Regulatory Commission Bill 2064 (2007-08), National Electricity Crisis Resolution Action Plan (2008) and National Energy Strategy (2009). IWM promotion and scaling features in the Governments' planning documents and the GoN has provisioned NPR 60,000 per kW subsidy for IWM Electrification up to 5 kW. It is expected that this subsidy policy of GoN will boost community electrification with IWM technology and will catalyse socio-economic benefits for rural and remote communities. Till date though, there is lack of detail in implementation modalities and guidelines relating to the Subsidy Policy and there is little knowledge regarding renewable energy related policies at district and village level.[16] Strengthening decentralized planning capacities is being picked up by other programmes such as the National Rural and Renewable Energy Programme (with the Royal Norwegian and Danish Embassies as lead donors), with extra support being foreseen by GIZ. At present, this means that for IWM electrification, there is a focus on accessing district level subsidies, such as in the case of Sindhuli, where NPR 50,000 is provided per kW, based on power output verification of completed sites. Over time, further proportionate reduction of IWM grants is envisaged, based upon increased accessibility to central subsidies in the financing mix of IWM-E sites.

Other enabling measures introduced by the Government of Nepal include the establishment of national, district, and community rural energy funds, tax and duty concessions and the exemption of mini, micro and pico hydro projects from royalties and licensing requirements.

1.3 Institutional Set-up in the Energy Sector

The institutional set up in the IWM and pico hydro sub-sector is managed by the below institutions:

- **Ministry of Science, Technology and Environment (MoSTE):** the main objectives of MoSTE include promotion of sustainable development through environmental protection; conservation and promotion of the natural environment and cultural heritage of the country; creation of a clean and healthy environment through the conservation of life-supporting elements comprising air, water, and soil; poverty alleviation through

[16] RERL Programme document

environment related research activities; and coordination of adaptation and mitigation programmes to minimize the negative impacts of climate change;

- **Alternative Energy Promotion Centre (AEPC):** established in 1996 by GoN to promote the use of renewable energy and the efficient use of energy, particularly in rural areas, AEPC is a semi-autonomous Government body under the MoSTE. It is governed by a Board, comprising nine members representing the government, private sector, non-governmental organisations (NGOs) and financial institutions. The main objectives of AEPC are to develop and promote RETs and energy efficiency to raise the living standard of the people, to reduce the negative impacts on the environment due to the use of traditional sources of energy and to develop commercially viable alternative energy technologies in the country. AEPC's mandate in the hydropower sector has hitherto been limited to the development of projects up to 1 MW, although in reality its experience has only been in off-grid micro-hydro power projects which are off-licence, subsidy-supported and less than 0.1 MW in capacity. Under the AEPC Bill, the threshold has been revised upward to 5 MW, and it is expected to reach 10 MW. In terms of IWM technology, there are strong indications that AEPC, in it's ongoing revision of the NRREP targets wants to increase the target for IWM installation, based on the current progress and good performance, showing their strategic interest in the sector.

1.4 Major Donor Activities

The promotion of IWM by GoN in cooperation with external development partners has been taking place from the 1970s. The local endeavour of replacing wooden shaft and turbines was initially supported by the GIZ/GATE project. SNV, on behalf of the Dutch Directorate General of International Cooperation (DGIS) supported GoN (2003-10) through the Improved Water Mill Programme under the Renewable Energy Sector Support (RESS) Programme. After 2010, IWM fell under AEPC's Energy Assistance Programme (ESAP) and from 2012 till present IWM comes under the Community Electrification Component of AEPC's multi-donor supported National Rural and Renewable Energy Programme (NRREP).

Major Historical Events of IWM Development in Nepal, all focusing on mechanical power:

Stages of Development	Year	Donors, partners and implementing agencies	Policy/Programme	Technology Aspect
Pioneering and research Technology introduction	1984-1988	Research Centre for Applied Science and Technology, Tribhuvan University	----	Prototype of an IWM replacing the wooden paddles by hydraulically more efficient wooden blades, and a new bottom bearing.
Internalization and expansion		Kathmandu Metal Industries (KMI)		Low scale Multi-Purpose Power Unit (MPPU) consisting of a metal runner, a metal axle and bearings
Market development	1984-1988	GIZ/GATE	"Activating Traditional Indigenous Techniques" mainly in Dhading; 80 mills improved for hulling.	MPPU
	1991-1993	GIZ/CRT-N	"Dissemination of Improved Water Mill in Rural Villages of Nepal" supported by GTZ in Kabhrepalanchok and Sindhupalchok; 54 mills improved	IWM
	1993-1996	CRT‐N with GIZ support	211 mills improved in various districts	IWM
	1996-1999	GIZ/CRT-N with collaborative efforts of Ministry of Local Development, NGOs, banks and local manufacturers	Supported by GTZ; 287 mills improved	IWM
Market expansion and regulation	2002 - 2010	AEPC, SNV (DGIS) Accredited kit manufacturing firms, GOAs, SCs	IWM Support Programme; By December 2010, a total of 6,349 water mills were improved, including 23 long shaft for multiple end use and 7 for electrification	IWM
Integration with ESAP Programme	2010-2012	AEPC (ESAP) funded by SNV, NORAD and DANIDA	IWM Programme under ESAP. A total of 7,500 water mills.	IWM
NRREP adopts IWM Programme	2012 July	AEPC as executing agency for multi donor funded single RE programme NRREP	IWM comes under the community electrification component of NRREP	IWM

