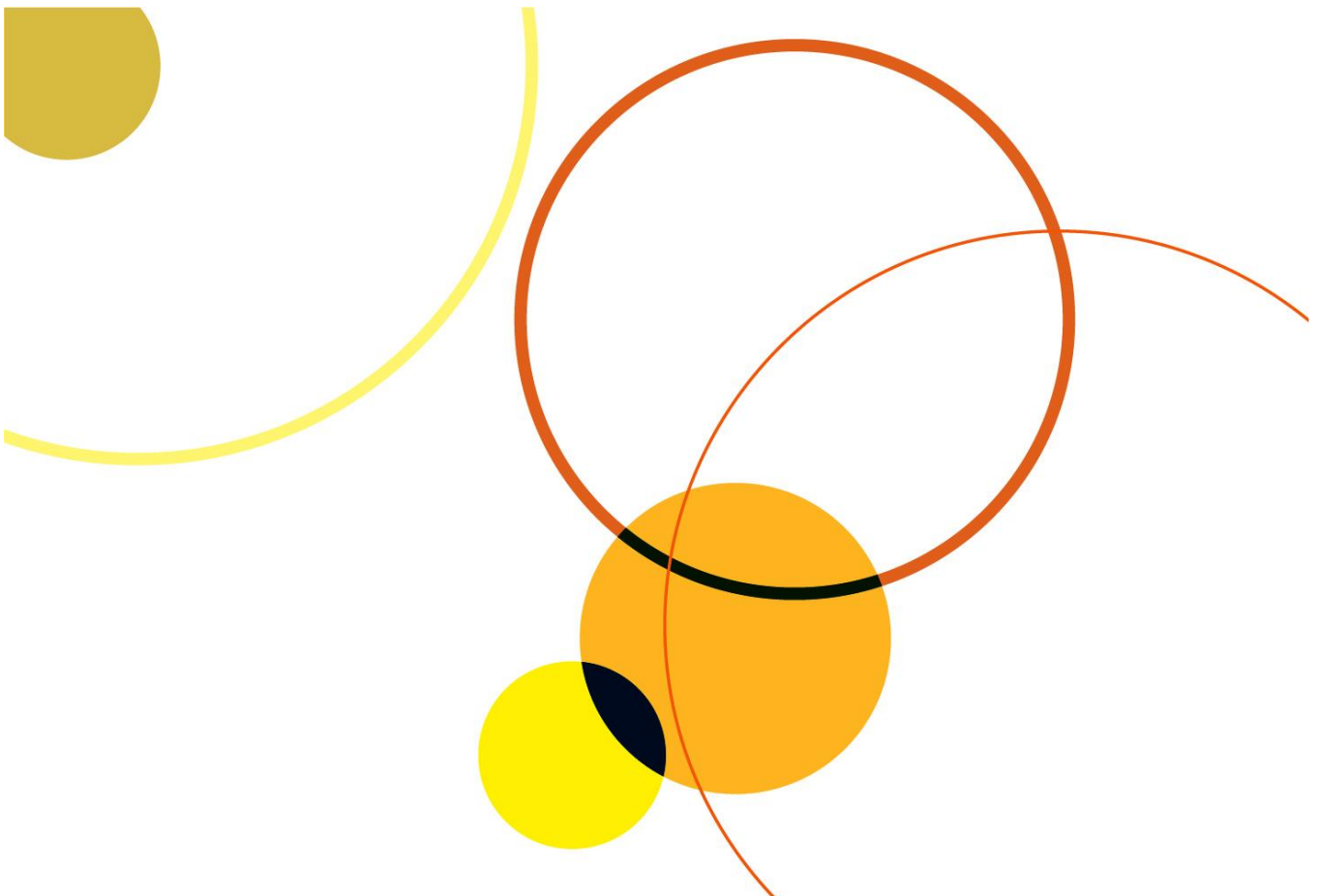


Results-based approaches to support the National Biogas Programme of Ethiopia

Report prepared for SNV

Final report
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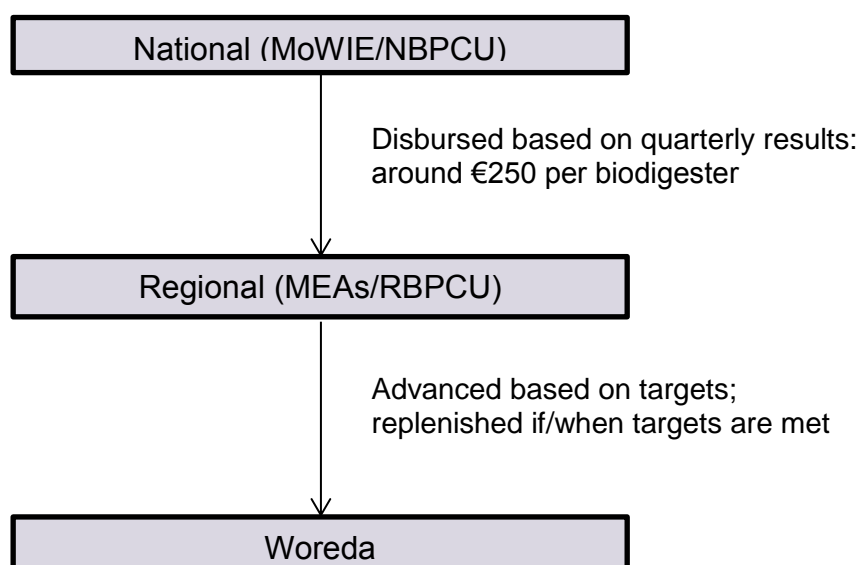


Executive Summary

Results-based funding offers an opportunity to increase performance, accountability and ownership within the National Biogas Programme of Ethiopia (NBPE). Results-based approaches work by tying disbursements directly to achievement against some pre-determined and independently measured indicator of performance. Payments are made only after improved performance is verified. Recipients are given full autonomy over how to achieve the result and what to do with any funding that they receive. As a result, recipients are fully accountable for their performance. They are free to adapt to changes in local conditions and to experiment with different approaches. Finally, they have a strong incentive to find the most cost-effective way to achieve the result.

Administration of the NBPE is conducted through national and regional coordinating units, with implementation drawing on woreda level staff. High level administration of the programme is provided by the National Biogas Programme Coordinating Unit (NBPCU), which sits within, and is accountable to, the Ministry of Water, Irrigation and Energy. Each of the four regions within Phase I of the programme also has a separate Regional Biogas Programme Coordinating Unit (RBPCU). Parallel to the NBPCU, each RBPCU sits within, and is accountable to, the regional Mines and Energy Agency. Implementation of the programme also draws heavily on woreda level supervisors, who are responsible for much of the day to day administration of the programme, such as signing off on the construction of individual biodigesters. The national unit disburses programme support to the regional level which, in turn, disburses programme support to woredas. In addition to programme support, a subsidy worth approximately €185 is provided to households through the national and regional offices.

Figure 1. Flows of programme support with the NBPE



Note: An additional subsidy, not shown, of around €185 is provided to biogas users upon installation

Source: Vivid Economics



The first steps towards a results-based structure have already been taken within the NBPE, as shown in Figure 1. Payments from the national to the regional level are already broadly results-based, depending upon the number of installations that each region achieves per quarter. Payments from regions to woredas also have results-based features; targets for installations are determined on a woreda by woreda level, with advances made on the basis of these targets and later reconciled against measured progress. This model diverges from the ‘textbook’ results based funding in two main ways. First, the autonomy given the recipient in each case is limited. Second, verification is not conducted independently.

There are four key ways in which the results-based structure within the NBPE could be enhanced. These are explored below.

1. Use better indicators for structuring payments from the national to regional level

A good indicator for use within a results based funding scheme should combine proximity to impact, ease of measurement and an appropriate incentive effect. Proximity to impact requires that the result closely mirrors the objectives of the programme. This ensures that any progress against the result necessarily implies that the programme is achieving its objective, reducing the risk of gaming or unforeseen consequences. Ease of measurement requires that the indicator can be monitored reliably at a reasonable cost. This ensures that both the funder and the recipient can have confidence in the results and monitoring does not detract significantly from the resources available to achieve development impact. Finally, appropriate incentive effect requires that the recipient has good influence over performance as measured by the indicator and that the indicator is reasonably easy to explain. Good control is necessary for the recipient to be incentivised by the scheme; if performance against the indicator is completely independent of their actions, they have no reason to change their behaviour in response to an RBF. This will also suffer from an increase in risk. Ease of explanation allows the RBF to act as a coordinating device, articulating a single well-defined goal which can be spread throughout the programme.

Planned alterations to the monitoring and evaluation framework offers the prospect of the use of new and better results indicators for structuring payments from the national to the regional level.

Installations, as measured through sales and quality agreements, form the basis of the current monitoring processes and payment amounts. There are plans to extend this framework, introducing a customer support centre that would use regular telephone interviews to monitor consumer experiences of biogas. This would greatly increase the information available to the programme. For instance, the customer support centre would measure the number of users who are using biogas for cooking and lighting, and the number who are utilising bioslurry. These additional indicators greatly expand the potential RBF designs that could be used without greatly increasing measurement costs.

In particular, tying funding to biogas use, as opposed to installation of a biogas digester, can provide a better designed incentive scheme. Installation does not guarantee use. Stakeholders identify malfunction of appliances as one of the key issues within the biogas programme; consumers often lack access to replacement appliances and, as a result, are unable to continue to use biogas for cooking or lighting once



their appliances break. Tying directly to installations provides no incentive to ensure that access to appliances improves. It also provides no incentive to encourage use of bioslurry. As such, it is a poor proxy for the objectives of the programme. Performance could be improved by switching to a use indicator, which should be possible using the data collected from the new customer support centre. Some supplementary sample based surveys to evaluate the veracity of this data may also be required, but the costs should not be prohibitive. A shift from installation to use characteristics could confer significant benefits by ensuring that all levels of the programme are focussed on promoting access to appliances, after sales service, and utilisation of bioslurry, all of which are likely to be important in reaching the goal of a commercially viable, market-orientated biogas sector.

