

Results-Based Aid in the Energy Sector

CASE STUDY

August 2014

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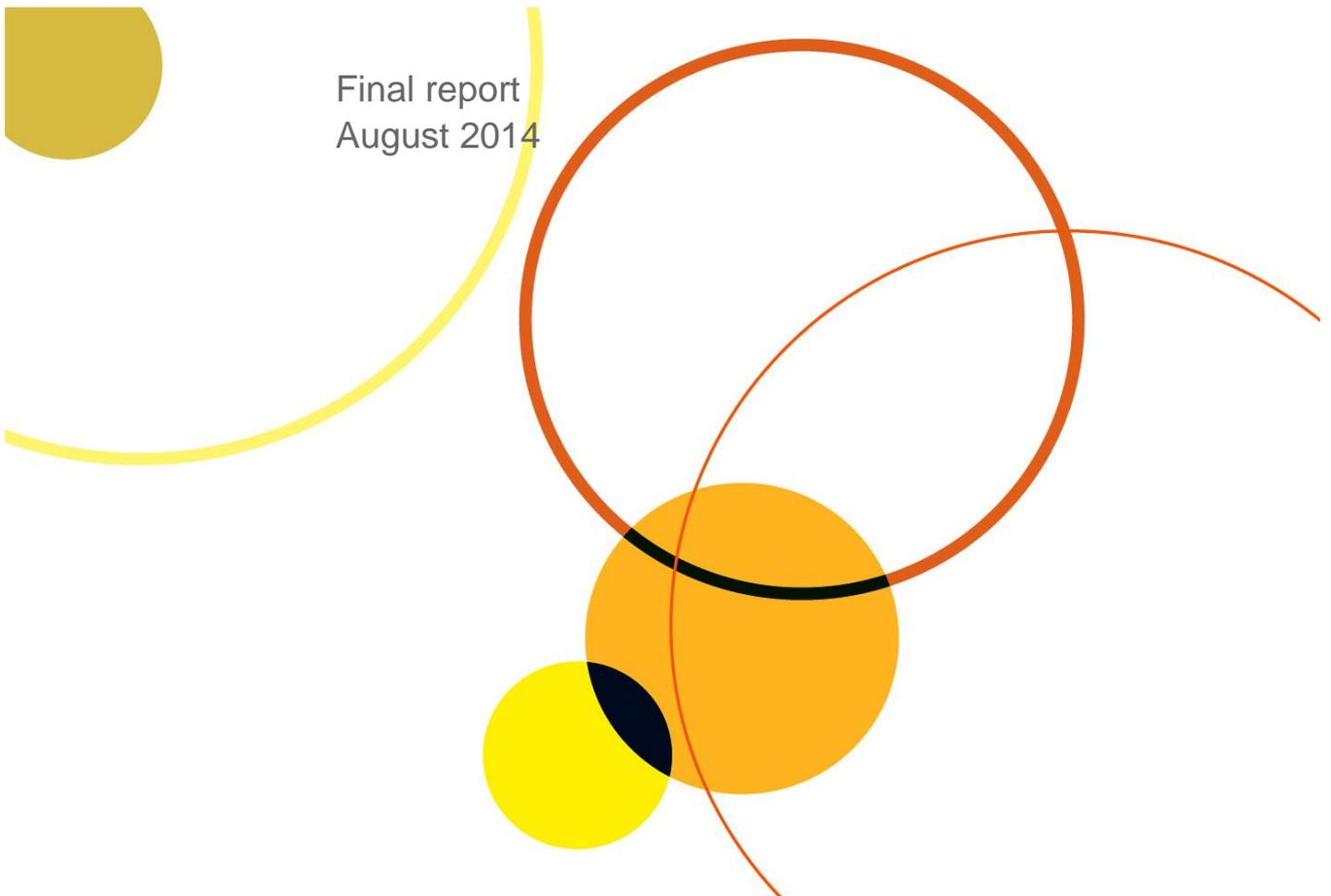
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RBA design options for the National Programme for Improved Household Biomass Cook Stoves Development & Promotion in Ethiopia

**Report prepared for ESMAP/Energy +/Government of
Ethiopia**

Final report
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Executive Summary

This report investigates whether, and how, results-based aid (RBA) could be used to support the implementation of the National Programme for Improved Household Biomass Cook Stoves Development and Promotion in Ethiopia. The report is intended to assist Energy+ in its discussions with the Government of Ethiopia regarding how results-based approaches could be used to structure the financial support that it is providing to Ethiopia to promote energy access and emissions reductions. It also serves to illustrate the methodological discussion regarding RBA outlined in an accompanying paper by Vivid Economics.

The National Programme for Improved Household Biomass Cook Stoves Development and Promotion is an ambitious programme for the deployment of more than 9 million Improved Cookstoves (ICS) in Ethiopia by January 2018. This deployment is expected to lead to a range of benefits including a reduction in emissions of up to 14 Mt of CO₂e over three years, a reduction of 1,000 – 2,000 deaths per year from indoor air pollution and the creation of more than 5,000 private sector jobs. The value of these benefits is expected to be significantly greater than the resources that the Ethiopian government estimates it needs from international development partners to deliver the programme.

RBA refers to the provision of financial support to national or regional governments only upon successful delivery, independently verified, of pre-agreed results. The accompanying conceptual paper discusses in more detail how RBA can be distinguished both from conventional aid modalities, which provide financial support in relation to development objectives prior to the delivery of any results, as well as from results-based financing (RBF), which provides financial support to individual service providers undertaking specific projects.

Four key preconditions needed for RBA to be successful are likely to be passed in any partnership between Energy+ and the Ethiopian government in relation to the cookstove programme.

- There is credible capacity and willingness on behalf of the development partner (Energy+) to implement a results-based approach in this context.
- There is willingness on behalf of the Ethiopian government to respond to the stronger incentives that an RBA scheme would impose, as indicated by the results-based philosophy underpinning the country's sector reduction mechanism (SRM).
- The Ethiopian government has demonstrated the relevant capacities in cookstove programme design and implementation, both through the current ICS programme and through previous cookstove programmes.
- Although further discussions are needed, it would appear that the Ethiopian government could pre-finance the portion of the costs of the programme that would subsequently be remunerated upon successful delivery of results

Choosing an effective indicator for a results-based scheme can be split into three discrete steps:

- Defining the objective; what is the programme trying to achieve?
- Deciding on the result level; what do we want to measure?
- Selecting an indicator; how can it be measured?



The objective of the cookstove scheme seems to be to (i) improve the health and wellbeing of households through increased access to clean energy and (ii) to prevent deforestation and forest degradation. While the programme objective is often stated in terms of ‘supporting the dissemination of 9 million improved cookstoves’, the underlying motivation for setting this target is to support the Climate Resilient Green Economy plan. Increased access to cookstoves is intended to improve access to clean energy and reduce deforestation. Dissemination of cookstoves should therefore be understood as an interim goal which will contribute to but not guarantee the achievement of these ultimate objectives.

These objectives define the impacts that the programme is seeking to achieve. Interventions can be understood as using a set of inputs, in the form of financial support, investment and human resources, to realise some development goals (or ‘impacts’). In the energy sector, they do this through influencing the physical and institutional energy ecosystem (referred to as ‘outputs’). These changes in the energy ecosystem result in energy becoming more usable (an ‘outcome’), which increases or improves energy use, which, in turn, results in improvements in the environment or quality of life. The cookstove programme may, for instance, attempt to change the energy ecosystem by increasing availability of improved cookstoves and cooking fuel, which improves the usability of energy for cooking for households, leading them to use higher quality cooking services that reduces fuel collection times, improves health and reduces deforestation.

If possible, disbursement should be made on the basis of an outcome indicator measuring changes in the usability of energy for cooking, not an output indicator measuring changes in availability of improved cookstoves. Cookstove programmes have consistently found that changes in household ownership of improved cookstoves are insufficient to guarantee use. Stoves may not always address local needs and households may continue to use traditional cookstoves instead of, or as well as, the improved cookstove (“energy-“ or “fuel-stacking”) (Accenture, 2011; Watson et al., 2011). The incorrect or increased usage of stoves can also undermine fuel savings or reductions in indoor air pollution (IOB, 2013). By contrast, measuring and rewarding outcomes (changes in the usability of energy for cooking) ensures that progress against the result is likely to lead to achievement of the programme objectives: improved household welfare and reduced environmental degradation. However, monitoring outcomes is costly, requiring regular household surveys. If monitoring outcomes is not possible, or cannot occur regularly enough to form the basis of a results-based programme, an output level indicator could still be used provided safeguards were put in place to ensure development impacts are achieved.