Source: Improved Water Mill Programme (IWMP), AEPC, 2013

2. Project Approach

2.1 Energy Technologies and Services Promoted by the EnDev Project

The proposed project aims to use IWM Long Shaft (LS) technology to generate electricity for village electrification with the potential for communities to take on a larger loan for installing a cross flow turbine. Electricity generated from IWM electrification will be used for household lighting[17] and for small, rural micro enterprises. Households that have no access to grid electricity rely on substitutes such as kerosene oil for their lighting needs. Kerosene lamps are not only a poor source of illumination, but are also polluting, unsafe and subject to irregular and unreliable supply. IWM electrification will provide a clean source of household energy to the community. Selected project villages do currently not have access to the electricity grid and are not planned to be connected in the near future.

IWM electrification technology has been progressing satisfactorily over the last few years. During the proof of concept stage of the programme, improvements in electromechanical equipment have been incorporated for better output efficiency and increased durability and overall increment in the life of IWM-E systems. During the pilot phase, SNV's local partners like DL Energy Pvt. Limited (IWM installation company) have developed turbines comprising of a robust metallic structure which reduces vibration, as well as an efficient nozzle with discharge control mechanism and higher output efficiency. Single phase synchronous generators will be used to generate electricity, since they can operate small capacity motors which can bring diversity in PEUs. Besides, the pilot has also introduced cross flow turbines. Hence, the up-scaling project will have menu options of both cross flow and generally used IWM turbines. A detailed technical description is enclosed in the report on 'Proof of Concept' (see UP Nepal annex 1).

Except for the generators, which will be imported from India, all components used in the project will be fabricated in Nepal by local manufacturers. Installation and testing will be done by local companies. For repair and maintenance, supplies will be available in the local market. The distribution model of the project will be built upon community participation and involvement of local operators and IWM owners. In the course of this intervention, further opportunities to reduce the investment on a mill without compromising on quality and opportunities for the use of low power appliances available in the Nepali market will be identified.

Site selection is the first and a key step in this IWM community electrification intervention. The proof of concept stage of the programme has designed a site selection methodology, based on field tested guidelines, consisting of technical, social and economic parameters. A detailed list of site selection parameters is provided in annex (see UP Nepal annex 2).

In terms of **credit provision**, the Clean Energy Development Bank (CEDB) and SNV have designed a tailor made credit component for IWM community electrification, which will have a maximum interest rate of 18% and the best plausible collaterals for the credit will be the machineries of the

[17] The energy demand scenario in rural Nepal is mainly for cooking, lighting and powering electrical appliances like television, radio etc. For cooking, rural poor communities are dependent on improved cookstoves, biogas and in certain cases liquid petroleum gas. Based on the residential demand analysis, carried out in the baseline report of SNV, it is found that in a rural household of Nepal, total demand of electricity is around 40 W (4 * 7 W CFL lamps + 1 * 12 W) of power and around 3 kW mechanical power for industrial load. Therefore, IWM with 3 kW capacity will be sufficient and appropriate technology to operate industrial load of 3 kW power and supply electricity to more than 50 households.