Figure 2. An indicator based on use characteristics is likely to be the most desirable

| | Number of installations | Number of installations provided by BCEs | Use characteristics |
|------------------------------|--|---|---|
| Proximity to impact | Does not measure use; including availability of appliances and application of bio-slurry | Increases emphasis on private sector, but does not include use or guarantee commercial sustainability | Captures appliance and bio-slurry use, possibility of adding incentive for injera mitad |
| Ease of measurement | Monitoring framework is in place, independent verification through CSC | Monitoring framework is in place, independent verification through CSC | Measured by CSC within planned extension of the monitoring framework |
| Appropriate incentive effect | Easy to explain and can be measured at monthly intervals | Easy to explain and can be measured at monthly intervals | Measured less frequently; requires greater pre-finance |
| Suitable result? | x | ? | ✓ |

Note: Green indicates good performance against the requirement, yellow indicates medium performance, red indicates poor performance

Source: Vivid Economics



2. Provide more discretion to regions

At present, regions only have discretion over the use of a programme support budget; there is a separate, nationally-determined, subsidy budget. Around €250 is currently made available, on a results-basis, to each region per installation. This is intended to cover promotion, training, quality management, private sector development and monitoring and evaluation, alongside some other items. However, an additional subsidy of around €185 is split between the consumer and the mason involved in installation. This subsidy amount is determined at the national level, with no discretion afforded to each region.

It may be desirable to fold the subsidy into the RBF scheme. This would allow the regional offices to decide whether they wish to keep the subsidy at the current level, increase it, or decrease it. This would allow them to respond to changes in, for instance, local wage levels or raw material costs to ensure that biogas remained affordable to consumers.

For instance, a potential scheme could offer €300 to regions for each biogas digester that is being used for cooking, lighting and bioslurry one year after installation, with an additional €75 for continued use in each of the two following years¹. This would provide similar funding per digester to the current structure, but with both programme support and subsidy placed at the discretion of regions. The majority of funding is provided relatively soon after installation, limiting potential problems with pre-finance that might occur if regions had to wait several years before recouping their investment. At the same time, this scheme would provide an incentive to ensure that digesters were maintained, properly used and that consumers had access to replacement appliances. The payments could be gradually phased out over the course of Phase II. For instance, biodigesters built within the first year of the RBF could follow the payment levels outlined above, with payments for biodigesters built in the next year decreased by one-third and so on.

3. Consider providing regions with explicit incentives for private-sector development

Higher payments could be offered for installations that occurred through biogas construction entities (BCEs) to encourage private sector development. This would provide an incentive to encourage masons to form companies, who could eventually take over many of the functions performed by the government within the biogas sector, such as promotion and quality control. For example, rather than offering €300 to regions for each biogas digester that is being used for cooking, lighting and bioslurry one year after installation, €500 could be offered if the installation was made by a BCE. However, it should be noted that installation by a BCE is a crude measure of private sector development. Increasing installations by BCEs need not, in itself, indicate that a sustainable market is being created. In addition, providing a financial incentive may be unnecessary if the relevant stakeholders recognise that the creation of a sustainable market is the most cost-effective method of promoting biogas use.

¹ This is an ad hoc example, based on the existing payment levels for programme support and subsidy. Further analysis is necessary to determine whether this payment level is sensible; a good starting point would be to see whether the broadly results-based support provided in the first year of Phase II has been sufficient to achieve programme targets.



4. Explore the greater use of results-based payments to implementers

Either the national, regional or woreda level of the programme could offer payments to implementers, such as microfinance institutions or biogas construction enterprises (BCEs). Currently, the only results-based payment to implementers is the biodigester subsidy, which is determined at the national level. However, regions or woredas could also use similar schemes at smaller scale.

Implementers have limited control over the broader success of the programme, and therefore require payment to be tied to more tangible results that are further from impact. Micro finance institutions can provide credit for digester construction, but have limited ability to incentivise new installations if raw materials or appliances are unavailable. Similarly, masons can promote biogas use, but are unable to provide credit. As such, disbursement to implementers tends to be tied to more tangible, concrete results, such as provision of a loan or construction of a high quality digester.

RBF payments targeted at implementers are effectively subsidy schemes and can be suitable to address particular market barriers. Potential schemes include a subsidy provided to microfinance institutions for biogas loans or a performance grant for BCEs reaching a particular quantity of production. Both function by tying disbursements to the achievement of a pre-agreed result. These schemes can address specific market barriers. For instance, access to finance has been identified by stakeholders as one of the crucial issues preventing proliferation of biogas. By offering a subsidy to microfinance institutions based on the quantity of loans offered for biodigesters, an RBF could increase the returns to MFIs entering the sector and potentially contribute to creating a sustainable market in private capital for biogas.

However, such subsidies may be best determined at the regional level. Specific barriers preventing expansion of biogas vary across time and between regions. Schemes targeted at implementers tend to deal with a specific issue that may or may not be the most salient barrier in two years' time. As such, they may be most successful if implemented flexibly by bodies with good knowledge of the local conditions, who are able to reallocate resources if necessary. This may help ensure that limited resources continue to be used efficiently.

Further considerations

While the options outlined above appear to be the most promising, design of an effective RBF scheme crucially depends upon the capacities and preferences of the implementing bodies. Organisational culture is not malleable and is likely to, at best, change slowly in response to the introduction of new funding modalities. The attitudes, abilities and preferences of the implementing bodies need to be taken into consideration. As far as possible, this report has attempted to do this, but deeper consideration of these issues and consultation with the relevant parties is necessary before such an RBF scheme is to be put in place. It is essential that there is agreement across stakeholders on the goals and methods to be used within the programme.



Nonetheless, strengthening results-based approaches may provide significant benefits to the NBPE.

Aligning results more closely with the objectives of the programme, both through increasing the emphasis on use and potentially including additional payments to encourage emergence of stronger BCEs, may provide an incentive scheme that encourages more autonomy, ownership and better performance across the programme. Decentralising control over subsidy levels may allow more flexibility and responsiveness at the regional level to changing local conditions. Finally, targeted subsidy schemes could potentially be powerful tools to buy-down specific barriers preventing greater expansion.



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1 Introduction

Results based funding offers the recipient autonomy, responsibility and a strong incentive to achieve

1.1 Principles of Results Based Funding

Result based funding (RBF) describes any financing modality for a programme that follows four rules:

- The amount of finance disbursed is tied to achievement of a pre-agreed and independently verified result
- Disbursal occurs only *after* the result is achieved
- The recipient is free to adopt any method they want to achieve the result
- Money is provided to the recipient without any strings attached

First, finance is provided only upon achievement of a pre-agreed and independently verified result.

The ‘result’ can be any measure of progress against the objectives of the programme. For instance, this report considers tying payment to number of biogas installations or to the quantity of loans provided by micro finance institutions. It must be verified independently, meaning that neither the principal disbursing the money nor the recipient can be wholly responsible for its measurement.

Second, financial support is provided only after the result is achieved, not before. Conventional financing modalities often provide a large proportion of the total funding upfront. While additional funding tranches may be released at semi-regular intervals upon evaluation of progress, the conditions for receipt of this additional funding are often opaque. RBF, by contrast, provides money only after results are achieved and verified, leaving the recipients to organise pre-finance independently.

Third, the recipient is free to adopt any method they want to achieve the result. Traditional financing modalities often prescribe what the recipient is intended to do with the resources provided. This can range from prescriptions on how to structure the programme to what should be procured from whom. Itemised budgets are typical. RBF, by contrast, takes a hands-off approach. Recipients assume full responsibility for the programme and are welcome to adopt any method they believe is suitable. However, unless results are achieved, no money will be provided.

Finally, money is provided with no strings. This is closely linked to the last point. Not only are recipients free to structure the programme as they wish, but they are also free to use the money provided through RBF for other purposes entirely. If the recipient wishes to pursue the result through regulatory changes rather than through provision of financial support then they are free to do so. The revenues for RBF can be transferred elsewhere and used to achieve goals unrelated to the programme.

The combination of these features is intended to provide the recipient with autonomy, responsibility and a strong incentive to achieve. Providing financial support after achievement of goals ensures that recipients have a financial stake in the success of the programme, assuming responsibility and ownership for



both its successes and failures. On the other hand, revenues from RBF do not need to be used within the programme; if the recipient can achieve the result at low cost, the programme may allow them to realise profits (revenues in excess of costs). As a result, they also have a financial incentive to achieve efficient progress. The responsibility and incentive are complemented by the autonomy afforded the recipient. The best course of action is not determined top-down, by the funder, but is instead determined bottom-up by the recipient, and can be adapted to local contexts and changing conditions.

A literature review conducted for a previous report (Vivid Economics, 2013) suggests results based funding can lead to more cost efficient achievement of programme objectives. While results based funding is a relatively new concept and few fully fledged RBF programmes have been implemented, evaluations of the approach so far are often, but not always, positive. Programme objectives can be achieved at lower cost than under alternative schemes, and in a way that increases ownership among recipients, but only if they are designed well and in a manner which is sensitive to the context in which they intend operate.

1.2 Implementers and coordinators

RBF can be used between any two levels within a programme. For instance, RBF payments can be made between a donor national government and a recipient national government, but could equally be used between local government and individual companies within a country. In between are a wide array of potential configurations. This aspect of the scheme is referred to as the *vertical design*.

One distinction in vertical design is between schemes aimed at coordinators versus implementers (or, as they are sometimes known, service providers).

Coordinators are high level bodies who are charged with putting in place a broader supportive framework and organising the efforts of implementers; national and regional governments are typical examples. Regional government bodies in Ethiopia are not directly responsible for installing biodigesters, in the sense that their employees perform neither the construction nor the maintenance of the plant. However, they provide the framework which allows installations to take place, including quality control and promotion of biogas use. They also organise the efforts of implementers by, for instance, training masons and channelling financial support.

Implementers, on the other hand, are active on the ground and directly involved in achieving the result; private companies and finance institutions are typical examples. Masons, biogas construction enterprises, co-operatives, NGOs and micro finance institutions can all be directly involved in providing access to biogas plants. Their role is primarily the delivery of a particular product, such as a loan or a biogas plant, rather than the coordination of actors.

The distinction is not always clear cut. Implementers will often provide broader coordinating functions where necessary, such as when BCEs train masons and engage in promotional activity. Coordinators can sometimes step in directly when implementing partners are unavailable. Nonetheless, the distinction can be useful when analysing design options.

Throughout this report ‘Results Based Funding’ will be used as an umbrella term encompassing schemes aimed both at implementers and coordinators. This is intended to avoid confusion caused by switching terms and also recognises that both types of schemes share a common structure.

1.3 Purpose and structure of report

This report provides an initial survey of options for results based funding within the National Biogas Programme for Ethiopia. As described above, results based funding can be applied in a wide variety of contexts to structure almost any transfer of finance between bodies involved in the programme. This report aims to identify the most promising options for application of RBF in the NBPE, as well as some initial ideas concerning their design.