There are three indicators that could be used as a trigger for a results-based payment in support of the cookstoves programme. These indicators balance three competing criteria: the requirement that an indicator is a sufficiently good measure of the desired impacts from the initiative that the development partner is willing to accept that when this indicator has been achieved, the initiative can be considered successful; the requirement that the indicator provides an incentive effect, such that achieving improvements in the indicator is sufficiently within the control of the recipient that they do not risk expending substantial effort and cost and yet still not receive any funding; and the requirement that the indicator can be monitored at a reasonable cost. From a wide range of candidates, three broad approaches appear to score well against the three criteria of proximity to impact, ease of monitoring and appropriate incentive effect. The choice between the three depends upon the extent to which resources can be dedicated to monitoring.

The first option would be a result such as increased access to clean cookstoves, with the associated indicator being the number of improved cookstoves sold within the programme. This is an output, and



therefore suffers from poor proximity to impact. Stoves that are distributed may never be used. Good performance as measured by this indicator does not ensure that the programme objectives are met. However, distribution of cookstoves is relatively easy to monitor, and requires little extension to current plans for the monitoring framework. It also provides a clear and simple goal that is easily disseminated across agents within government, and should form an effective incentive since it can be predictably influenced using a range of interventions that are well-understood.

The second option would be a result that captured the increased usability of clean cooking solutions, as measured by the multi-tier indicator being developed by ESMAP. ESMAP is devising an index to measure access to modern cooking solutions that takes account of six key attributes: capacity, duration/availability, quality, affordability, convenience and health and safety. They have devised a methodology for aggregating these attributes to construct an index, which approximates household access to cooking solutions. Improvements in this index could then be used as a trigger for payment. However, this would require annual household surveys (which, in turn, may or may not require additional financial support from international development partners). In addition, depending on the approach taken to aggregating performance on different attributes it may sometimes be challenging for stakeholders to fully understand, and hence appropriately respond to, the incentive arrangements. Nonetheless, this indicator offers the best option if annual household surveys are feasible.

The third option would try to combine both output and outcome results, using a hybrid indicator that combines disbursement based on distribution with top-up payments based on the multi-tier framework. This approach would separate the RBA payment into two components. One component would be paid proportional to the number of stoves distributed. The second component would be paid out in a way that was proportional to improvements under the multi-tier framework. Performance against this usability metric could be assessed less frequently than annually, in which case there would be the potential for a periodic ‘top-up’ to the incentive payments made in relation to the distribution of stoves. This approach has the advantage of providing an incentive payment that is closer to the desired impacts of the program than the distribution indicator, but also places less onerous demands on the monitoring framework.

It would be preferable to use RBA rather than RBF in association with any of these results indicators. The combination of the strong federal structures within the Ethiopian government, the focus of the programme on developing infrastructure that would be shared by many manufacturers, and the ambition of the programme in the context of the small scale of most Ethiopian cookstove manufacturers all suggest that Energy+’s support to the programme is better delivered in partnership with the government (RBA) than directly to individual manufacturers (RBF).

Regardless of the payment trigger, the RBA payment should most likely be made as a grant. This aligns with Energy+’s preferred funding approach and is also the type of capital that the current investment plan identifies is required.

The report also provides discussion about some of the more detailed design characteristics for each of these three approaches.

- In the case of the distribution indicator, it suggests that a single payment is made for each ICS distributed. The cost per cookstove appears to be around US\$3.80. This is broadly consistent with estimates made by



other stakeholders and could form the starting point for negotiations over the payment level. Payments would only be for each additional cookstove distributed.

- For the index indicator, a baseline survey would be needed to establish the current performance of Ethiopia against the chosen index. The expected improvement in the index if the program was to fully meet all of its objectives, and the agreed costs of meeting these objectives, would also need to be calculated. Payments would then be made proportional to the improvement in the index score over time.
- For the hybrid indicator, a decision would first need to be made about the relative incentive attached to the quantity of cookstoves distributed versus the incentive attached to improvements in usability. As far as possible, the emphasis should be on the latter; the former should only be rewarded insofar as it is necessary to prevent problems with pre-financing. Once this was established, the quantity based aspect of the indicator would work as in the simple indicator and the quality-based payment could be made using the same methodology as for the index indicator.



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1 Introduction

A practical application of the theory of RBA design

This case study report identifies how it may be possible to support Ethiopia's National Programme for Improved Household Biomass Cook Stoves Development and Promotion as a Results Based Aid (RBA) programme. Results-based aid is an aid modality that is distinguished by the fact that financial support is made to governments upon satisfactory delivery, and verification, of pre-defined results. To development partners, when deployed in the right circumstances, RBA offers the prospect of generating better development outcomes for each dollar of assistance; for recipients it offers both the prospect of incentivising stronger development outcomes, while also providing them with the flexibility to choose the best way to achieve these benefits. An accompanying report (Vivid Economics, forthcoming) outlines many of the conceptual issues that need to be addressed when considering an RBA scheme. This case study provides a practical application of how these conceptual considerations may be addressed in a real-world context.

The work has a number of different audiences. In the first instance, the intention is to assist the dialogue between the Energy+ initiative and the Government of Ethiopia on the best way to structure Norway's support to the Government of Ethiopia on these topics. At the same time, it intends to demonstrate to a broader audience how the conceptual analysis in the accompanying Vivid Economics paper can be practically applied.

The report is based on information gathered while visiting Ethiopia, in May 2013, and through desk review of programme documents and relevant literature available by December 2013. Further developments between December 2013 and publication have not been taken into account.

The remainder of this case study is structured as follows.

- Section 2 discusses Ethiopia's National Programme for Improved Household Biomass Cook Stoves Development and Promotion, how this relates to Ethiopia's broader Climate Resilience Green Economy Strategy and the institutions that have been created for this, as well as Norway's Energy+ initiative and its relationship with the Government of Ethiopia.
- Section 3 applies the 'screening' process identified in the Vivid Economics conceptual paper, to assess whether RBA is a feasible tool to support the National Programme for Improved Household Biomass Cook Stoves Development and Promotion.
- Section 4 considers whether an RBA approach is likely to be a desirable or optimal approach, considering both whether it is likely to be preferable to alternative conventional aid modalities that are not results-based (pay for inputs) and how this differs depending on what 'result' is chosen; and whether support to a public institution performing an aggregating role may be better or worse than a more decentralised (results-based financing, (RBF)) approach that would support individual projects or initiatives.
- Section 5 discusses specific possible features of an RBA design in this context.



2 Context

Ethiopia has ambitious plans for cookstove deployment

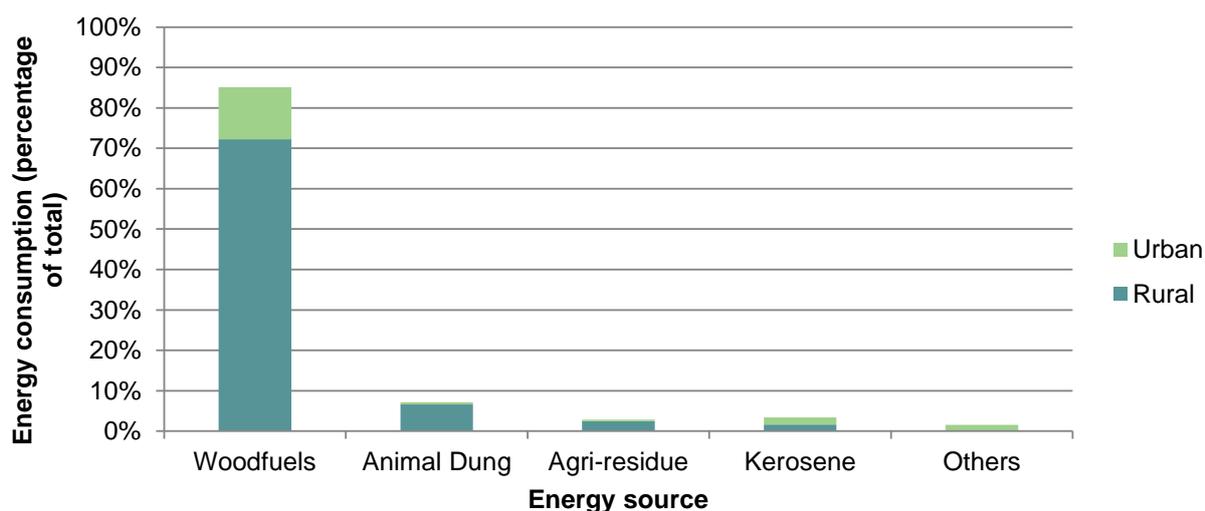
This section provides details about Ethiopia's plans for cookstove development and deployment and places this in the broader context of the country's Climate Resilient Green Economy Strategy. It also provides details on Norway's Energy+ programme which is a potential key supporter for both the cookstove programme and the CRGE strategy more generally.