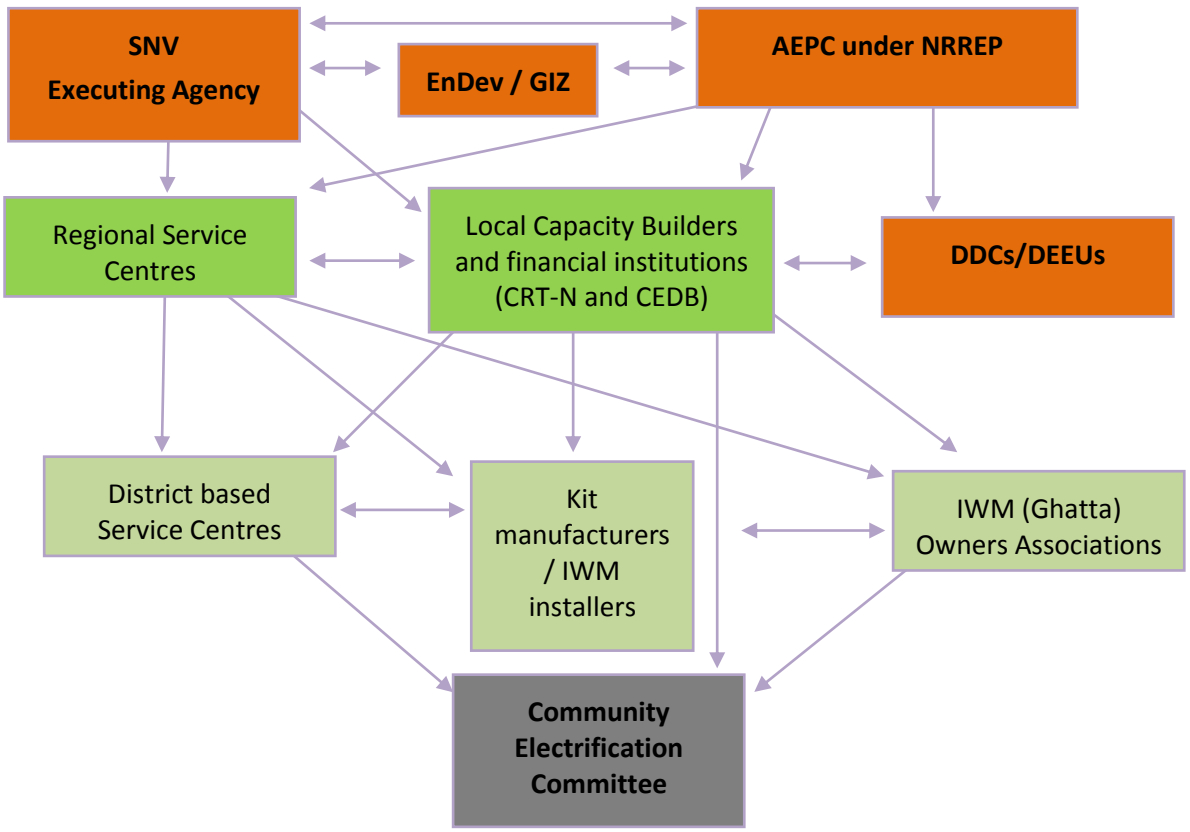
electrification component of the IWM unit. CEDB has identified its preferred local credit partners in Sindhuli, Kavre and Dhading. These local partners will be responsible for working together with CRT‐N for demand creation for credit sub-component as well as assisting CEDB in supervising the credit funds. With no defaulters till date, experiences from the pilot phase are promising. CEDB will establish the credit fund under its deprived sector lending. CEDB will have access to own funds for establishing this credit fund (which amounts to EUR 77,350 for 26 IWM electrification units). With this investment, CEDB will be able to work towards a purely market-led credit fund for renewable energy sector development in Nepal. In addition to CEDB, other banks, local cooperatives and microfinance institutions will also be encouraged to take part in the credit lending.

2.2 Project Governance

In terms of operational structure, the project will be managed by SNV, who will be responsible for technical assistance and overall project management and quality control in line with EnDev and NRREP requirements. Local partners will support SNV for ground level implementation and will be responsible for demand creation, training of construction teams, awareness raising about IWM-electrification benefits and supply side management. In addition to CRT‐N, other competent Regional Service Centres (RSCs) and financial institutions will play a critical support role in demand creation. At the field level, implementation of the project will be supported through existing structures such as District Development Committee (DDC) / District Energy and Environment Unit (DEEUs), local partner organizations and IWM owners. The project will directly contribute to NRREP targets. To ensure strong government support and backing for the project and ultimately integration into NRREP, an MOU will be discussed and signed with the AEPC who will provide policy guidance.

The project governance mechanism is shown in figure 1.

UP Nepal Figure 1: *project implementation structure*



Based on the current cost estimation for a single 3 kW IWM electrification unit, it is found that the required capital investment is EUR 8,500. It is planned that 45% of this investment (EUR 3,825) will be a grant from EnDev and that 35% will be credit from CEDB (EUR 2,975), with the remaining 20% being the equity investment from the communities in the form of cash and labour.

It is important to note that there will be no grant component to support micro and small enterprises of the programme, however, there will be credit support available to these enterprises from CEDB.

It is expected that the loan to communities and/or micro-enterprise owners can be repaid back with the revenue, which will be generated from the tariff and business profits of micro-enterprise. The revenue model, developed in the proof of concept stage depicts that both the tariff revenue and revenue potential from the micro-enterprise can reach the financial breakeven point in the 3rd year of the project cycle. The Internal Rate of Return with credit and grant component amounts to 25%. On average, in the baseline scenario, households spend NPR 115 per month[18] to pay for different energy sources (candles, kerosene and batteries) used for lighting and they indicate to be willing to pay NPR 150 for tariffs and NPR 240 to pay for the usage of electricity and additionally repay credit debt.[19] Based on pilot stage realities, we see that end users actually end up paying up to double that amount, showing their ability to pay.

The project will initially continue to be implemented in Kavre, Dhading and Shiduli districts of Nepal, based on market demand and supply, as presented in the national baseline on community electrification with IWM technology. Project planning and design will build in the necessary flexibility in the overall approach to enable future scaling up to new districts, incorporating the learnings and experience gained from implementation in the initial districts. Overall, we believe the project implementation will avail critical data to provide inputs to the design of a national up-scaling strategy.