This report is intended as a scoping exercise; further steps in the design of an RBF require closer consultation with programme staff and stakeholders. Based on a relatively brief consultation with some of the stakeholders involved in the programme, the recommendations are preliminary and more work will be required to determine whether RBF will be viable. Design decisions need to be taken with parties close to the operational details of the programme. Throughout the report, key risks and areas of uncertainty have been identified throughout the report; the conclusion intends to offer next steps that relevant parties could explore, if RBF is to be pursued further.

This report broadly follows the theoretical framework outlined in our previous and forthcoming reports on RBF design (Vivid Economics, forthcoming-a; Vivid Economics, 2013):

- Chapter 2 provides a high level review of the NBPE, including financial structure and monitoring framework
- Chapter 3 considers alternative results that could be used as the basis for RBF
- Chapter 4 evaluates different vertical design options
- Chapter 5 discusses processes for setting payment level and baseline
- Chapter 6 concludes with recommendations for application of RBF to the NBPE and several areas where further work is required

A number of other reports may be useful to the reader if further detail is required on particular aspects of RBF. ESMAP and Vivid Economics published a theoretical report on the design of RBF schemes aimed at implementers in 2013 (Vivid Economics, 2013). This includes a full literature review assessing the evidence on effectiveness of RBF schemes. A similar report is forthcoming on the design of RBF schemes aimed at coordinators (Vivid Economics, forthcoming-a), as well as a case study considering application of this framework to an Ethiopian cookstove programme (Vivid Economics, forthcoming-b). The latter report also includes a broader evaluation of the suitability of RBF in the Ethiopian context.



2 National Biogas Programme of Ethiopia

The NBPE aims to increase environmentally sustainable energy access in Ethiopia

2.1 Objectives and structure of the programme

The National Biogas Programme of Ethiopia (NBPE) supports the need for both environmental sustainability and improved access to energy through increasing the availability of biogas to rural households. Energy consumption in Ethiopia is very low by international standards, at around 0.38 tonnes of oil equivalent per capita. This is less than 15 per cent of per capita energy consumption in South Africa (World Bank, 2014). Traditional biomass currently meets around 88 per cent of the country's energy needs. The Growth and Transformation Plan identifies increased access to energy and expansion of energy infrastructure as a priority area for economic growth, singling out biogas as a promising off-grid solution. The NBPE is also aligned with the Ethiopian government's Climate-Resilient Green Economy initiative, which seeks to expand renewable energy generation and access to clean cooking solutions.

Biogas is produced through fermentation of animal dung and other waste. An underground digester is constructed by a trained mason from local materials – in the Ethiopian context, the main materials required are gravel, concrete, pipes and fittings. The digester is then loaded with manure and other waste which, once fermented, produces methane which can be used for cooking and lighting. In addition, an effective organic fertiliser, known as bioslurry, can be produced if the digester is constructed with a double compost pit.

Biogas offers a sustainable, carbon neutral energy source with significant complementary benefits to sanitation and agricultural productivity. Household substitution of biogas for biomass has the potential to drastically decrease time spent on fuel collection, reduce emissions and prevent deforestation. Biodigesters also improve health outcomes by providing a sanitary solution for waste disposal and by reducing indoor air pollution. Finally, properly utilised, bioslurry can greatly increase agricultural productivity.

The NBPE is managed and supported by a collaborative agreement between the Ministry of Water, Irrigation and Energy, SNV, and Hivos under the African Biogas Partnership Programme (ABPP). The programme is owned and implemented by the Government of Ethiopia. SNV provide technical assistance and Hivos act as fund manager. The NBPE is part of the ABPP, a six country initiative active across Sub-Saharan Africa seeking to improve access to biogas.

Administration of the programme is conducted through national and regional coordinating units. High level administration is provided by the National Biogas Programme Coordinating Unit (NBPCU), whose responsibilities include channelling financial support to the regional offices, standardization of quality control and internal monitoring of the national and regional performance. The NBPCU sits within, and is



accountable to, MoWIE. Each of the four regions within Phase I of the programme also has a separate Regional Biogas Programme Coordinating Unit (RBPCU), whose responsibilities include channelling finance to woredas and households, monitoring construction quality on the ground and organising mason training and accreditation. Parallel to the NBPCU, each RBPCU sits within, and is accountable to, the regional Mines and Energy Agency.

The focus of the programme is primarily on household energy access. There are no current plans to expand the scope of the programme to include productive uses of energy (such as biogas for intensive agriculture) or community uses of energy (such as biogas for prisons).

Over the long term, the programme seeks to create a commercially viable, market-orientated biogas sector. Biogas has the capacity to greatly improve quality of life among rural households, but the sector will not be able to achieve scale unless a thriving, commercial biogas sector emerges. At first, this will require significant support. However, this support is viewed as a temporary stop-gap allowing the initial barriers preventing uptake to be tackled. Over the long term, the biogas sector should be able to stand on its own.

2.2 Priorities for Phase II

Phase I of the NBPE took place between 2009 and 2013 across four regions in Ethiopia: Amhara, Oromiya, SNNP, and Tigray. Over 8,000 digesters were constructed in Phase I. Initial progress was slow, but production picked up significantly in the later years of the programme. By 2013, more than 3,000 biodigesters were being produced annually.

Other than construction, almost all of the coordinating activities during Phase I were performed by government. A large number of biogas masons were trained, with around 100 accredited masons active in the third quarter of 2013. However, few masons have formed companies (often referred to as biogas construction enterprises, or BCEs). The government performed many of the other activities along the value chain, such as promotion of biogas, training of additional masons and quality control for installations.

Phase II seeks to build on the achievements of Phase I with construction of an additional 20,000 digesters by 2017. This represents a significant increase over the 8,000 digesters constructed between 2008 and 2013. The achievement of this target will require improved performance across the board. Understanding the challenges facing the NBPE and the barriers preventing further roll-out is an essential first step in designing a results based scheme for the programme.

Priorities for Phase II include:

- *Increased involvements of biogas construction enterprises across the value chain.* The involvement of BCEs in activities other than construction remains limited. Around ten BCEs were registered in Ethiopia by the third quarter of 2013, jointly producing less than 20 per cent of biodigesters. Reliance on individual masons may be successful over the short-term while government assumes responsibility for training, promotion and quality control. To reach scale, however, a significant increase in the number and importance of BCEs will be required. In a sustainable market operating without government support, they will be required to take responsibility for additional activities along the value chain.



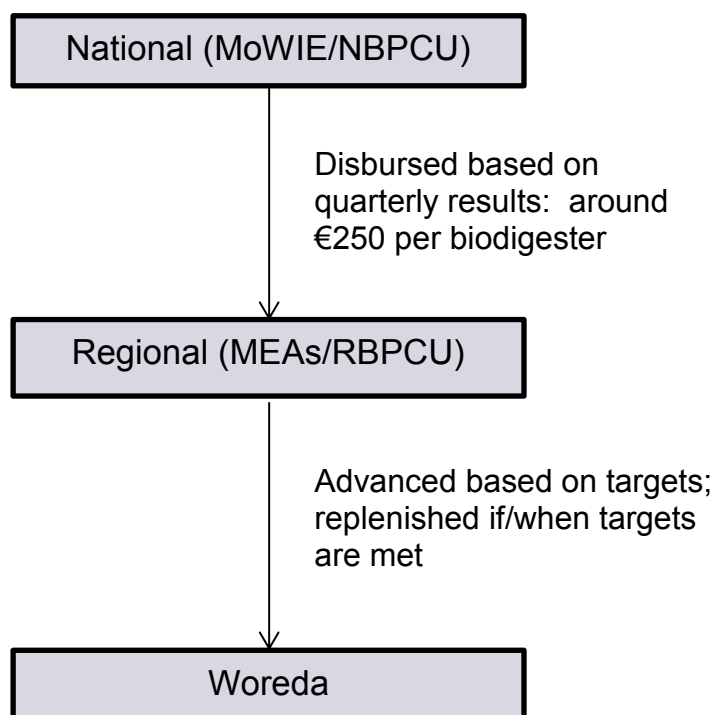
- *Improving the affordability of biodigester technology.* Biodigesters remain expensive relative to the income of the consumers targeted by the programme. The latest programme reports indicate costs of around €600 per biodigester for installation (ABPP, 2013), though interviews with stakeholders have indicated that this may be an underestimate. A subsidy (discussed further below) contributes around €185, leaving a deficit of at least €400 per digester that needs to be filled by household financing. This is around 125 per cent of average per capita income (World Bank, 2014). Reducing the cost of digesters will therefore make a big difference to both the value proposition and financing capacity of households.
- *Ensuring continued access to credit for households.* Access to credit through micro finance institutions (MFIs) remains precarious, but is essential for uptake of biogas. Credit through MFIs is currently available in three of the four regions covered in Phase I, but it is unclear whether this will continue and whether sufficient additional capital will be committed to support the expansion. In Tigray, where no credit facilities were secured, the government has provided its own credit line through co-operatives. Few households have sufficient capital to cover the costs of biodigesters without support.
- *Promoting appropriate use of bioslurry.* Bioslurry can be an effective fertiliser, contributing to large increases in agricultural productivity when properly utilised. The extent to which households take advantage of this opportunity is unclear because it is not measured within the current monitoring and evaluation framework. Promoting use of bioslurry and demonstrating its benefits will make a big difference to the perceived value of a biodigester to the household and is likely to be important in bolstering demand.

2.3 Current financing structure

Figure 3 illustrates the determinants of programme support flows between the different levels of government involved in the programme. Disbursement to regional offices depends on the number of biodigesters installed over the previous quarter, with approximately €250 allocated per installation. Woredas, on the other hand, receive advances from each region based on targeted production. Their budget is replenished if and when they achieve interim targets.



Figure 3. Flows of programme support from national to woreda level



Source: Vivid Economics

As of 2014, disbursement from national to regional level is broadly results based. There is a strong tie between the amount of financing received by regions and their performance in terms of number of installations. Some components of a strictly results based scheme are missing. For instance, disbursement in the first quarter of 2014 was provided in advance based on targets rather than after the results were achieved. Regional autonomy is more limited than under pure RBF, with itemised budgets provided to each region and all financial support tied into the biodigester scheme. However, the first step towards results based funding has already been made.