2.1 Ethiopia's National Programme for Improved Household Biomass Cook Stoves Development and Promotion

2.1.1 What is the energy sector context in Ethiopia?

Ethiopia's large population relies heavily on biomass energy. Ethiopia's population is currently 84 million people and with a growth rate of 2.6 per cent per annum it will reach 103 million by 2020 (Central Statistical Agency, 2012). Domestic energy requirements in rural and urban areas are mostly met from wood, charcoal, animal dung and agricultural residues as shown in Figure 1 below. Biomass in its various forms accounts for significantly more than 80 per cent of total energy consumed in the country. The three-stone-stove, which has about 90 per cent energy loss, is used by around 80 per cent of the population (Ministry of Water and Energy, 2013a).

Figure 1. Woodfuels dominate both urban and rural total household energy consumption



Notes: These figures assume rural and urban household energy consumption are, on average, the same.

Source: Adapted from Ministry of Water and Energy, 2013a



2.1.2 What is the National Cookstoves Programme?

The Ethiopia Improved Cook Stoves (ICS) Programme aims to support the distribution of 9 million ICS in Ethiopia by January 2018. The long term goal is to disseminate 31 million stoves before 2030 (Republic of Ethiopia, 2011).

The programme recognises the need to focus on sustainability and replicability. With this in mind, the main activities of the programme are building institutional capacity (including developing standards), promoting ICS products to build consumer demand and providing support to producers of ICS products (Ministry of Water and Energy, 2013b). Success is dependent on many more producers entering the market and much higher consumer awareness of the benefits of ICS.

Ethiopia has a long history of ICS technology diffusion spanning experience with indigenous technology development and technology transfer. These programmes have introduced an active ICS production and sales sector with current annual sales of approximately 66,000 injera ICS (Mirte) and 16,000 rocket-type ICS woodstoves (Tikikil). Through the Energizing Development Programme, between 2010 and 2013, an estimated 1.3 million people have already benefited from the use of an ICS technology. The proposed ICS Programme aims to leverage these experiences (Ministry of Water and Energy, 2013b). Box 1 below provides more details on these previous initiatives.

Box 1. There are a range of related cookstove initiatives already operating in Ethiopia

Some of the most important initiatives in this sector in the last 20 years are summarised below.

a) Commercialization of Innovative Woodstoves Project (CIWP) 1994-1997.

This scheme developed and commercialised the "Mirte" ("best") improved biomass stove for cooking traditional injera bread from 1994 onwards, focusing on urban areas. Around 15,000 stoves were sold at market price, illustrating that stoves can be successfully marketed without subsidies if producers receive training, technical assistance and commercial guidance. The Mirte is now a standard product and can be easily and cheaply produced by small local producers. The modular structure also provides some standardization.

b) Household Energy and Protection of Natural Resources (HEPNR) ended 2005.

This project set up 36 Mirte stoves production units in the Southern Nations, Nationalities, and Peoples Region (SNNPR). Around 40,000 - 50,000 Mirte stoves are in use in SNNPR due to this and other such programmes, but the number of active ICS producers may have halved since the end of the project.

c) The Rural Household Energy Efficiency Improvement Project (RHEEIP) 2006 – 2011.

This project disseminated around 2.6 million stoves by June 2011 focussing on models such as Opesi, Lakech, and Tikikil stoves. The project trained 25,000 private stove producers and 5,000 staff from government offices and NGOs.

d) The Energizing Development Programme (2010 – 2017).

Initially implemented by GIZ during 2010-2013, this project established more than 600 small-scale ICS producers in 310 districts. By January 2012, these producers had sold more than 520,000 of Mirte, IRS



and Tikikil stoves with more than 1.3 million beneficiaries. On average, households benefitting from this programme have been able to save around 575 kilograms of fuelwood per year.

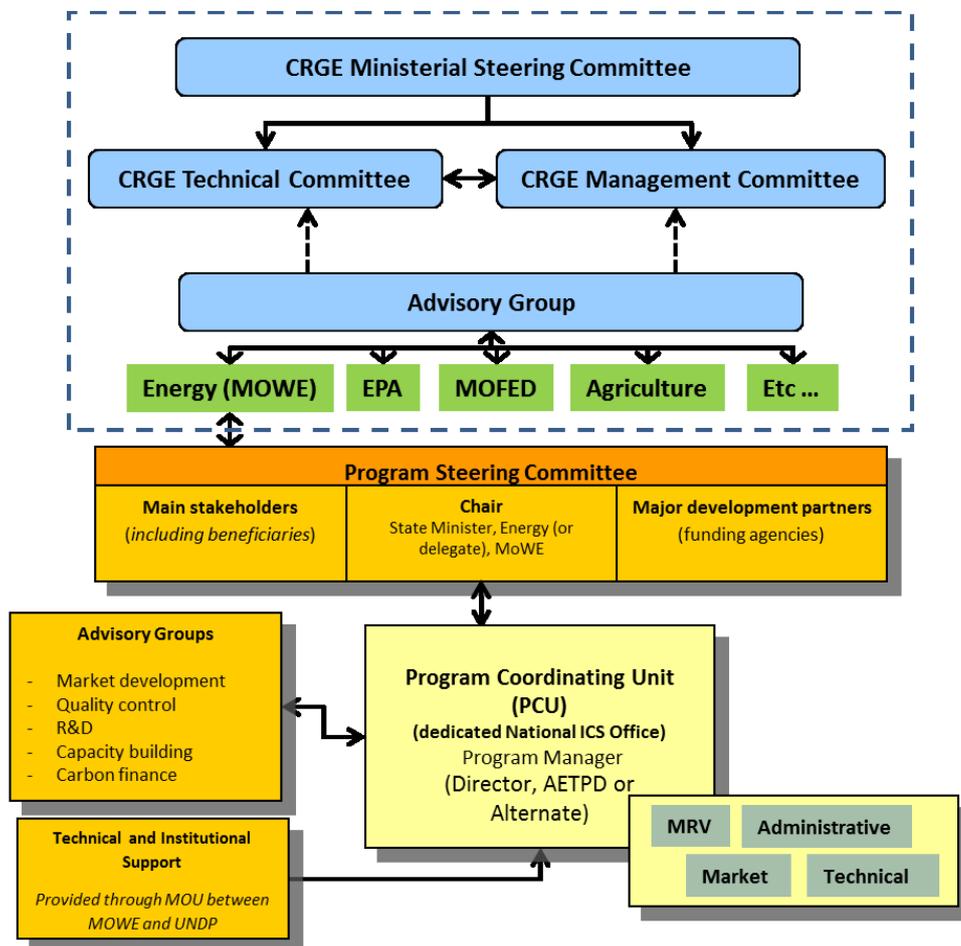
An additional Results Based Financing component, financed by DFID and initiated in 2013, extended this initiative for a further 3-4 years with focuses on the distribution of 250,000 new ICS products in the Tigray and Oromia regions.

2.1.3 How will the ICS Programme be implemented?

The Ministry of Water and Energy (MOWE) will take the lead on managing the ICS programme although much implementation will take place within regional centres. The institutional arrangements for the ICS Programme are set out in the MOWE Investment Plan (Ministry of Water and Energy, 2013b), and replicated in Figure 2 below. The MOWE, as sector ministry, will host the Programme Coordinating Unit (PCU). However, the programme is cross sectoral and international, with plans (subject to favourable market conditions) to link it to carbon finance, the Sustainable Energy for All initiative and the Global Alliance on Clean Cookstoves. Within government, the Environmental Protection Authority (EPA) will be responsible for alignment of the programme with the broader Climate Resilience Green Economy strategy (see section 2.2). There are also important roles for other parts of government, including the Ministry of Finance and Economic Development (financing), the Ministry of Agriculture, (tracking effects on deforestation and forest degradation), the Ministry of Health (MoH) (tracking indoor air pollution impacts), and the Ethiopia Quality and Standards Authority (approving ICS standards).



Figure 2. The Programme Co-ordinating Unit (PCU), which has been established in 2013, is supported by an inter-departmental Programme Steering Committee and Advisory Groups



Source: Ministry of Water and Energy (2013b)

2.1.4 What are the key challenges to the programme?

The government recognises that building consumer awareness, production capacity, institutional capacity as well as facilitating financing will be important in determining the success of the programme. ICS technologies have been tested and deployed on a large scale but there remain real challenges to scaling up and sustaining achievements (Federal Democratic Republic of Ethiopia, 2011; Ministry of Water and Energy, 2013b). Table 1 identifies some of the key constraints to the success of the programme.