2.3 Energy for lighting/electrical appliances in households

Based on the lessons learned from the pilot phase, it is found that for developing an IWM electrification unit with reduced subsidy and increased contribution from the community (through equity and loans from financial institutions), one of the key factors is ownership of the land where the IWM-E unit will be installed. It is noted that with community owned land, credits and community equity contributions are relatively easy to come by, compared to establishing a unit on privately owned land (like long shaft IWM owners). On the downside, greenfield units on average come at a EUR 2000 cost premium, compared to a retrofit unit (long shaft to IWM-E). During the up-scaling phase of the project, with individual sites needing tailor made solutions, SNV will target both greenfield and retrofit units with a priority of promoting community owned units. The budget is prepared on the basis of a greenfield scenario.

The project will provide technical assistance and capacity development services to IWM stakeholders (IWM owners, service providers, Ghatta Associations, local implementing agencies and regional service centres) under the overall policy guidance of AEPC and NRREP. The project will have seven key components, which will help to: create demand for IWM electrification and diversified use of electricity; enhance performance of IWM electrification stakeholders; introduce a transparent and

[18] Solar Pico PV market potential in Nepal, SNV, 2014

[19] Assessing the potential of rural households to contribute to small hydroelectricity projects: the case of IWM-E in Nepal, F.a. Verkuijlen, June 2014.

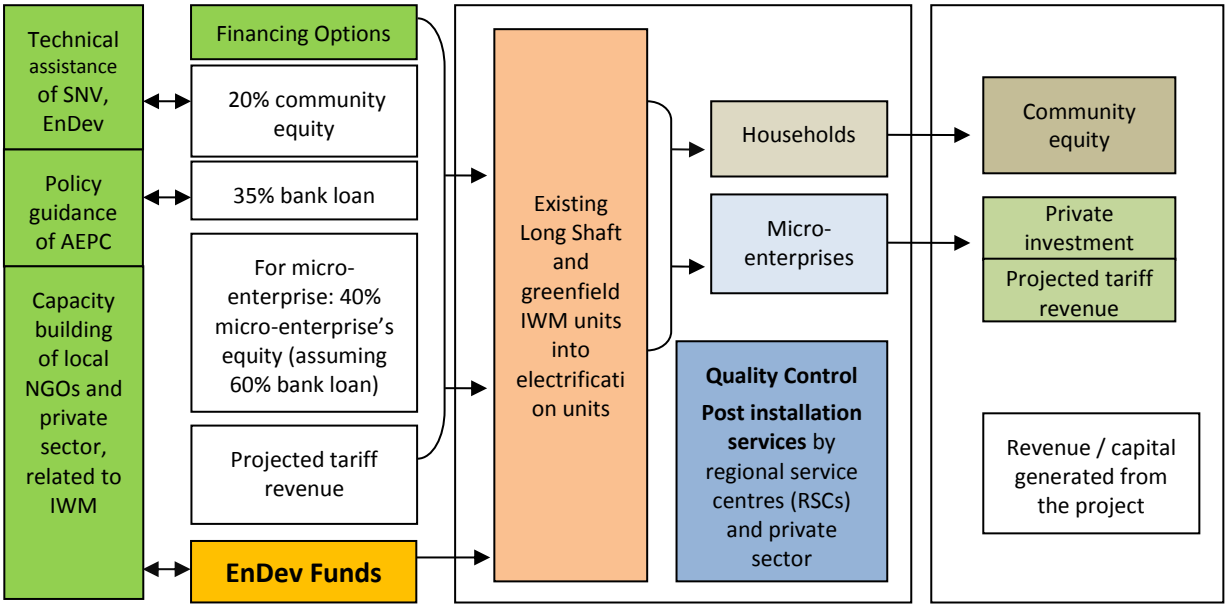
efficient monitoring and evaluation system and design a way forward, beyond 2016. See components and activities below.