Disbursement from regional to woreda level is also dependent on biogas installations, though more loosely than under RBF. As with results based funding, woredas that perform well will have their budget replenished more often and receive more funding in total. However, all finance is provided up front. Some stakeholders raised concerns that this creates issues with liquidity dispersion; money becomes tied up in low performing woredas and cannot be recovered or redistributed to higher performing woredas.

In addition to programme support, the Government of Ethiopia provides a subsidy for biodigesters of around €185. The subsidy is broken down into its constituent components in Table 1. Around €90 is provided directly to the mason on behalf of the household as payment for labour upon completion of a (satisfactory) biodigester. Around €85 is provided to the household to cover materials costs. Finally, around €10 is used as the guarantee fee, provided to the mason if the biodigester remains functional one to two years

after installation. Payment of both the mason fee and the guarantee fee are dependent upon physical verification performed by the woreda supervisor to ensure that the build is high quality and functional.

Table 1. The subsidy consists of three components

| Component | Amount |
|--------------|--------------------------|
| Mason fee | ~€90 (2,400 ETB) |
| Materials | ~€85 (2,300 ETB) |
| Guarantee | ~€10 (300 ETB) |
| Total | ~€185 (5,000 ETB) |

Source: Vivid Economics

2.4 Current monitoring and evaluation arrangements

The number of installations is the headline indicator for the programme. There are annual installation targets for each country within the ABPP, each region within the NBPE and each participating woreda within each region. The monitoring and evaluation framework collects detailed information on each installation, including the mason responsible for construction and the location of the biodigester.

However, a large number of additional indicators are also monitored at the regional level, including:

- Number of active masons
- Mason productivity
- Number of active BCEs
- BCE productivity
- Cost per plant
- Loan share in investment
- Number of installations with double compost pit and toilet extensions
- Share of women in biodigester construction training
- Share of women receiving biogas loans

These indicators are constructed from information contained in sales, completion, quality and after sales service records, in combination with maintained lists of accredited biogas masons and companies.

For instance, the number of active masons is defined as the number of accredited masons who have constructed three or more digesters in the last quarter. Since sales agreements record the mason responsible for construction, the number of active masons and average mason productivity can be directly deduced from



these records. The accuracy of sales and quality agreements determines the veracity of measured indicators and the monitoring framework depends heavily on their reliability.

2.5 Planned alterations to monitoring and evaluation

Regardless of any RBF scheme, additional monitoring arrangements should be in place by early 2015.

Across the ABPP, additional monitoring of customer satisfaction will be maintained through customer support centres (CSCs). CSCs will be independent organisations, operating outside the current national programmes.

Information on all installations will be inputted into a database and physically verified. Based on existing records, a fully functional database will be constructed recording all biodigesters installed under the programme. To ensure validity of data, local government (kebele) staff will physically verify the installations. Each installation will be numbered, marked and the GPS coordinates will be recorded. A short questionnaire will also be conducted with each household.

On the basis of this database, the customer support centre currently plans to conduct regular telephone interviews with all biogas users. Telephone questionnaires will confirm a plant's existence and functionality, as well as the perceived benefits to the household. They will include, for instance, questions on the number of hours cooking on biogas and the whether bioslurry is being used as fertiliser. Potentially, SMS technology could be used to conduct simple surveys with follow-up via interview if necessary. In the event that there is an issue with biodigester or appliance functionality, problems will be flagged and reported to the biogas programme. The household will receive follow-up calls to determine whether the problem has been resolved.

As a result of this process, the NBPE should soon have a much more complete picture of programme impacts. For instance, the current monitoring framework does not measure the proportion of households using bioslurry or the proportion of biodigesters that are still functioning. Regular telephone questionnaires will produce much more information that can then be used to inform the design and implementation of the programme.



3 What results could be used for RBF?

Biogas use, measured through consumer survey, is the most promising indicator for an RBF scheme

3.1 Introduction

This section and the next consider, in turn, potential results to use as a basis for an RBF and potential recipients that could be targeted within an RBF. These two design elements jointly determine the structure of the RBF – who is giving money to whom on the basis of what indicator.

Results based funding is only suitable if a reliable result can be identified. Pursuing a results based framework without a high quality result may be detrimental to the success of the programme. If a strong result cannot be identified, measured and verified, then it would be preferable to stay within traditional financing modalities.

Equally, results based funding requires an appropriate recipient. Some recipients will be better placed than others to respond to the autonomy and incentive provided within a results based scheme. If no recipient possesses the willingness, institutional capacity and access to pre-finance necessary to engage in RBF, traditional modalities should be preferred.

As such, these two sections jointly determine whether an RBF is a viable modality to use within the NBPE. Both must be addressed before an RBF can be recommended for use.

They are separated to maintain analytical clarity but there are interactions between the two questions. Some indicators are inherently unsuitable to use as a result for an RBF, but many are suitable for some recipients but not others. Equally, some recipients are better suited to traditional aid modalities, but many will be suitable for RBF based on some indicators but not others. The potential interactions are noted in the text, but it is worth bearing in mind throughout that the separation between the two questions is, to some extent, artificial.

3.2 Choosing a result

There are three potentially competing requirements that a suitable result indicator must balance.

- Proximity to impact
- Ease of measurement
- Appropriate incentive effect

First, it should be close to the desired impact. The result should mirror the objectives of the programme as closely as possible. With a perfect result, measured progress against the result would necessarily ensure that the scheme is achieving its objectives; it would be impossible to have one without the other. In reality, the objectives of any programme are complex and multifaceted. The NBPE seeks to improve health outcomes,



educational attainment, convenience of fuel supply and environmental outcomes within a sustainable, private sector led market. As emphasised below, simple indicators, such as number of biogas plants installed, will only be able to approximate this objective. However, they may come close enough to the desired impact to be suitable.

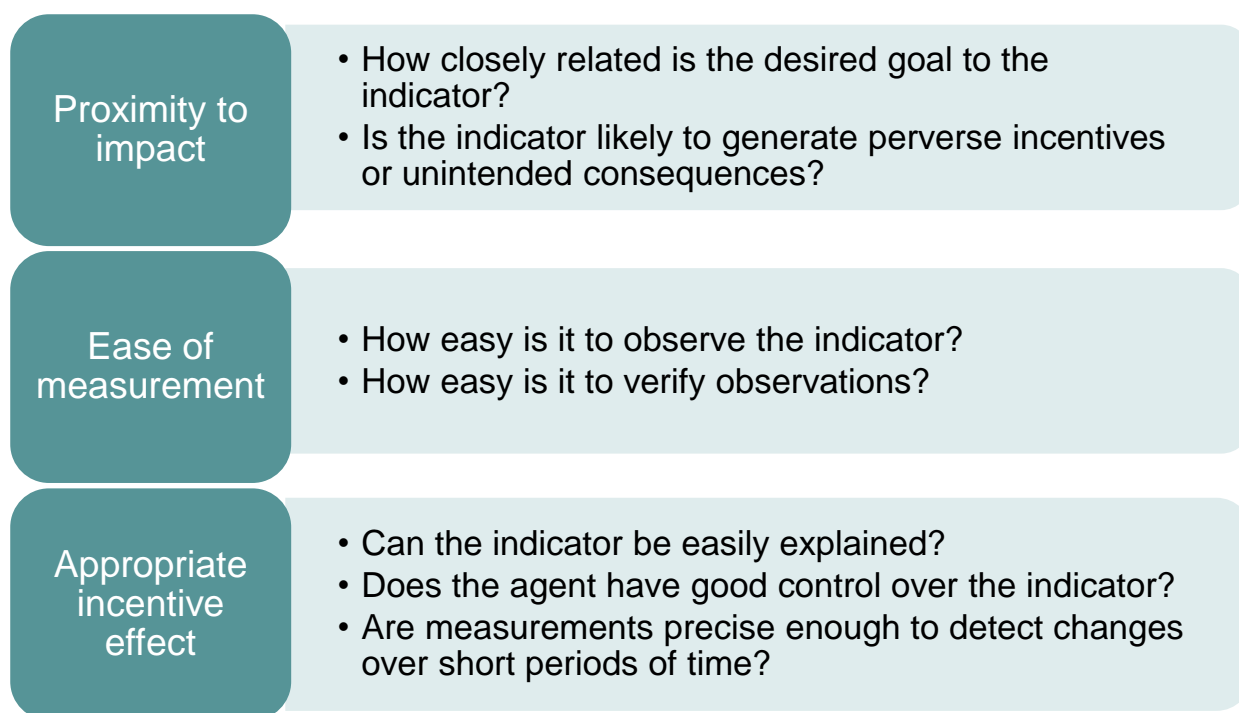
Second, it should be easy to measure and verify. Any result used for RBF needs to be measured regularly and to a reasonable degree of accuracy. Both the funder and the recipient need to have full confidence in the reported progress. On the other hand, within a fixed budget, the more resources that are used for measurement, the fewer resources will be available to achieve development goals, so there will be a limit on how much should be spent on measurement. A good result therefore needs to be measurable, both to a good degree of accuracy and at a reasonable cost.

Third, it should provide an appropriate incentive effect. The recipient must be able to influence the result for the incentive to be effective. If progress against the result cannot be achieved through their actions, then the scheme cannot hope to convince them to act. They will be unwilling to commit their own resources to a program which may, through no fault of their own, fail to pay out and they will also be unable to convince others to lend to them on this basis. Also, the result should ideally provide a single, simple goal which can be easily explained. Incentive effects rely on agents understanding the consequences of their actions – in this case, the effect of their actions on the payments they receive. Excessively complicated results or results which combine many indicators may obscure the link between action and payment and therefore weaken the incentive effect.

There are often trade-offs between ease of measurement, proximity to impact and appropriate incentive effects. Simpler measures, such as number of biogas installations, tend to be easy to measure, and provide a clear incentive, but may be a poor approximation of the desired impact. More complex measures, which seek to capture the true impacts of the programme, will often be more expensive to measure and provide a weaker incentive. Choosing a result requires that these three requirements are carefully balanced.



Figure 4. A successful results indicator needs to balance three competing objectives



Source: (Vivid Economics, forthcoming-a)

3.3 Number of installations

Payments could be tied to the number of biodigester installations. For example, €250 could be disbursed for every biodigester installed. As discussed in Section 2, a significant portion of transfers to regions, transfers to woredas and, through the subsidy, transfers to masons are currently based on number of installations, though the financial structure does not follow a strict results based strategy.