It will be crucial to take advantage of the existing institutional infrastructure and experience, as well as grassroots level organisations. The production of large volumes of high-quality stoves needs to be ensured at an affordable price to consumers. Given current production and distribution practices, which are largely small scale, the programme needs to quickly boost supply and demand at a local level.

Table 1. **There are a range of institutional, market and technical constraints to the expanded distribution of ICS in Ethiopia**

Institutional	Market	Technical
Limited Coordination: divergent objectives; wasted resources	Product: unmet customer needs; lack of product management	Stove designs and production: variation in design/production
Limited institutional capability: limited focus on product management, distribution and marketing; inadequate reporting/information management (MRV)	Production: raw materials cost (sheet metal), mis-matched capacity locally, complex producer management, many small scale producers, basic production methods	Stove stacking: use of multiple types in households
	Distribution and retailing: capacity shortages; limited use/development of distribution channels; complex (processed) fuel distribution	Dynamics of cookstove use: consumer behaviour including use of multiple appliances can affect ICS results
	Marketing: limited promotional activities; ineffective marketing messages	Testing and Evaluation: laboratory capabilities
	Financing/economic: concerns over government budget (although see section 3.2 for further discussion), funding sources and customer financing; gender-differentiated household income; dependence on subsidies	

Source: Adapted from Ministry of Water and Energy (2013b)

It is also notable that the programme does not seek to define the objective of the program using (emerging) international practice on measuring access to cooking solutions. To date, the conception and design of the program has been focussed on how the delivery of the additional cookstoves can be achieved, However, as discussed later in this report, there is emerging international thinking on the appropriate way to measure and report access to household cooking solutions, which extend beyond deployment of cookstoves to cover issues such as availability, legality and safety. At present, these do not form a core part of the design of the program.

There are also unique challenges within the Ethiopian context due to traditional cooking requirements. Two different ICS technologies are required in most households, one for injera and another for other cooking. Box 2 explains how and why these traditional cooking requirements affect the cookstove programme.

Box 2. Responding to traditional cooking needs with ICS technology in Ethiopia

Injera, a unique type of yeast-risen flatbread, is produced and consumed widely in Ethiopia. Traditionally, injera is made out of teff flour and has a slightly spongy texture. Injera is baked on a large diameter flat cooking surface. However, for ordinary cooking purposes, smaller diameter pots are



also used. The two types of cooking (injera and other cooking) cannot work efficiently on the same ICS appliance.

In this context, there is usually the need for two different ICS technologies in order to provide efficient cooking. For instance, GiZ promotes the large diameter Mirte stove for injera baking and the Tikikil for other cooking in order to fully meet these different consumer needs.

Moreover, most stove products, especially the Mirte, are relatively bulky and heavy. Production in urban centres and poor rural road conditions means that transporting them to the consumer is expensive, especially to remote rural households.

2.2 Ethiopia's Climate Resilient Green Economy Strategy (CRGE)

2.2.1 What is the CRGE?

The CRGE sets out a strategy for protecting the country from the adverse effects of climate change and to build a green economy. Many consider that Ethiopia is already experiencing the effects of climate change such as an increase in average temperature and changes in rainfall patterns. This presents significant challenges but, in conjunction with international climate finance and international partnerships, also presents the opportunity to adopt a new, sustainable development model. Recognising this, the Government of Ethiopia initiated the Climate-Resilient Green Economy (CRGE) initiative in 2011 (Republic of Ethiopia, 2011). The strategy aims to build a sustainable economy that will also support the country's ambition of reaching middle-income status by 2025 in a resource efficient way.

So far, the government has identified more than sixty CRGE initiatives. These could help the country to achieve its economic development goals while at the same time emitting 250 Mt CO₂e less than is expected under its current development path. Sixteen of these initiatives have zero or negative abatement costs.

The ICS Programme is a Fast-Track initiative under the CRGE. Of the sixteen zero cost initiatives, four were selected for Fast-Track implementation, one of which is the large-scale promotion of advanced rural cooking technologies. The ICS programme will therefore be an important contribution to the CRGE goals and it is estimated that it could contribute to over 5 per cent of the expected emissions reductions from the CRGE, as well as lead to a range of further health and social benefits.

2.2.2 What is the Sectoral Reduction Mechanism (SRM)?

The SRM is the process by which Ethiopia will achieve the country's climate change vision.

The Sectoral Reduction Mechanism (SRM) has 4 objectives:

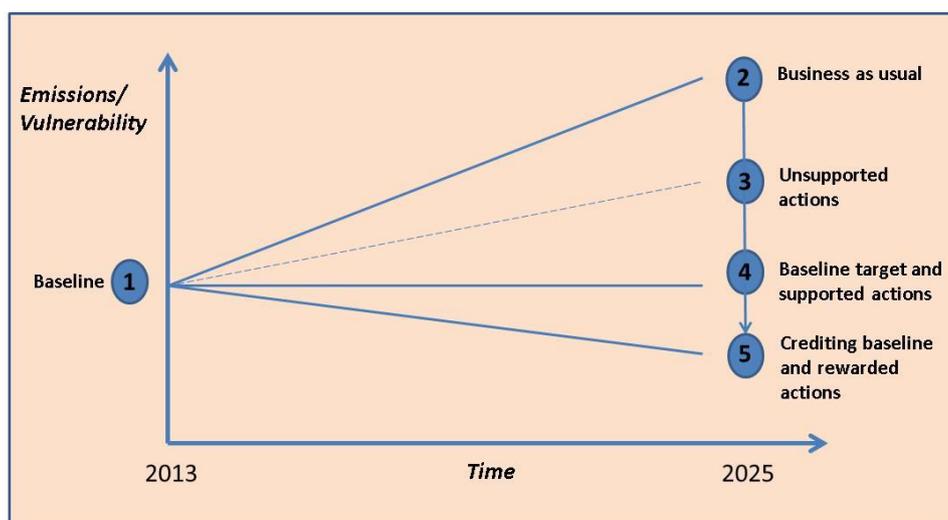
- **Reduce the cost of vulnerability.** Creating enabling conditions for the implementation of actions which reduce the cost of social, economic and environmental vulnerability;
- **Reduce greenhouse emissions.** Creating enabling conditions to reduce greenhouse emissions;
- **Tracking progress.** Providing a measurement and quantification of reductions in emissions and vulnerability due to implemented actions; and
- **Deliver on international commitments.** The SRM will help to foster the implementation of the UNFCCC and other relevant multilateral environmental agreements to which Ethiopia is party.



It plans to reach these objectives by developing a BAU trajectory for both emissions and climate vulnerability and then identifying ‘actions’ that can improve performance against these baselines.

These actions are divided into (1) unsupported actions, which are to be undertaken using domestic resources, (2) supported actions and (3) rewarded (potentially results-based) actions. Figure 3 provides a stylised representation of the Sectoral Reduction Mechanism.

Figure 3. **The SRM conceptual framework identifies the concept that the Business As Usual pathway (2) will be altered by unsupported (3), supported (4) and finally rewarded actions (5)**



Source: Environmental Protection Authority, 2012

The EPA will establish a National Measurement, Reporting and Verification (MRV) system. The MRV for the ICS Programme, as discussed further in sections 4 and 6 is expected to be consistent with the overall MRV system for the SRM, although firm details on both were not available at the time of writing.

2.3 The Energy+ initiative

2.3.1 What is the Energy+ Initiative?

Energy+ supports efforts to achieve universal access to sustainable energy and reduce greenhouse gas emissions in developing partner countries. In 2011, The Prime Minister of Norway and the United Nations Secretary-General initiated the International Energy and Climate Initiative, ‘Energy+’. Norway entered into partnership agreements in 2012 with Ethiopia, Kenya, Liberia and Bhutan.

Amongst Energy+ partners, Ethiopia is well advanced in terms of preparations at the country level.

Of the total Energy+ commitments of NOK 950m (US\$162 million), NOK 500 million (US\$85 million) has been agreed with Ethiopia over 5 years. The first tranche of Energy+ funding to support Ethiopia’s Readiness activities (US\$3.4 million) was made in December 2012.