Outcome	Activities	Timeframe
Component I **Increased demand for IWM electrification and diversification of use for productive activities**	Develop awareness and demand creation strategy/plan for IWM electrification at household and enterprise level. Community involvement for demand creation will be led by district level service centres and district development committees (DDCs).	Month 1 – 2
Component II **Capacitated IWM electrification stakeholders for improved performance to install and manage IWM electrification units**	Development of programme implementation plan in partnership with AEPC and key IWM stakeholders (including training for kit manufactures, installers, local capacity builders, regional and local service centres).	Month 1 – 3
Component III **Increased number of households supplied with electricity**	Install IWM-electrification units and connect to individual HHs.	Month 4 - 17
Component IV **Established rural micro-enterprises for enhanced and market-led productive end usage of off-grid electricity and mechanical power (business linkages)**	Identification of agriculture value chain (rice, wheat and maize for hulling; spices for grinding; rapeseed and mustard for oil expelling) and other potential productive end uses (service provision; poultry farming; …). Entrepreneurship development training to micro-enterprises, including business planning, accounting, product log book management, pricing etc. Community electrification committee basic financial and management training Install IWM-electrification units and connect to micro-enterprises.	Month 3 - 17
Component V **Financing: increased access to appropriate financing (local financial institutions)**	Broker access to finance along the supply chain (IWM owners, households and micro-enterprises) in cooperation with financial institutions. This includes the development of innovative end user payment models matching the household's irregular cash flows.	Month 1 - 12
Component VI **Monitoring and Evaluation**	Site specific IWM electrification baseline survey: gathering basic data (household details, financing scheme, ownership, etc.). Site verification visits and 6-monthly user surveys (both at household and micro-enterprise level): people served, fund details, PEU business case monitoring; distribution channel monitoring and knowledge development for scaling up.	Month 1-5 Month 6 Month 12 Month 18
Component VII **Post 2016 planning**	AEPC owned and supported exit planning or identification of further support needs to allow scaling of IWM electrification without additional grant support, based on the results of the project and a clearly defined theory of change.	Month 12- 18

As illustrated in figure 2 and designed in the proof of concept stage, there will be a logical sequence of activities, from needs assessment over identification of financial streams and their uses to continuous maintenance, quality control and post installation services to the installed IWM units. To supply electricity to individual households and rural micro-enterprises, local village power distribution centres (power houses) will be established. From these power houses (managed by the IWM community electrification committee), synchronization of the produced electricity as well as

monitoring and regulation of the electricity production, distribution and consumption will be done. Based on the tariff mechanism as designed in the proof of concept stage, a business oriented tariff system will be introduced to ensure sustainable operation of installed IWM units.

UP Nepal Figure 2: *conceptual framework of IWM community electrification*



Roles and responsibilities of project stakeholders

- **SNV:** overall project management (project oversight, technical assistance and reporting);
- **Alternative Energy Promotion Centre (AEPC):** nodal government agency, responsible for the enabling environment through providing strategic inputs towards the way forward, coordination, support to local organisations in implementing the project and subsidy provision;
- **District Development Committee (DDC) and District Energy and Environment Unit (DEEUs):** district nodal agency, which will provide policy guidance to the programme in selecting sites and meeting the development needs of the districts;
- **Village Development Committee (VDC):** for social mobilisation, planning and support;
- **Local partners and regional service centres:** responsible for project execution at ground level;
- **CEDB:** Clean Energy Development Bank will in the initial stages be responsible for managing and disbursing the credit component of the programme from its own funds;
- **Financial Institutions/Cooperatives:** for long term commercial and financial sustainability, more local cooperatives, District Cooperative Offices and selected Financial Institutions will be gradually involved;
- **Manufacturers and Installation companies:** kit manufactures will produce quality kits as per a standard design while the installation companies will install and maintain units. Both of these will be responsible for after sales service and warranty of the products supplied;
- **Service Centres:** local service centres will facilitate the feasibility study process of the projects and will assist with installation and servicing;
- **Ghatta Owners Associations:** the representative body of Ghatta Owners Associations will facilitate and promote IWM/Electrification projects in the selected districts;

- **Community Electrification Committee:** responsible for up-front investment, management and electricity usage, based upon operational guidelines on tariffs, maintenance and repair funds, servicing of the equipment, role divisions, etc.
- **Others:** opportunities to leverage the IWM-E intervention to potential other initiatives in the project area (irrigation, enterprise development, etc.) will be explored to create extra value where relevant.

2.4 Energy for productive use / income generation

IWM electrification units will be useful to supply mechanical energy that can be used directly or be converted to electrical energy through a generator, for use in refrigeration, milling or a number of other productive uses, such as rice hulling, oil expelling, etc. In the project, provision will be made to provide access to electricity for 26 micro-enterprises. These enterprises will be selected based on a market-led approach, in which, a thorough analysis will be carried out to examine the market feasibility of enterprises, supply side management, links to the commercial market, entrepreneurship development, etc. The objective of this analysis will be to maximise productive use of electricity.

3. Expected Impacts of the Project Intervention

The objectives of the project are to provide clean, renewable energy for lighting purposes and to strengthen small scale enterprise development in rural and remote areas of Nepal. The suitability of IWM technology hinges on the full participation of the target beneficiaries throughout the implementation phase of the project.

At household level, the project will provide access to clean lighting solutions, thereby reducing indoor air pollution, caused by the use of kerosene lamps. Access to electricity for lighting increases time for productive activities. In addition, with higher efficiency and services from IWM electrification, the monthly income of the poor and socially excluded IWM (owner) family has the potential to be doubled. With the implementation of the proposed project it is expected that up to 7,800 men and women (6 persons X 50 households X 26 sites) will benefit from the project. It is also estimated that by establishing 26 micro-enterprises, there will be 52 direct employment opportunities.