The monitoring framework for number of installations is already in place. Sales and quality control agreements are produced for every installation. These are required for claiming the subsidy and are currently used both to disburse programme support to regions and to monitor performance against targets.

It may be necessary to strengthen independent verification. Monitoring currently occurs entirely within the government. Officials at the woreda level are responsible for signing off each individual installation, with additional verification at the regional level for some sample of installations. Oversight is provided at the national level. At no point is the documentation or physical existence of the plants independently verified by a non-government body. Given that woreda and regional budgets are already contingent on performance against this indicator, there is a risk that lack of independent verification may eventually lead to conflict and erosion of trust. However, current plans for extension of the monitoring and verification framework to include a customer support centre, run by an independent body, should rectify this problem.



The incentive would be consistent with the programme target of installing 20,000 digesters by 2017.

Basing disbursement on installations therefore has the benefit of dovetailing with the current headline metric used to judge the success or failure of the project. Other indicators run some risk of sending confusing signals by basing disbursement upon one metric and broader programme evaluation on another. However, this problem is not insurmountable. Evaluation of the programme already takes into account a much broader range of information than just installation numbers and would stand to benefit from the additional information provided through measurement of other indicators.

Of greater concern is the lack of proximity to impact. To provide benefits to households the biodigester must be used. Malfunction of either the biodigester itself or the appliances that are used in conjunction with the biodigester will undermine these benefits. In particular, stakeholders report that faulty appliances and limited access to replacements are a consistent issue across the programme. Tying disbursement purely to installations provides no financial incentive to ensure appliances remain available.

Even if the biodigester and all appliances are functioning correctly, the impact on the household will depend upon their behaviour. Households may not realise the benefits of bioslurry or understand how much to apply. Despite access to biogas, they may continue to use biomass for particular types of cooking out of habit or due to personal preference. Measuring installations will not pick up on variations in consumer behaviour, and will therefore fail to capture the actual impact on the household. As a result, it will also provide no financial incentive to encourage correct use.

Finally, using the number of installations as the results indicator does not measure the creation of a commercially viable, market-orientated biogas sector. The ultimate aim of the programme is to encourage the development of a thriving biogas sector which can operate largely without government support. The number of installations does not capture this aspect of the scheme's objective and therefore runs the risk of incentivising a largely government led expansion.

An additional incentive could be tied into the guarantee process, but this would not greatly improve proximity to impact. As discussed in Section 2, a woreda supervisor confirms functionality of the biogas digester one to two years after installation as part of the guarantee agreement. An additional payment of, say, €50 could be disbursed following completion of this process to provide some financial incentive for maintenance. This would improve proximity to impact, but still misses some of the key impacts and objectives of the programme. For instance, it would not incentivise increasing bioslurry use and, depending upon the details of the guarantee, may not include appliance maintenance. It would do no more to encourage commercial market expansion than tying purely to installations.

3.4 Number of installations provided through BCEs

Payments could be tied to number of biodigester installations provided through registered BCEs. For instance, a payment of €500 could be disbursed to regions for every biodigester installed by a registered BCE. Alternatively, a smaller payment could be provided directly to BCEs for every biodigester installed, effectively functioning as a targeted subsidy.



This approach shares many of the benefits and disadvantages of tying purely to quantity of installations. The monitoring requirements that are currently in place record the mason or BCE that is responsible for construction, so an RBF based on this result could be monitored within the existing framework. As with the previous indicator, independent verification would need to be strengthened. This result would also provide no financial incentive for continued maintenance of the biogas plant or encouraging correct use of biodigesters among consumers, which would be particularly concerning if it was used to structure payments to regions or woredas.

The result may encourage private sector development. The lack of large scale BCEs is a barrier to the biogas sector reaching scale; as highlighted in Section 2, the sector is reliant on the government to provide many of the functions that might ideally take place within the private sector, such as training and marketing. By encouraging the proliferation and growth of registered biogas enterprises, tying payments to the number of installations provided by BCEs may be able to provide a stronger link to the long-term programme objective of creating a sustainable, commercial biogas market.

However, it remains, at best, an unreliable proxy for commercial sustainability. More and larger BCEs may be required for the biogas market to be sustainable, but they do not guarantee it. Instead, tying incentives to production by BCEs may encourage a push for registration and formal organisation into companies without incentivising any tangible shift in decentralisation of government functions to the private sector.

Variations of this result, such as tying payments to BCEs attaining production ceilings or reaching break-even points, suffer from the same problem. The existence of large BCEs does not guarantee that their behaviour or role in the market has progressed beyond that performed by a large number of independent masons. Instead, organising into BCEs may just be a sensible response to the fiscal and tax incentives created by the programme and government, implying no substantive change in behaviour.

These results would be most suitable to structure a direct subsidy to BCEs, but successfully scaling up access to biogas will require additional market support activities given the limited number and capacity of BCEs in Ethiopia. In the third quarter of 2013, around ten biogas construction enterprises were active in Ethiopia (ABPP, 2013). Providing subsidies to encourage their further growth may form an important element of a wider overall strategy for the NBPE or for particular regions, but given their current limited capacities it would need to be combined with extensive support for the market provided through other means.

3.5 Use characteristics

Payments could be tied to use of the biodigester, confirmed through survey. For example, €75 could be disbursed annually for every household that is using bioslurry as a fertiliser and biogas for lighting and cooking.

Monitoring could occur through the planned customer support centre. Section 2 describes the current plans to create a customer support centre which would, through telephone interview, monitor the use of installed biogas digesters. Given that the call centre would be operated outside the NBPE by an independent



body, it appears to be an ideal candidate for monitoring and verification. Telephone interviews could be supplemented by sample-based face-to-face surveys of users to confirm the validity of the data collected through the support centre.

Telephone monitoring will take place regularly enough to limit problems with pre-finance. All biogas users would be surveyed via telephone at least annually, with more regular interviews for new users. Potentially, SMS surveys could also be utilised. These regular and low-cost survey techniques could form the basis for disbursement, though occasional face-to-face surveys remain necessary to ensure that the data is accurate and representative. Using the telephone interviews as a basis for disbursement would limit the delay between achievement of results and receipt of payment. With less regular surveys, pre-finance may become a significant issue; the recipient would need to fully fund the programme for longer than a year before seeing any return on the investment. Nonetheless, even the slight delay resulting from telephone interviews represents a disadvantage versus installations, for which disbursement could occur almost immediately.

Unlike installations, payments would be contingent on the continued functioning of the biodigester and appliances. This would provide a strong incentive for good after-sales service and full user training in correct use of the biodigester and appliances. Ensuring the accessibility of replacement appliances would be essential. As a result, the indicator would have much better proximity to impact.

Payments can be tied directly to bioslurry use and, in anticipation of their availability, the use of a biogas injera mitad. The customer support centre is already planning to inquire about cooking behaviour and bioslurry utilisation, and the information collected about these aspects of biodigester use could be tied explicitly into payments. There may be additional concerns, particularly with bioslurry use, about the validity of data collected through telephone interview; for instance, a consumer reporting that they use bioslurry may be using it incorrectly, in too large or too small quantities. This underpins the importance of supplementing telephone interviews or SMS surveys with face-to-face sampled surveys. Nonetheless, explicit inclusion of bioslurry use within the result could help ensure that incentives are aligned with the programme priority of increasing extension. Similarly, the lack of biogas injera mitads has been a consistent barrier for the programme, given the importance of injera as a staple food in Ethiopia. Including an additional payment for use of an injera mitad would provide a financial incentive to bring this appliance to market and ensure that it is available both to consumers getting new installations and to consumers with existing digesters.

It would still fall short of a true measure of commercial market sustainability. Widespread use of biogas will, in and of itself, contribute to commercial viability; households will become more aware of the benefits of biodigesters and this may increase demand through word-of-mouth. However, use of biogas can be encouraged through more or less market-led approaches. Success against this result does not necessarily indicate that a sustainable commercial sector is being created.

However, insofar as creating a commercial market is the lowest cost method of increasing biogas use, the incentive for encouraging private enterprise still exists. From the perspective of the recipient, contributing to the creation of a strong commercial market in biogas may be a very sensible strategy to adopt. They would collect the payment for increased biogas use whether or not the programme itself was playing a



leading role in the sector. The more functions that the private sector takes on board, the more results they can produce for any given level of expenditure on the programme.

3.6 Other metrics

A number of additional metrics merit discussion. Disbursals could be tied to:

- the profits of biogas construction enterprises;
- the quantity of private financing provided for biogas plants or to biogas producers; and
- the quantity of locally produced (high quality) stoves.

Profit of biogas construction enterprises would be a good measure of private sector health, but is difficult to monitor and independently verify. High profits tend to indicate strong commercial conditions. They encourage further entry into the market and expansion of existing players. As a result, they form a much more direct measure of commercial viability than quantity of plants installed by BCEs. Unfortunately, verification is likely to be problematic. It would require an independent audit of company accounts and, particularly, reported costs. This process would be expensive and agreeing on results to use as a basis for disbursement may be difficult. Sampling may be possible if there were large numbers of smaller BCEs operating throughout the country, but, for now, the number of formal enterprises with full auditable records is likely to be limited. There may also be a problem if linking payments to BCE profits provided an incentive to restrict output and increase the price of installations.

Both the quantity of private finance and the quantity of locally produced stoves identify particular barriers that are constraining sector growth. Access to finance is one of the priorities identified in Section 2; continued involvement of micro-finance institutions is essential for households to be able to cover their contribution to biodigester installation costs. Similarly, lack of locally produced stoves was a barrier throughout Phase I, with poor access to appliances (most of which are produced in China) limiting expansion.

They do not capture underlying objectives of the programme. Ultimately, the programme seeks to improve access to biogas through the creation of a sustainable, commercial market. Access to finance and locally produced stoves are both means to this end, but are not ends in themselves. While they may be important barriers over the next year, it is unclear how long they will continue to cause problems. For instance, interviews with stakeholders suggest that access to appliances appears to have fluctuated throughout the programme. While it has occasionally been one of the key barriers preventing expansion, it has also occasionally been much less important than other constraints. Tying disbursement to a specific problem over a number of years risks misallocating resources; once the barrier is overcome, tying incentive payments directly to it will be unnecessary and resources may be better spent elsewhere.