2.3.2 Status of Energy+ relationship with Government of Ethiopia

The purpose of the Energy+ agreement with the Government of Ethiopia is to assist Ethiopia to achieve universal access to sustainable energy and avoid or reduce emissions of greenhouse gases from the energy sector by 2030. It seeks to do this through provision of results-based contributions. The Energy+ partnership will also build an overall approach to the energy sector on renewable energy and energy efficiency policy to help achieve targets set out in the CRGE strategy (see section 2.2). It has three phases¹:

– **Phase I - Readiness Activities, 2012 - 2013**

- Preparatory steps, including establishing a programme coordinating unit (PCU) in the MoWE and finalising investment and implementation plans.

– **Phase II – Implementation 2013 - 2015**

- Initiated in 2013 or early 2014 and to be completed by the end of 2015, Phase II is to agree and initiate a results-based programme for increased access to energy and reduced emissions.

– **Phase III – Results-Based Contributions (2016 – onwards)**

- Results based payments would be made according to progress, based upon independently verified results achieved in year 2015.

2.3.3 Other partners supporting the sector

There are a number of international and local partners involved in accelerating progress in the ICS sector, which will co-ordinate with the Energy+ programme through the MOWE. Partners include, but are not limited to, the United Nations Development Programme (UNDP), the Barr Foundation, GIZ, the World Bank and the UK Department for International Development (DFID). Broad stakeholder mapping, resulting from a consultation workshop in 2012, is available in the ICS Investment Plan (Ministry of Water and Energy, 2013b).

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¹ It is noteworthy that the expected dates for the introduction of results based contributions under the Energy+ agreement, 2016 onwards, does not coincide closely with the expected timeframe for the ICS programme which is/was expected to commence from 2012 or 2013. Nonetheless, there is value in considering how results-based approaches could be used to support the ICS initiative both to provide an example for other later initiatives (for which detail is not yet available) and because of the possibility of delay in the roll-out of the ICS initiative.

3 Should RBA be considered in this context?

Screening the context against key criteria to check appropriateness

The accompanying conceptual report identifies four factors that need to be in place before it is appropriate to consider RBA approaches:

- the recipient government wants to improve performance against the result;
- the recipient government has sufficiently high capacity to design and implement effective interventions;
- the recipient government has access to pre-finance to fund interventions; and
- the funder is trusted to fulfil the terms of the contract.

All four of these preconditions appear to be satisfied in this context, albeit in the final case with some caveats. This is discussed in each of the subsections below.

3.1 Recipient capacity and willingness

Ethiopia has been pioneering work on results-based approaches that could further its development objectives. As described in section 2.2, the Sectoral Reduction Mechanism explicitly anticipates a role for ‘unsupported’, ‘supported’ and ‘rewarded’ actions where, as discussed in section 2.2.2, rewarded actions are intended to receive financial support *after* emissions reduction activities have been verified; in other words, upon achievement of results. This approach is well aligned to an RBA programme, whereby the principal – such as Energy+ – rewards progress on verification of results. The leading role taken by the Government of Ethiopia provides confidence that it will be able and willing to respond to the incentives provided by a well-designed RBA programme. In addition, the Ethiopian government is already involved in RBA pilots, particularly within the education sector (see, for instance, Birdsall & Perakis, 2012)

This is corroborated by more general data about the institutional capacity of the country. Ethiopia has the joint highest score of all low-income countries for the Quality of Public Administration in the World Bank’s 2012 Country Policy and Institutional Assessment (CPIA) ratings. This is a measure that ‘*assesses the extent to which civilian central government staff is structured to design and implement government policy and deliver services effectively*’. It scores 3.5 out of 6; only Kenya, Rwanda and Burkina Faso have an equivalent score among low-income countries.

The government has repeatedly demonstrated both interest in improving access to cooking solutions and the aptitudes necessary to design and administer effective programmes. The ICS Programme has been effectively designed, with a strong focus on improving institutional capacity, building consumer demand and providing support to producers. The programme also appears to have support throughout the government, and comes on the back of several other programmes focused on access to cooking solutions,



such as the Energizing Development Cookstove programme. Box 1 provides details of several other examples.

3.2 Ability to pre-finance

The overall costs of the programme are estimated to be in the region of US\$30-40 million but potentially only US\$17-23 million of these costs would be appropriate to recover through an RBA initiative. Different Implementation Plans for the cookstove programme identify somewhat different costs over slightly different periods:

- a Ministry of Water and Energy Implementation Plan document submitted to Energy+ in April 2013 identifies a cost of US\$40.1 million over the period 2013-2016 in one part of the document and US\$37 million elsewhere (Ministry of Water and Energy, 2013c);
- an investment plan (version 8) dated February 2013 identifies a cost of US\$33.5 million over the period January 2013-January 2018 (Ministry of Water and Energy, 2013b);
- an earlier investment plan document identifies a budget of US\$40.1 million over the period 2012-2015 (Ministry of Water and Energy, 2012).

However, it may not be appropriate to recover all of these costs through an RBA programme. Many of these costs are fixed and relate to enhancing institutional capacity or establishing MRV systems. While these are an essential prerequisite of the scheme, they should be funded through grants rather than upon achievement of results. This is essential to preserve the independence of the monitoring body and limits the risk that the Government would incur substantial fixed costs which, if the scheme failed, they could not recover. This is consistent with the phased approach planned by Energy+ whereby results based payments are only made after an initial phase of support for readiness activities.

Instead, it may be better to only provide the RBA incentive in relation to activities that directly and proportionally lead to more results, for example, increasing awareness of stoves, creating distribution channels, and, potentially, subsidising cookstove sales². Based on an earlier investment plan³, we estimate that the total costs that might be subject to the RBA initiative to be in the region of US\$20-26 million⁴ (Ministry of Water and Energy, 2012).

Annual costs that may need to be pre-financed might amount to a maximum of US\$11–17 million or 0.6 per cent of current Ethiopian government final consumption expenditure (with total government expenditure, including investment expenditure, higher still). This estimate accounts for the fact that the costs that would need to be pre-financed under the RBA scheme would not be constant in each of the years in which the scheme is implemented. It would appear that the maximum amount of costs for which pre-

:vivedeconomics



² Some versions of the implementation plans suggest that subsidies for cookstove production will be provided, others suggest that a fully market-based approach will be adopted.

³ This is the only version of the investment plan that we have seen that provides a detailed allocation of costs across different activities.

⁴ The higher numbers include both capital expenditure and operating expenditure related to production, distribution and promotion of cookstoves, whereas the lower range excludes capital expenditure.

finance would need to be found - bearing in mind that the Energy+ scheme requires payments to be made on an annual basis⁵ – would be manageable, although this would need to be confirmed in further discussions.

3.3 Donor capacity and willingness

Energy+'s strong public commitment to piloting results-based approaches can provide confidence to the Government of Ethiopia that commitments will be honoured. For an RBA to be effective, recipients must have confidence that donors will quickly respond by providing funds upon satisfactory achievement of the results. This is likely to be the case in this context: Norway has made a very clear public commitment to the use of results-based approaches which means that it would suffer acute reputation risk if it did not deliver on its commitments. In addition:

- In the World Economic Forum competitiveness index, Norway is ranked in the top 10 per cent of all countries in the world for a range of indicators that serve as a proxy for the credibility of government contractual commitments. These include diversion of public funds (10th out of 144); public trust in politicians (4th out of 144); irregular payments and bribes (8th out of 144); favouritism in decisions of government officials (10th out of 144).
- The total cost of the programme is between US\$30 million and US\$40 million (see section 3.3. below). It is not expected that Energy+ would provide all of the support to this programme but, even if it were to do so, this compares with around US\$85 million that Energy+ has committed to Ethiopia at this stage.

However, the characteristics of the Energy+ programme do place some constraints on the design of any RBA instrument. In particular, Energy+ has a requirement/expectation that payments are made annually rather than, for instance, only paid after a number of years when a threshold target in terms of results is reached. This is a common characteristic of many bilateral programmes.



4 Is RBA a desirable choice for this programme?

To make a judgement about the potential advantages of structuring the programme using a results-based approach, it is necessary to outline the broad principles of the programme's design. It is only possible to directly compare a results-based approach to an alternative conventional approach when both have been sketched out. This crucially requires choosing a result and indicator to which disbursement would be linked in a results-based programme. If an 'appropriate' result and indicator can be found then it is plausible, based on the empirical research discussed in the conceptual paper, that RBA may represent a more cost effective form of intervention than conventional aid modalities.

Following the approach outlined in the theoretical report, designing a results-based scheme can be broken down into three stages:

- Defining the objective; what is the programme trying to achieve?
- Deciding on the result level; what do we want to measure?
- Selecting an indicator; how can it be measured?