As capacity building, ownership and technology transfer are major features of the project, it is anticipated that, in the long run, the project will bring tangible benefits to communities and help to create better employment and income generating opportunities for households and small businesses. Creating buy-in and ownership, including in the operation and maintenance of IWM units, helps to create a market and ensure long term sustainability of the sub-sector. Entrepreneurship development is also expected to boost the number of entrepreneurs working with IWM technology.

Electricity generated by this project provides a large number of rural households with electricity and power for lighting, milling and other needs. Off-grid IWM systems not only help in poverty alleviation but also have direct local environmental benefits, such as:

- reduction in kerosene consumption by replacing kerosene for lighting;
- reduction in use of dry cells used to operate radio and torchlights, leading to reduced chemical pollution of the local environment and also reducing the health hazard resulting from the exposure and contact with these chemicals.

Aside from the environmental benefits, the project will benefit other areas of the Sustainable Development Agenda, such as:

- plants constructed under the project will be managed and operated by the community, institutions or private entrepreneurs leading to local empowerment;
- skills development and training for operation, repair and maintenance for the smooth operation of installations will enhance the skill set of local people;
- electrical and additional mechanical end-use enterprises will lead to opportunities for self-employment at local level.

Outcome	Output
Component I **Increased demand for IWM electrification and diversified use of energy for productive activities**	• 10 awareness raising events held; • 1300 households and 26 micro-enterprises enter into agreements with regional/district service centres to use electricity for lighting and productive end use.
Component II **Capacitated IWM electrification stakeholders for improved performance to install and manage IWM electricity units**	• At least 10 IWM technicians, 5 kit manufactures and 4 regional/district service centres attend and complete training, to subsequently be actively involved.
Component III **Increased number of HH supplied with electricity**	• 7,800 men and women use electricity for lighting.
Component IV **Established rural micro-enterprises for enhanced and market-led productive end usage of off-grid electricity (business linkages)**	• 26 micro-enterprises use electricity for productive end use; • 26 community electrification committees use basic financial and management skills; • at least 52 women and men directly earn an income; • at least 6 supply contracts are signed between IWM owners and retailers for processed foods like spices, grain and flour.
Component V **Financing: increased access to appropriate financing (local financial institutions)**	• Development of sound financial products for lending with local financial institutions; • at least three workshops on local financing for IWM electrification. • loan agreements signed where needed
Component VI **Monitoring and Evaluation**	• Site specific baseline reports • IWM electrification units installation record • Site verification visits and user survey reports from both household and micro enterprise point of view. • At least 2 companies are actively involved with IWM-E installation
Component VII **Post 2016 planning**	• EnDev support exit/up-scaling plan developed based on a solid theory of change and with clear AEPC owned approach for scaling IWM electrification (without additional grant support)

The key impacts, expected from the programme are presented below.

Key impacts	Possible indicators
Environment	Communities use water resources sustainably and produce hydroelectricity without any significant negative impact on the environment.
Health	7,800 men and women benefit from electrification (lighting) and avoid using kerosene and other harmful fossil fuels for lighting.
Poverty / livelihood	Neighbouring families receive end use services in terms of hulling, milling and oil expelling. With higher efficiency and services from IWM electrification, the monthly income of the poor and socially excluded IWM (owner) family has the potential to be doubled.
Education	The project will free up time for education.
Governance	The project helps to establish 26 community electrification committees for effective governance and management of individual IWM electrification units. Business enterprise level governance is also introduced at the SME level.

4. Possible risks and potential ways to mitigate them

Indicators	Risk	Description	Status	Risk level	Mitigation Plan
Annual kWh produced by IWM units	May vary based on actual power output for each IWM site	To be considered while selecting sites	Identified	Low	Project specific baselines to define and mitigate the risk
Number of additional customers reached	The expectation and demand of end users can be different and can't be met with the power produced	Demand of customers can vary between enterprises. But owing to the limited electricity production, there will be feasibility only for micro and small enterprises	Identified	Low	A site specific project feasibility study will be conducted for each site and this risk will be mitigated in the implementation plan
Number of EURO leveraged for EnDev investment	Leveraging fund can be different for each IWM unit	Leveraging funds need to be generated to the maximum	Identified	Low	EnDev fund is crucial –continuous fine tuning of the business model, based on lessons learned
Household connections	Abuse of household connections	Households pulling more power than agreed according to tariff	Identified	Medium	Community policing/social control is working well. Use of adapted current limiting devices.
Pre electrification	Increased cost per person reached	Reduced impact figures as a result of pre-electrification	Identified	Medium to High	A limit to community pre electrification will be included in the site selection criteria