They would therefore mainly be suitable for use in short-term (e.g. one or two year) RBFs aimed at the relevant implementer. For instance, an RBF tied to quantity of loans is best offered directly to MFIs so that, in effect, the scheme operates as a targeted subsidy. The RBF will bolster revenue from biogas loans, improve margins and encourage MFIs to expand provision. Channelling the incentive through a coordinator instead is unlikely to achieve better results unless there are specific regulatory or legal hurdles holding back



private sector expansion and may well instead add an additional layer of bureaucracy which serves to reduce efficiency.

They would not be suitable for a long-term (e.g. three years or more) programme aimed at a coordinator. Higher level coordinators need to be able to respond to any number of potential barriers that may arise. They will be unable to do so if all of their funding is tied into performance against a particular barrier that may or may not be salient in a few years' time.

3.7 Combining metrics

Multiple results could be incentivised within a single scheme. For instance, incentive payments could be primarily tied to installations, with 'top-up' payments provided if use surveys indicate continued application of bioslurry and utilisation of biogas for cooking and lighting. Alternatively, use characteristics could be the basis for disbursement, with additional payments made when installation occurs through a BCE.

This approach could avoid some of the specific issues that appear to detract from the individual indicators. For instance, basing disbursements on both installations and use characteristics would allow some portion of the incentive to be distributed quarterly (based on installations), while still maintaining a positive financial incentive to encourage use by tying some additional payments to continued utilisation of biogas and bioslurry. Splitting the payment therefore combines some of the better features of each individual indicator.

One potential risk of this approach is overcomplicating the incentive structure. As emphasised above, one of the key benefits of an RBF is coordinating disparate agents within government, civil society and the private sector around a single, easy-to-explain goal. When payments depend upon a multitude of different metrics, this effect is likely to be weaker. Rather than providing a single goal, a combined metric provides several different goals, some of which will appear more important than others due to being attached to higher payment levels.

It can also make it harder to understand the likely reaction of recipients, and could increase the potential for gaming. When multiple results are combined, it is necessary to set payment levels individually for each. If the payment levels are set inappropriately, recipients may face a positive incentive to concentrate their efforts on one result over and above others. For instance, if installations were combined with use characteristics, setting the incentive for installations too high may lead to use characteristics being ignored.

Combining metrics can therefore be a useful tool, but needs to be treated with caution. If designed well, use of multiple metrics can realise the advantages of different indicators while avoiding some of their individual disadvantages. However, the danger of providing a more opaque incentive and increasing the risk of gaming should be taken seriously. In particular, close consideration should be given to the likely reaction of recipients to a split incentive scheme.



3.8 Which result is most suitable?

Figure 5. Performance of three main candidate results against criteria

| | Number of installations | Number of installations provided by BCEs | Use characteristics |
|------------------------------|--|---|---|
| Proximity to impact | Does not measure use; including availability of appliances and application of bio-slurry | Increases emphasis on private sector, but does not include use or guarantee commercial sustainability | Captures appliance and bio-slurry use, possibility of adding incentive for injera mitad |
| Ease of measurement | Monitoring framework is in place, independent verification through CSC | Monitoring framework is in place, independent verification through CSC | Measured by CSC within planned extension of the monitoring framework |
| Appropriate incentive effect | Easy to explain and can be measured at monthly intervals | Easy to explain and can be measured at monthly intervals | Measured less frequently; requires greater pre-finance |
| Suitable result? | ✘ | ? | ✓ |

Note: Green indicates good performance against the requirement, yellow indicates medium performance, red indicates poor performance

Source: Vivid Economics

Use characteristics are suitable results for RBF and could be expected to perform well in a variety of situations. They are close to desired impact, with widespread use almost guaranteeing development benefits. They can be measured within the planned extension to the monitoring and verification framework. They offer a clear and easily understood goal to which recipients can aspire. However, there are two drawbacks to bear in mind. First, telephone interviews and sample based face-to-face surveys may not occur frequently

enough to construct a full picture of national biodigester use more than once per year. This will limit the frequency of disbursement and implies that regions will need to have good pre-financing capacity, though further investigation is necessary. Second, use does not fully capture the long-term programme goal of a sustainable, commercial market. This should not be problematic provided that regions view promotion of a market as the most cost-effective means to achieve results. If they do not hold this view, adopting an RBF based on biogas use may need to be more carefully considered. One potential option, discussed below, would be to combine payments based on use with an additional payment to encourage installations through BCEs

Given user surveys will soon be available, use characteristics should be preferred to installations unless there is very limited ability to provide pre-finance. Installations metrics offers a couple of advantages relative to use. First, the information is collected with higher frequency and disbursal can therefore be more regular. This should alleviate problems with pre-financing. Second, installations are currently the headline metric used to judge the success or failure of the programme, and there may be some advantages of aligning the RBF with overall project evaluation. However, proximity to impact is low. Installations do not guarantee use and without use there are no development benefits. Given that monitoring will soon include user surveys conducted by an independent body, these advantages do not offer sufficient reason to continue using installations as a basis for disbursal. In the event that access to pre-finance is very problematic, installations could form the basis for disbursals in combination with a use metric; for instance, €150 could be disbursed for every biodigester installed, with an additional €100 disbursed in the following year if good use characteristics are observed. This would allow for quicker disbursal, but would introduce the danger that insufficient attention would be paid to encouraging biogas use given that the majority of funding is tied to installation.

If more focus on private sector development is required, number of installations provided by BCEs could provide a useful auxiliary result to combine with use characteristics. While sharing many of the disadvantages of tying to number of installations, explicitly requiring installations to be conducted by BCEs at least encourages some basic private sector development. This may be useful if, as described above, regions are not expected to adopt a market based approach for cost-effectiveness reasons. The best approach in this case may be to use installations by BCE as the basis for a ‘top-up’ payment – the majority of disbursement being based on use characteristics, with additional resources made available if these results are achieved through BCEs. This combination of the two indicators would provide an incentive to encourage development of BCEs over and above the benefits that already accrue to regions through increased biodigester use. With the majority of the payment still based on use characteristics, the risk of gaming should be low. The goal of the programme would also be clearly expressed through the incentive scheme; increasing biogas use through creation of a sustainable private market.

Programmes tied to a specific problem could be used to address a particular market barrier over a short period (such as one year) but will be an unsuitable indicator for structuring disbursement over the programme as a whole. Availability of credit, for example, seems likely to be a key barrier in further expansion of biodigester use. However, credit availability varies significantly across regions and may improve over time. Using an RBF scheme as a targeted subsidy to improve credit availability may be sensible if the scheme is aimed explicitly at implementers, uses a fraction of total programme resources and is expected to be in place for a short time. However, a scheme like this is inflexible; it will not respond to



changes in conditions over time or between regions. As such, it is unsuitable to structure disbursement over the programme as a whole or over a longer period of time.

Table 2. **Use characteristics, possibly combined with an assessment of installations by BCEs, provide the most attractive results indicators**

| Result | Use case |
|--|---|
| Installations | Could be combined with use characteristics if pre-finance is expected to be very problematic |
| Installations by BCEs | Could be combined with use characteristics if stronger focus on private sector is required |
| Use characteristics | Likely to perform well in a variety of situations, provided recipients are committed to private sector development and have access to finance |
| Specific market barriers (e.g. quantity of credit) | Could be used effectively in short-term (one or two year) program targeted at implementers and intended to buy-down a specific market barrier |

Source: Vivid Economics



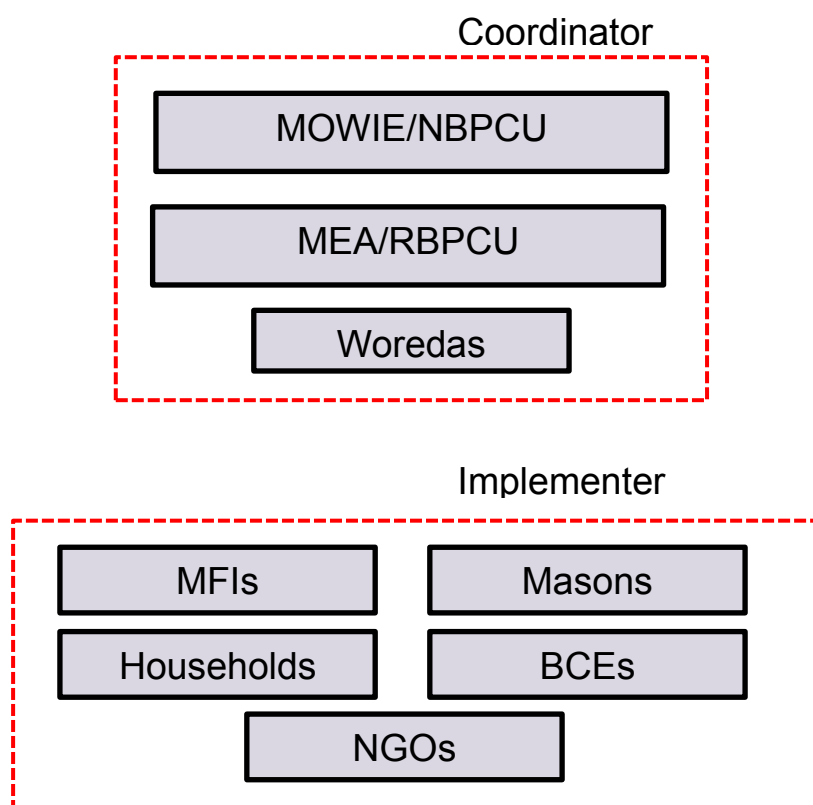
4 How could RBF be structured?

RBF seems particularly suitable for transfers from national to regional level

4.1 Principles of vertical design

RBF could, in principle, be used to structure disbursement to any level within the programme. Figure 6 shows a rough categorisation of the partners within the programme into implementers and coordinators. Woredas fit awkwardly into this typology; they perform both coordinating activity (for instance, promotion and training) and implementation (for instance, site visits to ensure quality standards are met). In theory, RBF payments could be made to and from any of these bodies.

Figure 6. Implementers and coordinators within the NBPE



Source: Vivid Economics

The suitability of a recipient for RBF depends upon their:

- influence over the chosen indicator;
- institutional capacity; and



- access to pre-finance.

Crucially, the recipient must be able to improve performance as measured by the result. If the barriers preventing improved performance are outside of the recipient's control, then RBF may be detrimental to the programme. To take an extreme example, if improving performance in biogas use is only possible with increased buy-in from woreda supervisors then an RBF based on biogas use aimed at Regional Biogas Programme Coordination Units would only be effective if they are able to influence woreda supervisors. If the supervisors are beyond their control and accountable elsewhere, then the RBPCUs will be unable to improve performance and the RBF will have no incentive effect.