The choice of result level and indicator needs to take account of the MRV framework identified by the Government of Ethiopia in the project implementation plan. The current proposal for MRV suggests three tiers of monitoring of the programme's success (Ministry of Water and Energy, 2012):

- First, regional household surveys will be used to understand the penetration rate of different stove technologies. This is described as providing a 'rough baseline' of the types of stoves used.
- Second, a monitoring system will be developed to establish the numbers of stoves sold in each woreda. It is expected that an online database open to all participants will be made available.
- Third, the use of stoves and emissions savings will be measured (for a sample of) households in those woredas which are hoping to acquire carbon credits.

4.1 Objective of the programme

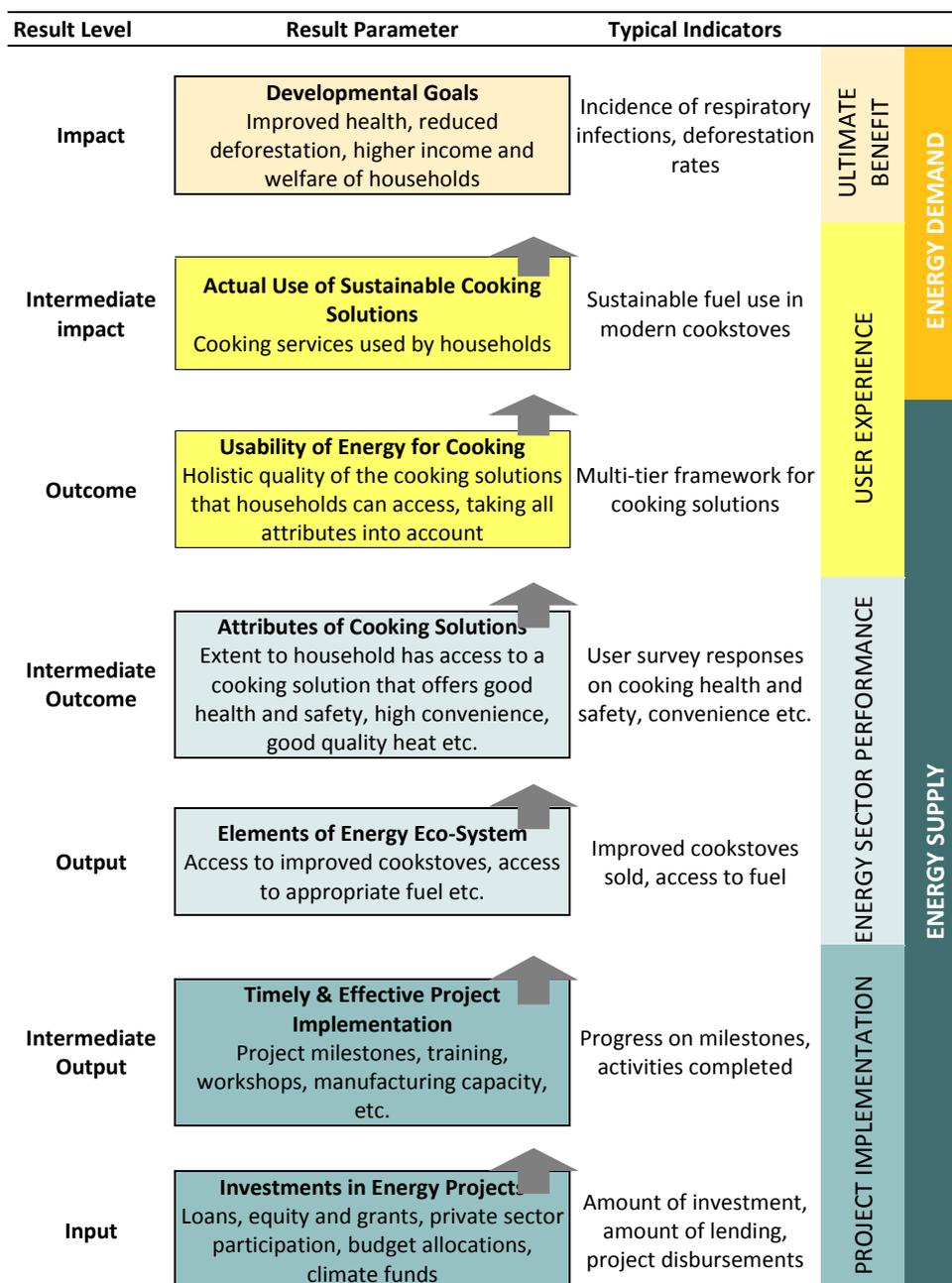
As discussed in Section 2.1, the objective of the programme is often framed within the documentation in terms of increased distribution of cookstoves. The stated objective is to support 'the dissemination of 9 million improved cookstoves in Ethiopia up to January 2018' (Ministry of Water and Energy, 2013b). This is to be achieved by building both 'a sustainable and vibrant market for improved cookstoves' and 'institutional capacity' (Ministry of Water and Energy, 2013b).

However, the ultimate objective of the programme goes beyond distribution; the intention is to reduce deforestation and improve access to energy. The programme investment plan notes that the vision for the programme is to 'contribute to the realization of the CRGE vision of reducing emissions from deforestation and forest degradation and ensuring access to clean energy'. In other words, the ultimate goal of the programme goes beyond distributing cookstoves; these cookstoves need to be in consistent use to create development benefits, in the form of reduced emissions from deforestation. Ultimately, increased access to clean energy is also probably valued because of the benefits that it creates for households, in terms of reduced fuel collection times, better health outcomes and so on.



These ultimate goals define the programme’s intended impact. Figure 4 depicts an adapted energy results chain for cookstove programmes. The Energy Results Chain, developed by ESMAP and discussed in more detail in the theoretical report, splits the impact of an energy intervention into several stages, each intended to lead to the next. The goals of improved health and reduced deforestation would be classified as an impact – the highest level in the chain. Higher level impacts could also potentially be defined, such as fostering climate resilient and sustainable growth across the economy.

Figure 4. The Energy Results Chain is split into seven levels



Source: ESMAP, Vivid Economics



Number of improved cookstoves disseminated, on the other hand, is an output. Outputs are defined as physical and institutional elements of the energy ecosystem. Number of improved cookstoves within households falls into this category. The presence of an ICS in a household does not, in itself, guarantee the improved usability of energy services (an outcome) or the achievement of developmental goals (an impact). For instance, consumers may have access to an improved cookstove but lack affordable or convenient access to fuel. The cookstove itself may deteriorate with use and, due to limited local capacity, it may be difficult for the household to maintain the stove. Finally, the cookstove may be inappropriate for the cooking needs of the household, providing a low quality or inconsistent heat.

4.2 Results level

A results-based scheme could, in principle, target any level of the results chain from output to impact. Emerging approaches to results-based aid have emphasised tying disbursement to outcomes (Birdsall & Savedoff, 2011). However, payments could also be tied to other results levels, including outputs and impacts.

The results level chosen will need to balance three goals, explored in more depth in the theoretical report:

- the proximity of the result to the desired impact;
- the appropriateness of the incentive effect created; and
- the costs of monitoring the result.

To make concrete trade-offs between each of these goals requires analysis of the specific indicators available, but some advantages and disadvantages are shared across all results at a particular level. As explored in this section, output indicators are likely to be easier to measure but may be far from impact. The opposite is likely to be true for outcome indicators. Exploring the relationships between results levels can help elucidate these general principles and test for applicability in the context of the Ethiopian cookstove sector.

4.2.1 Output level

Payments could be tied to an output level measure of changes in the energy ecosystem. Candidate indicators include number of cookstoves distributed through the programme or penetration of different cookstove technologies.

Evaluations of cookstove programmes have regularly found that owning a cookstove has been insufficient to lead to use. Even when cookstoves are successfully distributed to households, they are not always used within those households, in an enduring fashion, in a manner which leads to the desired improvements in energy access for cooking. For example, stoves may not always address local needs and households may continue to use traditional cookstoves instead of, or as well as, the improved cookstove (“energy-“ or “fuel-stacking”) (Accenture, 2011; Watson et al., 2011). The incorrect or increased usage of stoves can also undermine fuel savings or reductions in indoor air pollution (IOB, 2013). These findings have been echoed in prominent evaluations of cookstove programmes, such as Hanna et al. (2012). This study applied a randomised evaluation strategy to establish the effects of a cookstove distribution programme in India. They found limited impacts on health and fuel consumption, due to lack of regular and appropriate use and maintenance of the stoves.



This suggests that the programme outputs are a reasonable ‘distance’ from impact. Distribution will only have a positive effect on the wellbeing of households and on the environment if the cookstoves are in regular use. This cannot simply be assumed to occur, but rather depends upon the value that households place on the improved cookstoves, the cultural and social norms surrounding cooking behaviour and the quality of the cooking solution offered by the improved stove.