Indicators	Risk	Description	Status	Risk level	Mitigation Plan
Distribution of households	Thin spread of households	Length of distribution lines	Identified	Low	Explore battery charging solutions for isolated households falling outside a predefined perimeter
Capacity development of farmers for IWM use	Capacity gaps and needs for capacity development will be different for each IWM site	Capacity of SMEs, farmers and other stakeholders will be different and hence we need to design customized capacity development programmes for each category of project stakeholders	Identified	Low	A capacity needs assessment of key stakeholders is in place as part of the national baseline report. On commissioning the project activity, an appropriate mitigation plan will be designed to mitigate this risk
Credits are available to farmers	Willingness to borrow loan/credits	Farmers and SMEs need timely awareness on the importance of a credit facility	Identified	Low	Awareness programme on the importance of credit facility is an integral part of this proposal
Tariffs	Tariff setting	Tariff setting too low to manage system maintenance	Mitigate	High	Guidance on differentiated tariff setting
Sound business development knowledge of entrepreneurs	Business development knowledge and accounting, marketing skills of SMEs are grossly missing in the project area	Without business and market development skills SMEs cannot run commercially viable businesses	Identified	Medium	A detailed business development training related project activity is developed as part of the programme. Business Development Manual is ready to use. 6-monthly user surveys
IWM installers	Limited presence of IWM installers	Lack of turnkey IWM installers	Identified	Low	Involve a diversified set of qualified actors, increasing competition in the market
IWM technology has sufficient power output	The power output will depend on the technical feasibility of the project	the availability of water and installed capacity of IWM unit will be different	Mitigate	Low	SNV has developed site selection guidelines to select sites which will have above 3 kW power output throughout the year

Indicators	Risk	Description	Status	Risk level	Mitigation Plan
Community and farmers are taking part in the programme with their own equity investment	Availability of farmers equity depends on community consensus	Community consensus development process is long and complex	Mitigate	Low	SNV, RETSC, CRT and CEDB provide direct support to community and facilitate in building consensus on community equity
Repair and post - installation care knowledge	Post installation care is an often neglected part of any project	Repair and post-installation care manual and training programme is necessary	Mitigate	Low	Repair and post-installation care manual and training programme is developed
The rate of interest of the credit portfolio needs to be less than or equal to 12%	Developing this ROI (12%) is a challenge	The current prime lending rate is 15% and therefore CEDB has a risk to develop this concessional loan portfolio	Mitigate	Medium	CEDB has decided to make this loan portfolio available under the Deprived Sector Lending of Nepal, which is mandatory under the Govt of Nepal financial policies for commercial banks. The ROI in Deprived Sector Lending of Nepal cannot be above 12%
Micro-finance institutions need to be active	MFIs capacity needs to be developed	There are capacity gaps on developing energy linked MFI projects in Nepal	Mitigate	Low	MFIs capacity development plan is developed
Awareness on micro-credits and credit facilities	Awareness creation and MFIs capacity needs to be developed	MFIs need to be aware about the IWM and SMEs operations	Identified	Low	Awareness plan will be developed
Farmers receive capacity development support	Business development knowledge and accounting, marketing skills of SMEs are grossly missing in the project area	Without business and market development skills SME cannot run commercially viable businesses	Mitigate	Low	A detailed business development training related project activity is developed as part of the programme. Business Development Manual is ready to use

5. Budget

		EUR
1	Human resources and travelling	0,000,000
2	Equipment and supplies	0,000,000
3	Funding financing agreements/local subsidies	499,739
4	Other direct costs	18,325
5	**Total direct costs (sub-total)**	**518,064**
6	Mark up costs/administrative overheads/imputed profit	31,936
7	**Cost price**	**550,000**

UP Nepal Annex 1: Rural Community Electrification with Improved Water Mill Technology and Micro Enterprise Development in Nepal. [Proof of Concept] 2013

http://www.snvworld.org/en/countries/nepal/publications/improved-water-mills-with-electrification-proof-of-concept

UP Nepal Annex 2: Site selection criteria

Technical guidelines:

- source of discharge must be perennial river/stream providing design discharge of more than 40 liters per second (lps) throughout the year;
- intake must be selected at safest place available (chances of landslides should be low);
- headrace canal having shortest route (15 meter) to fore-bay should be selected. Canal alignment must be safe from landslide;
- fore-bay site should be large enough (minimum 12.5 m^2) to construct as per design. The site must be selected to minimize head-loss and should have passage to spill over excess water. The site must be safe from landslide;
- penstock profile must be stable and not very steep. The site must be safe from landslide. Maximum design head should be 30 meter;
- the area for powerhouse site should be big enough (minimum 20 m^2) to incorporate all electromechanical equipment. Land should be stable and safe from landslide and flood;
- shortest transmission/distribution route (maximum 2 km) from the power house must be selected to ensure least power loss during transmission/distribution;
- there is no grid connection near to the village where IWM community electrification is taking place (minimum 2 km near to the village), nor are there plans to be electrified in the foreseen future.