The recipient should have strong institutional capacity. With all else equal, the best recipient to engage in RBF is the recipient with the highest institutional capacity and therefore the strongest likelihood of delivering results. There is also often less concern about providing untied budget support to stronger institutions – any excess returns from the RBF are more likely to be effectively deployed in achieving other valuable goals.

Finally, the recipient will need to be able to access credit or alternative sources of revenue to fund the programme in the short-term. Since RBF payments are made only after the results have been achieved, initial progress will have to be funded through the recipient's own resources. This requires them to have some flexible access to additional funding, either through borrowing or from internal revenue generation (or existing budgets).

4.2 Payments to regions

Payments from the national to the regional level are already broadly results based, but this could be further strengthened. As discussed in Section 2, funding provided to regions depends on performance in terms of number of installations, with around €250 of programme support provided for each digester installed. However, some of this funding has been provided in advance, recipients have limited freedom over the use of funds and all funds are required to stay within the programme. This suggests three steps which are necessary to transform the scheme into a full RBF: first, payments need to be made only after results were achieved; second, funds need to be allowed to be used outside of the biogas programme; third, regions need to be given greater autonomy in how to achieve the results. For reasons outlined in Section 3, it may also be worth changing the result that disbursement is tied to.

Payments to regions could be provided directly to MEAs. The RBPCUs sit within MEAs and are accountable to them. The two regional institutions are not independent. Instead, the RBPCU seems to operate as an office within the MEA. On the other hand, lower level implementing partners, such as the woredas, are primarily accountable to the MEA rather than to the RBPCU. Since engaging woreda officials is an important determinant of programme success, MEAs may have better control over the result than RBPCUs and providing payments directly to the MEA may reduce bureaucracy.

If suitable, payments provided without constraint on use may form a more effective incentive, reduce monitoring costs and give deeper autonomy to regional officials. Disbursement to regions is currently tied into the biogas program; it is provided directly to the RBPCU and cannot be redirected to other programmes



or objectives. This ensures that money provided in advance is used for its intended purpose, but it may undermine the incentive effect for money provided after achievement of results. If regional officials do not already prioritise biogas, they will be unlikely to want to dedicate their own resources to the programme since they will be unable to use any of the returns from the programme for any other purposes. Any income that they realise from the results based scheme will be permanently tied to biogas and will not be available for use elsewhere. It also limits the autonomy of the regions, who will be required to justify all expenditures as relevant to the biogas programme, and increases monitoring. Offering general budget support, on the other hand, may be a more attractive offer. Returns from the biogas scheme can then be used to achieve other MEA objectives and the programme may even be able to generate revenue for the department if particularly cost effective means of expanding biogas use are available. Suitability for providing untied support depends on the capacities and preferences of both the funder and recipient, but deserves close attention as a potential means to strengthen performance.

Under this model, MEAs would be explicitly responsible for funding and running the RBPCU. They would determine the RBPCU budget and take full ownership of the regional programme.

There would be several advantages over the current system:

- efficiency and transparency may be improved by automatically linking funding to results;
- uniform payment levels for different regions will ensure money is allocated where it will be most effective;
- regions would be given more freedom to determine priorities and budget allocation; and
- the result used to determine disbursement can be improved.

Explicitly linking payments to results may help minimise delays in budget replenishment. Payments could be made immediately upon receipt of reports from the independent customer support centre, minimising the time spent on review and assessment of budget requests. Provided the verifier is trustworthy, close scrutiny of each region's financial position and budget would not be required.

Over time, regions could be given full freedom to determine local priorities and strategy. For instance, line budgets could be removed, leaving regions free to respond to local conditions and barriers. If they wish, the regional offices could continue to apply the strategy determined over the last six years. However, when conditions change, they would be free to reallocate budget or personnel as required. The degree of autonomy that is suitable depends on the capacities and preferences of the donor and funder, but it should be noted that some degree of autonomy is necessary for an incentive to be effective; performance will only improve due to changes in behaviour and strategy at the regional level, which cannot occur if these are dictated from above.

Performance would be improved if payments were tied to biogas use rather than installations. As discussed in Section 3, installations are a poor proxy for the objectives of the programme. Shifting to biogas use will improve performance by ensuring that any improvement in results directly implies a tangible development benefit.

Access to pre-finance across each of the regions would need to be assessed before RBF was put in place. Regions need to be able to independently finance the first stage of the programme for RBF to be



viable. This should not be a significant problem, especially since funding is already broadly results based. However, it is worth assessing the financial capacity of regions before shifting to a fully results based model.

4.3 Payments to woredas

Payments could also be made directly to woredas based on performance, either from the national or regional level. Again, transfers to woredas already have a results based element since budget replenishment depends upon meeting installation targets. There are, however, opportunities to strengthen the results basis of the scheme through ensuring that payments are made only after the achievement of results and increasing woreda autonomy. As with payments to regions, it is also worth considering changing the result that determines transfers to woredas. In theory, payments to woredas on the basis of results could be channelled through regions, as within the current system, or could come directly from the national level.

Payments directly from national to woreda level may reduce bureaucracy, but risk decreasing regional engagement with the programme. Woreda priorities are largely determined at the regional and local level. If payments were to come directly from the national government there would be the risk of sending mixed messages – budgets may both depend on achievement of results determined at the national level and achievement against priorities determined locally. There would be a reduction in layers of bureaucracy, but also in accountability throughout the political system. The result may be lack of engagement in regional government and clash between independently determined priorities, which may undermine the effectiveness of the programme as a whole.

RBF may be more useful for structuring payments from regions to woredas. Within the current structure, there is room for a stronger results basis to be used by regions in determining payments. First, the link to results could be made more explicit and continuous; rather than waiting for achievement of targets, a set amount of budget could be provided for each digester installed. Second, a uniform amount could be provided across all woredas per digester. Third, woredas could be given more autonomy to determine the uses of budget. Finally, a better result could be selected.

Again, this approach promises several improvements over current financing structure:

- disbursing payments after the achievement of results could ensure that less funding is tied up in low performing woredas;
- efficiency gains may be possible from setting explicit uniform amount; and
- untied payments could generate a stronger incentive to perform.

Less funding would be tied up in low performing woredas. Stakeholders have raised concerns that under the current system, limited budget can remain tied up in ineffective woredas where it has been provided on as a result of ambitious targets. This risk can be mitigated with more regular reconciliation of advances against realised results – for instance, if small advances were provided monthly and docked against underperformance in the previous month. It can only be completely removed under a stricter results based scheme that disbursed only after achievement of results. Under this system, woredas would be required to demonstrate results before they began to realise any returns from the programme.



As with funding to regions, reducing variations in payment per installation may increase efficiency. It is unclear whether some woredas receive higher payments per result than others. If this is the case, it may lead to low performing woredas enjoying greater financial support per installation. Rerouting these resources to higher performing woredas may increase results.

Over the long term, untied payments may strengthen both the incentive for improved performance and woreda autonomy. Budget provided to woredas is currently tied into the biodigester programme. If, instead, the money provided through RBF could be used for any purpose, then woredas have the option of using the programme for revenue generation. As argued above, this increases the potential incentive effect and may lead to further engagement with the programme. It also increases the autonomy of woredas and reduces monitoring. Although suitability will depend upon the institutional capacities of the bodies involved, increasing autonomy over budget allocation deserves serious consideration.

Again, suitability depends upon ability to pre-finance. The ability of woredas to pre-finance may vary significantly across regions and across woredas within regions. Application of RBF therefore requires careful consideration of the context.

Assessment for the suitability of RBF would be best conducted at the regional level. An RBF is a contract between two parties, both of which must be happy with the content of the agreement. The above analysis suggests there could be possible gains to applying RBF to structure payments from regional to woreda level. However, it has also highlighted the possibility of there could be many context specific concerns. For instance, some woredas within a region may have poor access to pre-finance, limited institutional capacity or little ability to respond to the incentive due to competing priorities. The extent to which this is the case, and therefore the suitability of RBF, is best determined at the regional level in consultation with woredas. Nonetheless, RBF could be valuable tool for regions.

4.4 Payments to implementers

Either the national, regional or woreda level of the programme could offer payments to implementers. Currently, the only results based payment to implementers is the biodigester subsidy, which is determined at the national level. However, there is nothing stopping regions or woredas starting similar schemes at smaller scale.

Implementers have limited control over the broader success of the programme, and therefore require payment to be tied to more tangible results that are further from impact. Particular implementers have, at best, partial control over the achievements of the programme as a whole. Micro finance institutions can provide credit for digester construction, but have limited ability to incentivise new installations if raw materials or appliances are unavailable. Similarly, masons can promote biogas use, but are unable to provide credit. As such, disbursement to implementers tends to be tied to more tangible, concrete results, such as provision of a loan or construction of a high quality digester. Coordinators, on the other hand, can be expected to overcome a variety of barriers resulting from different sources, and payment can therefore be tied closer to impact.



As a result, RBF schemes aimed at implementers are mainly suitable for overcoming particular barriers over one or two years. Effectively, they function as targeted subsidies. They encourage providers to increase their production or provision to a market at the expense of programme resources. They can buy down particular barriers - for instance, by ensuring that masons can earn a decent margin on digester construction. However, particular barriers tend to come and go and will vary across regions. For example, if the major barrier in 2015 is availability of credit, a subsidy for construction may be less effective than a subsidy aimed at MFIs. Since they tend to be tied to a result further from impact, RBFs for implementers are less adaptable to changing conditions.

In the context of the NBPE, payments to implementers would need to be combined with programme support provided to coordinators. For instance, given the limited number, size and capacity of BCEs in Ethiopia, it seems unlikely that a subsidy provided directly to BCEs could lead to significant scale-up of the biogas market unless combined with extensive support activities. Similarly, payments to MFIs could not constitute the majority of programme spending, but would have to be combined with other activities to be effective. A direct scheme aimed at implementers would therefore be likely to encompass a limited portion of the total spending within the programme.

Such schemes may be best determined at a regional level. Given variation in the constraints to expansion between regions and across time, identifying a single barrier at the national level may be ineffective. Within the RBF scheme outlined in Section 4.2, regions would have the autonomy and budgetary freedom to respond to local developments, potentially using their funds to provide subsidies to implementers such as BCEs or MFIs. Allowing regions to lead on targeted subsidies to implementers may be more effective than design of a national scheme. It would mitigate the risk that such schemes become unresponsive to changing conditions and local barriers by delegating their management to bodies that are close to the ground and accountable for providing results.