This risk may be reduced by the market-based approach underpinning the implementation plan. The programme requires that households contribute to the purchase of cookstoves, which should help to ensure that only households who intend to make use of the cookstove will participate. There is also considerable experience of cookstove interventions in the Ethiopia context, lessons from which have been built into the ICS Programme Investment Plan.

Nonetheless, tying disbursements to an output level result may be risky, or may require additional safeguards to be taken that undermine the goal of affording total autonomy to the recipients. Donors may wish to be more involved in the programme implementation if payments are tied to an output measure, to ensure that sufficient steps are being taken to ensure that cookstoves are used and maintained. This could provide assurances that the risk of disbursing large payments without achieving development goals is limited, but also undermines one of the key advantages of results-based aid: promoting accountability and ownership by allowing donors to adopt a hands-off approach.

Linking to an output level result does offer advantages in terms of ease of measurement. Distribution of cookstoves, for instance, is likely to be relatively easy and cheap to monitor, compared to outcome or impact results and associated indicators that may require regular household surveys. Distribution statistics could plausibly be produced quarterly, allowing regular disbursements to closely track the achievements of the programme. This would limit potential problems with pre-finance by ensuring that the government was able to quickly see returns from their investment. Finally, the planned monitoring, reporting and verification framework includes output level indicators of cookstove distribution, which could be used as the basis for disbursement through an RBA at little or no additional cost.

The incentive effect could be strong. Improving the availability of efficient cookstoves offers a single, clearly articulated goal that can be easily disseminated throughout government. It should be clear to all parties what achieving the goal would look like, and the government is likely to be able to influence performance. As a result, the risk that payments are much lower than expected will be small, which should strengthen the incentive effect.

On balance, output level measurement could be used within an RBA programme, but it is likely to suffer from some serious disadvantages. It would be necessary to carefully mitigate the risk that disbursement would occur without the programme achieving the desired objective of improving the wellbeing of participating households and reducing environmental degradation.

4.2.2 Outcome level

The theoretical report argues that, within the energy sector, linking to usability of energy will often offer attractive opportunities for an RBA scheme. Outcome measures offer a good balance of proximity to impact and provision of an appropriate incentive.. However, within the energy sector, until recently, few



robust outcome level measurements had been formulated and applied. This has compromised ease of measurement.

A good measure of the usability of cooking solutions would be close to impact. If measured well, highly usable cooking solutions are likely to lead to regular use and therefore contribute to achieving the programme objectives. As a result, both donors and recipients could have confidence that disbursements would only occur if genuine improvements were occurring on the ground. The risk of gaming would be minimised.

However, good usability still does not guarantee impact; households may place a high value on traditional cooking methods or underestimate the advantages of improved cookstoves. The assumption underlying use of a usability indicator is that the previous programmes that have experienced problems with sustaining use have done so because they have failed to improve some attribute of usability. Either fuel has not been easily available or the quality of the cookstove has not been suitable for cooking needs or some other aspect of usability has been deficient. This is plausible, and certainly an improvement on assuming that distribution implies use, but the relationship between usability and impact may still need to be monitored throughout the programme.

Outcome level results, depending on how they are constructed, could provide an appropriate incentive effect. Improving usability of cooking solutions is a more abstract goal than, for instance, distributing improved cookstoves or other measures of improvements in outputs. It is dependent on several different attributes of energy supply and does not correspond to a direct physical change in infrastructure. This may somewhat weaken the incentive effect, since it is harder to disseminate a goal that cannot be clearly and easily explained. However, this need not be an insurmountable obstacle; usability is an intuitively appealing target for policy.

However, measurement may be more difficult than with output level indicators. Outputs can often be monitored on the supply-side, which reduces costs and allows metrics to be reported more frequently; for instance, cookstove distribution can be monitored in real-time at a manageable cost. Outcome indicators of access to cooking solutions, on the other hand, need to be measured through household surveys. These can be costly and, if conducted infrequently, can lead to a significant lag between initial investment by the recipient and disbursement. This lag, which prevents recipients from earning a quick return on their capital investments, could exacerbate pre-financing problems and prevent scaling up the programme based on early successes.

This is further complicated by the requirement of Energy+ to make disbursements annually. As with many bilateral programmes, Energy+ is required to structure disbursements to the Government of Ethiopia such that payments are made each year. This implies that, to base payments purely on outcome level metrics would require either annual surveys or the use of some intermediary body.

Whether using an outcome level result is possible within the cookstove programme crucially depends upon whether regular household surveys can be funded, either through the RBA or using additional resources from elsewhere. Regular, independent surveys on access to cooking solutions (and potentially covering other energy access issues) are valuable to many groups outside of the cookstove programme. It may therefore be possible to attract external funding to assist with the costs. A number of development



partners, including ESMAP, have indicated a willingness, in principle, to support the establishment of regular household cooking surveys. If enough funding can be raised, either internally or externally, regular household surveys offer both a sensible way to structure payments and a valuable resource to provide feedback on the programme. Without any household surveys, it would be difficult to know whether increased distribution of cookstoves was having any effect on access to cooking solutions.

4.2.3 Impact level

Impact level results are, by definition, very close to impact. The programme may have some higher level impacts that it aims to achieve, such as improving the climate resilience of Ethiopia's economy, which cannot be directly measured. Nonetheless, the available indicators at this level of the results chain, such as incidence of respiratory infections, deforestation rates and carbon emissions from fuel combustion, are still very close to the programmes objectives.

Changes in impacts are very difficult to attribute to the cookstove programme. There are many different factors that affect the incidence of respiratory infections, for instance, and as a result establishing the impacts of the cookstove programme could be difficult. Simultaneous changes in provision of health services, income from agriculture or household nutrition may have much larger effects on the incidence of respiratory infections than better access to cooking solutions. Disbursing based on impact would therefore require establishing an accurate baseline that took into account other changes in conditions to isolate the effect of the cookstove programme itself. Determining this baseline would be difficult and contentious. As a result, even if the indicators themselves are relatively inexpensive to monitor, attribution poses challenges that render measurement of programme effects extremely difficult.

Some indicators at this results level could also be very expensive to monitor. Changes in emissions, for instance, may require expensive extensions to the monitoring framework. It is telling that the current MRV plans for the Programme envisage this type of monitoring framework in relation to a small number of areas where carbon credit generation is foreseen, but not otherwise. It is also notable that Ethiopia has yet to successfully register any cookstove projects under the Clean Development Mechanism (and, indeed, only one project in total).

Impact level results are therefore unlikely to be suitable for use in a result-based programme.

Measurement and attribution problems are likely to rule out tying disbursements directly to the programme impacts, even though the direct relationship between improvements in these indicators and achievement of programme objectives would, in theory, be advantageous.

4.2.4 Conclusion

Tying disbursement to progress at the outcome level is attractive. Outcome results offer relatively close proximity to impact while, provided that the associated indicator is justified and chosen carefully, the incentive effect should also be appropriate. In particular, tying disbursements to outcomes allows the recipient significant autonomy over how results are achieved.

However, implementing outcome level measurement may be difficult within the constraints of the available monitoring resources and the requirement for annual disbursement. Regular household



surveys will be necessary to ensure that disbursements can occur quickly enough to limit problems with pre-finance. Ideally, these surveys would occur annually, so that Energy+ could make disbursements on this basis each year. If this is not possible, it may be necessary to either (i) combine outcome level results with other results that are available more frequently to allow for annual disbursement or (ii) to create some intermediary body that could be disbursed to annually by Energy+ and who would, in turn, disburse less frequently to the Ethiopian Government.

If outcome level measurement is not possible, tying to outputs might be effective. Output level results have the advantage of being relatively easy to measure and providing a clear and transparent goal. Despite this, the distance from impact, particularly in the context of a sector where distribution has repeatedly been insufficient to ensure use, renders output indicators problematic for a results-based programme.

They may require additional safeguards or policies to ensure that improvements in outputs lead to development impacts. Implementing a programme based entirely on improvements in outputs runs the risk that disbursement does not coincide with achieving developmental goals. Additional safeguards or oversight may be desired by the donor country, undermining the autonomy of the recipient.

The remainder of the report will therefore limit consideration to outcome and output level indicators, and how they could be used to structure an RBA agreement on cookstoves.

4.3 Result indicator

Having identified that outcome level results will often be preferable, but that output level measurement could also offer opportunities for a results-based programme, several candidate indicators can be explicitly compared for suitability. Again, it is worth considering how each indicator performs in terms of:

- the proximity of the result to the desired impact;
- the appropriateness of the incentive effect created; and
- the costs of monitoring the result.