Socio- economic guidelines:

- the sites must be near the road-head and not more than 20 km from an identified market place;
- site should be near the settlement, which should not be very scattered (maximum 1 km radius from the IWM site);
- no water use conflict should be present in the village of the selected site;
- no conflict among the community members regarding constructing and operating the IWM-E;
- community and IWM/traditional water mill owner must be ready to invest at least 20% of the total project cost (in cash and/or in kind);
- financial institutions must be accessible and willing to provide loans to the community for IWM units.

Productive end-use guidelines:

- community/IWM owner must be ready to operate at least 1 productive end use and 1 micro enterprise using the electricity from IWM-E project;
- there should be market channels/mechanism present, e.g. village market, linkage with town market, presence of village cooperatives or financial institutions;
- availability of agro/forest based products in the village;
- rural micro-enterprise or individual entrepreneurs must have necessary skills for promoting their activities (vocational skills, market knowledge, accounting etc.);
- rural micro-enterprise or individual entrepreneurs must have minimum 40% own equity investment available and shall be eligible for taking credits/loans from financial institutions.

G. Annex to Annual Planning Update 2015

Please refer to the separate .zip file for the Full Proposals of the third round of the EnDev RBF facility.

Abbreviations

ABPP	Africa Biogas Partnership Programme
ACCS	Advanced Clean Cooking Solutions project
ADES	Association pour le Développement de l'Energie Solaire, Switzerland
AEPC	Alternative Energy Promotion Centre
AMC	advanced market commitment
BMZ	German Federal Ministry for Economic Cooperation and Development
BoP	Base of the Pyramid
CDM	Clean Development Mechanism
CEDB	Clean Energy Development Bank
CfP	Call for Proposals
CLASP	Collaborative Labelling and Appliance Standard Program
CSC	Customer Service Centres
CSI	Credit Sanctioning Incentive
CU	Concern Universal
DDC	District Development Committee
DEEU	District Energy and Environment Unit
DEZA / SDC	Swiss Agency for Development and Cooperation
DFAT	Australian Department of Foreign Affairs and Trade
DFID	UK Department for International Development
EAC	East African Community
EnDev	Energising Development programme
ESAP	Energy Assistance Programme
ESMAP	Energy Sector Management Assistance Program
FA	financial assistance
FONERWA	national climate change and environment fund, Rwanda
GACC	Global Alliance for Clean Cookstoves
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
Global LEAP Awards	Global Lighting and Energy Access Partnership
GoN	Government of Nepal
GoU	Government of Uganda
GoV	Government of Vietnam
GVEP	Global Village Energy Partnership
HAP	household air pollution
HDI	Human Development Index

HH	households
HIVOS	Humanistisch Instituut voor Ontwikkelingssamenwerking
HQ	headquarters
ICS	improved cookstove
IDCOL	Infrastructure Development Company Limited, Bangladesh
IFC	International Finance Corporation, World Bank Group
IWM	improved water mills
IWM-E	improved water mill electrification
KEBS	Kenyan Bureau of Standards
KPI	key performance indicator
KPT	kitchen performance test
LDCs	Least Developed Countries
LED	light emitting diode
LS	Long Shaft
M&E	monitoring and evaluation
MARD	Vietnam: Ministry of Agriculture and Rural Development
MEMD	Ministry of Energy and Mineral Development, Uganda
MEP	Ministry of Energy and Petroleum, Kenya
MFA / DGIS	Netherlands Ministry of Foreign Affairs Directorate-General for International Cooperation
MFA-NOR	Norwegian Ministry of Foreign Affairs
MFEPD	Ministry of Finance, Economic Planning and Development, Malawi
MFI	micro finance institution
MHP	micro hydropower
MME	Cambodia: Ministry of Mines and Energy
MoSt	Laos: the Ministry of Science and Technology
MoU	Memorandum of Understanding
MPPU	Multi-Purpose Power Unit
MRC	Market Regulation Committee
NAMA	Nationally Appropriate Mitigation Action
NAPA	National Adaptation Programmes of Action
NRREP	National Rural and Renewable Energy Programme
NSSP	National Social Support Policy
OTC products	over the counter products
picoPV	pico photo voltaic
PU	productive use of energy

PW	Public Work
QPI	Quality Plant Incentive
RBF	results-based finance
RBFF	results-based finance facility
REF	Renewable Energy Fund
RESS	Renewable Energy Sector Support Programme
RET	renewable energy technologies
RSC	Regional Service Centres
RVO	Rijksdienst voor Ondernemend Nederland
SACCO	Savings and Credits Cooperative
SCT	Social Cash Transfer
SHS	solar home system
SI	social institutions
SME	small and medium enterprise
SNV	Stichting Nederlandse Vrijwilligers / Netherlands Development Organisation
SSC	Stove Selection Committee
SWH	solar water heaters
TA	technical assistance
TWM	Traditional Water Mills
UF	Foundation of Eduardo Mondlane University
UNFCCC	United Nations Framework Convention on Climate Change
VDC	village development committees
WB-ESME	Energy Small and Medium Enterprise
WHO	World Health Organisation
WTP	willingness to pay

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