4.5 Conclusion

For now, RBF within the NBPE seems best suited to determining payments to regions. There are clear gains that could be realised by switching to a stricter results based system for disbursement to regions, including increased efficiency, accountability and autonomy. Switching the result used as the basis for disbursement from installations to use characteristics and strengthening independent verification could also greatly improve performance.

Using RBF to structure payments to woredas or implementers are both useful tools to bear in mind for the future. Structuring payments to woredas through RBF may be very helpful for reducing liquidity dispersion, which seems to have been a problem throughout Phase I. However, its suitability will need to be assessed at the regional level and depends crucially on the ability of woredas to access pre-finance. Similarly, additional RBF payments to implementers may be useful for buying down particular barriers, but the exact form that such payments should take depend upon the developments within each region during Phase II. Regions may want to consider offering subsidies or top-up payments to existing subsidies to speed progress against particular barriers as and when required, and would be able to do so if given sufficient autonomy to determine their own priorities and spending.



5 How would the scheme be designed?

Payment level should be determined in negotiation with regions, with reference to current performance against targets

5.1 Payment level

An RBF scheme for regions could include only programme support. Around €250 is currently made available to each region per installation, intended to cover promotion, training, quality management, private sector development and monitoring and evaluation, alongside some other items. A similar amount could be tied, in stages, to biodigester use characteristics rather than installations.

Ideally, however, the subsidy scheme would also be folded into the same framework. An additional €185 (5,000 ETB) is available through the subsidy scheme. This money could also be folded into an RBF, leaving regions free to determine how these funds could be best allocated within the biogas programme. For instance, they may choose to either top up or reduce the subsidy based on the extent to which affordability is an important constraint in the local context. If access to finance is the most important barrier, they could channel these funds into cooperatives instead to provide consumer loans.

The payment level should be determined in negotiation with the regions. RBF is a contract between two or more willing parties, with no objective formula for determining payment amount. To ensure that funds are directed to the regions in which they can generate the most benefit and assuming that there is no reason to prioritise biogas use in one region over another, the payment amount should be uniform. However, beyond this, the 'correct' payment amount and structure can only be determined in consultation with recipient.

A reasonable starting point would be based on current total disbursements of around €430 per installation. Current disbursements per installation offer an anchor for negotiations, but several additional factors will need to be considered. First, use is a more demanding result than installations; to achieve results, regions will need to both continue to encourage installations and take additional action to encourage bioslurry use, access to replacement appliances and so on. This suggests that a higher payment level may be required. Second, there should now be a growing evidence base on how successful current payment levels have been. By analysing performance in 2014, it should be possible to determine whether €250 of programme support in combination with the subsidy has been enough for regions to meet targets. This evidence will provide some directional guidance: if current performance is on target, the payment is probably around the right level, whereas if it is below target then it may need to be increased.

The payment structure needs to balance two competing demands:

- Pre-finance is easier if a high proportion of the payment is frontloaded (e.g. disbursed immediately following installation)
- Incentive for maintenance and use is higher if a high proportion of the payment is backloaded (e.g. disbursed equally each year after installation)



The correct balance depends upon access to pre-finance at the regional level. If there were no limitations in terms of access to finance, the best payment schedule would offer an equal amount of money each year for any household using bioslurry as fertiliser and biogas for cooking and lighting. This would ensure that there is an equal incentive to promote use in a household that had a digester installed last year as in a household that had a digester installed this year. There is intuitive appeal to this approach: there is no reason to expect use of a digester to be more beneficial immediately after installation than three years after installation, so arguably the incentive payments should be no higher or lower in the third year than in the first year. On the other hand, this implies that many of the returns from the programme for the recipient will not materialise until several years after the recipient bears the costs. If pre-finance is likely to be an issue, a higher proportion of the incentive can be frontloaded in the initial year following installation to allow recuperation of costs while still offering a positive incentive for maintenance and use.

If pre-finance was expected to be problematic, a possible payment structure could offer €300 if the biogas digester is being used one year after installation, with an additional €75 for continued use in the two following years. This is an ad hoc example, purely based on current disbursements per installation, but serves as an illustration of a potential RBF. Regions could recuperate returns from investment relatively quickly but would still have a long term incentive in place for continued customer service and maintenance. Payments could be gradually scaled down for biodigesters built in each subsequent year; for instance, biodigesters built in the first year could be subject to the schedule described above, whereas those built in the second year would be paid one-third less and so on.

The payment after one year could be increased to €500 if installation was performed by a BCE. This provides a significant incentive to regions to promote organisation of masons into BCEs. It may be useful if there are serious concerns with the extent to which regions will prioritise the creation of a sustainable, commercial biogas sector.

5.2 Baseline

Payments should be made for all improvements in biogas use above those indicated in an initial survey. Prior to the NBPE, there had been very little biogas activity in Ethiopia. It is safe to assume that all increases in biogas use are due to the efforts of the programme, and payments should therefore be made for each and every improvement in results. This contrasts with RBFs in other areas, such as health or education, where a consistent historical record of improvement may call into question whether all changes in results are properly attributed to the RBF scheme.

If financially viable, payments should be made not only for improvements in biogas use among households with new installations, but also those with existing digesters from Phase I of the programme. For instance, if the initial survey indicates that a large number of households who participated in Phase I are not able to use the biodigester due to faulty appliances, additional payments should be made if subsequent surveys demonstrate that these problems have been resolved. If the payment structure discussed above was adopted, €75 could be offered for each household which was revealed by the initial baseline survey to not be using their biodigester but was subsequently shown to have enjoyed consistent use of biogas for a year.



6 Conclusion

Basing payments to regions on biogas use offers a promising opportunity for RBF within the NBPE.

6.1 RBF in the NBPE

This report is intended as a scoping exercise; decisions on the design of an RBF scheme need to be taken in closer consultation with the stakeholders involved in the programme. The report is based on both the available documentation on the NBPE and on interviews with staff and stakeholders involved in the programme. However, further work is required. In particular, as emphasised throughout the report, results-based funding will be most likely to work if all parties are satisfied with the content of the agreement. It is therefore of utmost importance that key decisions on design of an RBF scheme are taken with and between the stakeholders involved in the programme.

There is room for deeper integration of results based funding into the NBPE. There are already performance related aspects of transfers to both regions and woredas, but they fall short of a full commitment to results based funding. Linking payments to a better result, strengthening recipient autonomy, releasing funds from restrictions on their use and disbursing only after achievement could lead to improved performance.

Use characteristics offer the most promising result, potentially supplemented with information on whether the mason responsible for construction was organised into a biogas construction enterprise. Biogas use, confirmed by user survey, is close to the desired impact, can be monitored within the planned extension of the monitoring and evaluation framework, and offers a strong and clear incentive. The only major disadvantage is that it falls short of a full measure of commercial viability within the biogas sector, and therefore does not capture the long-term objective of the programme. This is only a problem if buy-in to the private sector led approach is very limited, since bolstering the private sector is likely to be a cost-effective means of achieving the result. In this case, it may be worth considering supplementing the payment to offer an additional incentive for installations that occur through BCEs.

RBF can be used to structure payments to regions, with potential benefits to efficiency and accountability. Payments should be directed to MEAs, who would be responsible for regional administration of the program and operating the regional offices. Linking payment to use rather than installations will align their incentives with the objectives of the programme, ensuring that the regions prioritise continued maintenance, access to appliances and extension activities. In addition, the incentive effect and autonomy of regions will be strengthened if funding is not required to be recycled into the biogas program. Creating this autonomy should be the long term goal of any RBF scheme established

Both the subsidy and programme support could be folded into the scheme, and payments can be frontloaded to mitigate problems with pre-financing. A potential payment structure would offer €300 if use of biogas for cooking and lighting and bioslurry for agriculture is confirmed through survey one year after installation. An additional €75 could then be provided in both the second and the third year provided



that use continues. If required, supplemental payments could be offered if installation occurred through a BCE; for instance, €500 rather than €300 could be offered after the first year if use is confirmed and installation occurred through a BCE.

Any improvements in use above an initial survey could be rewarded. Given the lack of independent activity in the biogas sector, all improvements can reasonably be attributed to the biogas programme. Payments should also be offered for improvements in use among households whose biodigester was installed as part of Phase I, to ensure that regions have an incentive to improve maintenance, access to appliances and extension across all households.

6.2 Areas for future work

While the approach outlined above appears to be the most promising, design of an effective RBF scheme crucially depends upon the capacities and preferences of the implementing bodies.

Organisational culture is not perfectly malleable and is likely to, at best, change slowly in response to the introduction of new funding modalities. The attitudes, abilities and preferences of the implementing bodies need to be taken into consideration. While this report has taken into account these issues where possible, deeper consideration is necessary before an RBF is put in place.

The next step in designing an RBF may therefore need to be a deeper institutional analysis. For instance, it is important that there is agreement across stakeholders on the goals and methods to be used within the programme. Similarly, consideration needs to be given to the likely reactions of the recipients to the new funding modality and the capacity and mandate of coordinating bodies. This would be best carried out by individuals who have experience working within the programme, in close consultation with the parties involved in a potential RBF scheme.

Consultation and negotiation with regions is essential. RBF is an agreement between willing parties, and the payment structure should be determined through negotiation rather than enforced from the top-down. It is necessary to consult with regions on the pre-financing capacity of the MEAs to identify how much of their own resources would they be willing to dedicate to the programme over the short term. If pre-financing is a significant constraint, it may be sensible to frontload more of the financing. Current disbursement levels can then be used as a starting point for negotiations, bearing in mind that achieving use requires more from regions than just achieving installations. Evidence from achievements versus targets from the first few months of Phase II may help determine whether current payment levels are too high or too low.

RBF could also be used to structure payments to woredas or implementers, though further investigation at the regional level is necessary to determine whether this would be worthwhile. The viability of an RBF programme aimed at woredas crucially depends upon access to pre-finance, and a detailed assessment of woredas capacity to temporarily fund the programme would be necessary before a firm recommendation could be made. Similarly, RBFs targeted at implementers, which effectively offer a subsidy towards achievement of some result, could be useful for tackling particular barriers to expansion. A thorough assessment of what barriers are most important in which regions and how likely they are to be effectively dealt with through increased subsidies will be necessary to evaluate whether an RBF of this kind is suitable. Given that the barriers may differ substantially across the country, it may be helpful to conduct this assessment at the regional level.



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