4.3.1 Multi-tier framework for access to cooking solutions

The multi-tier framework, described in Box 3 and depicted in Figure 5, offers an outcome level indicator that combines a number of different attributes of access to cooking solutions. It combines information collected through survey on the amount of time spent on fuel collection, legality of fuel sources and whether the household uses the cooking solution in conformity with instructions, among other attributes. The information from each of these attributes is then combined to produce a score for each household from zero to five.

Two different methods could be used to base RBA payments on this indicator:

- Payments could be based on improvements on the average tier score of all sampled households; for instance, US\$1 million could be disbursed for every 0.1 increase in the average tier score
- Payments could be based on improvements in the number of households at individual tiers; for instance, US\$200 could be disbursed for every household that moves from Tier 0 to Tier 1, US\$150 for every household that moves from Tier 1 to Tier 2 and so on



Figure 5. Multi-tier framework for access to cooking solutions

	Tier 0	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
Capacity	Primary solution not adequate*				Adequate	
Availability	Primary solution not available*				Available	
Quality	Low quality			Good quality		
Affordability	Primary solution not affordable*				Affordable	
Convenience	Not convenient				Convenient	
Health & Safety**	Self-made stove	Manufactured stove	Biogas/LPG/Electricity/Natural Gas Stoves			

	Tier 0	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
Indoor air pollution	Red	Orange	Yellow	Light Green	Green	Dark Green
Overall pollution	Red	Orange	Yellow	Light Green	Green	Dark Green
Efficiency	Red	Orange	Yellow	Light Green	Green	Dark Green
Safety	Red	Orange	Yellow	Light Green	Green	Dark Green

Based on test results

Note: The overall tier score for each household is equal to the lowest score on any of the five attributes; Box 2 explains the multi-tier framework in more detail

Source: ESMAP

The advantages and disadvantages of these two options are discussed in detail in the theoretical report.

The first methodology is somewhat simpler and ties directly into metrics that will be used for global tracking throughout the SE4ALL initiative. Coordination with a global programme of this kind may be beneficial for the cookstove programme, which could otherwise risk sending conflicting messages on priorities. On the other hand, the second methodology allows the incentive structure to be tailored towards encouraging interventions that target particular service levels. This could lead to more efficient allocation of resources by offering higher incentives for the tier improvements that offer more value to consumers. This would improve proximity to impact. For the sake of brevity, this case study will not explore in detail the differences between these two options, but will rather base the discussion around the common features of both.

Including attributes beyond cookstove ownership means that the indicator is closer to the desired impact. As discussed in Section 4.2.2, outcome indicators are generally closer to impact than output measures. Payments would not be disbursed under this indicator if the distribution of cookstoves had no effect on the usability of cooking solutions, and total payments will depend upon the quality of service provided. For instance, payment would be lower if, despite the presence of an improved cookstove, the household continued to use lower efficiency cooking solutions or continued to spend significant amounts of time collecting fuel.

The particular structure used for aggregation carries implicit value judgements, but this is unavoidable when constructing a single indicator combining diverse information. For instance, there is no increase in the multi-tier index score given to a household due to increased convenience unless the household has been placed in Tier 4 or above for the ‘health and safety’ attribute. Similarly, there is no change in the index score for improvements in the ‘health and safety’ attribute above Tier 3 if the household

is experiencing problems with capacity, duration, quality, or any of the other remaining attributes. These judgements have been based on stakeholder consultation and have been constructed such that each tier represents a meaningful change in the service level provided to the consumer. They are based on expertise of individuals with significant experience in this sector, but nonetheless embody implicit judgements about which attributes are valuable for consumers at different service levels. Such judgements are unavoidable when constructing a single outcome indicator combining diverse information on energy access. However, they should be borne in mind when considering using the metric as the basis of disbursement.

The current proposed MRV framework does not appear to include annual household surveys, but there may be scope to devise more sophisticated monitoring. Except for those households/woredas where there is an expectation that carbon credits can be secured, the current MRV system set out by the Ethiopian government does not envisage annual monitoring to analyse how cookstoves are being used after they have been sold. Despite the scale of distribution of improved stoves in Ethiopia, there is limited data to determine their impact over time. An extension of the monitoring framework to include regular surveys would provide this data, and also allow results-based payments to be linked to this indicator.

As discussed in Section 4.2.2, this would increase the costs of monitoring but would provide external benefits; it is possible that support may be provided from outside the cookstove program. Rather than just observing whether a household had an improved cookstove, the use of this indicator would require additional information on the way in which households were using the cookstove, the length of time households were collecting fuel, householders' subjective views of their cooking experience and so on. This would significantly increase the time and cost associated with monitoring performance against the metric. The extent to which such a framework would be feasible should be confirmed as part of the on-going work on the MRV, particularly given the potential improvements in proximity to impact of including additional characteristics and taking into account the potential availability of additional resources to support these activities from international development partners.

The incentive effect should be appropriate, though the index methodology may complicate communication. The concept of measuring usability of cooking solutions through household survey is not complicated, and each of the attributes that jointly determine a household's index score are intuitive. As a result, it should be easy enough to communicate the justification for the indicator and the interventions required to achieve improvements. On the other hand, the way in which attributes combine to lead to an overall score for a household may be difficult to explain and understand. As a result, agents within government may be unclear how improvements along any particular dimensions will effect aid disbursements in an RBA scheme, which could weaken the incentive effect.

The recipient will have weaker influence over this indicator than a simple output indicator, such as number of cookstoves distributed, but should still be able to influence performance. Payments would be tied to the behaviour of individual households. This may be more difficult to control than the one-off acquisition of a stove. However, the government would still have influence over the actual use attributes that would lead to higher payments. For instance:

- conformity of use with instructions can be influenced by the successful delivery of national and regional promotional campaigns and related print material;
- convenience can be supported by careful geographic targeting of the cookstove implementation plan coupled with successful training of producers to ensure a good cooking performance; and



- adequacy, affordability and availability rely on a range of aspects of the implementation plan that will collectively enhance the benefits gained by a household from the use of an improved cookstove. As a result, they should still have sufficient control to be influenced by the incentive and to be able to invest resources with a reasonable expectation of return.

Box 3. The SE4ALL proposal for multi-tier measurement of access to household cooking solutions

The SE4ALL initiative identifies seven attributes that collectively determine the extent to which households have access to modern cooking solutions. The six attributes are:

- adequacy;
- availability;
- quality;
- affordability;
- convenience; and
- health and safety.

Households receive a score for each attribute based on a household survey. The first five attributes listed above are binary; household's either possess the attribute or do not. For instance, a household is said to possess a high quality cooking solution if drops or fluctuations in fuel quality are minor and have 'little or no impact on cooking operations' and a low quality cooking solution if the opposite is true.

The 'health and safety' attribute is more differentiated, with households scored from zero to five. It is based, where available, on the International Workshop Agreement (IWA) standards on clean and efficient cookstoves. These are internationally agreed standards based on laboratory-based measurements of a cookstove's efficiency, safety and emissions. The final score depends on the main household stove's IWA ranking for each technical aspect of performance, adjusted to take into account conformity of household use of the cookstove with instructions; the score is adjusted downwards if the cookstove is used incorrectly or is in a state of disrepair.

The metric is constructed by scoring each household on a particular 'tier' for each of the seven attributes. For instance, households with access to high quality cooking solutions are mapped to Tier 5 for the Quality attribute, whereas those who suffer disruptive fluctuations in fuel quality are mapped to Tier 2. The overall tier assigned to a household is equal to their lowest tier score across the seven attributes.

Finally, the overall score for a region is calculated by performing the following calculation:

$$\text{Access to household cooking index} = \Sigma(P_K * K)$$

where K is the tier 'number', and P_K is the proportion of households in tier K.

4.3.2 Cookstoves distributed



If applying the multi-tier framework is not possible, an output indicator, such as directly monitoring the number of improved cookstoves sold through the programme, could be used. One payment could be made for every cookstove sold through the scheme, provided that the cookstove meets certain pre-defined quality criteria.

The technological characteristics of a cookstove could be taken into account, if desired. Depending on how the payment scheme was designed, the same payment could be disbursed for any cookstove that meets a minimum efficiency criterion, or different payments could be attached to cookstoves of varying efficiency levels. There would be a small increase in the costs of monitoring and improvement in proximity to impact but recording the type of cookstove sold, in addition to the number of cookstoves sold, would not greatly increase the costs of monitoring.

As discussed in Section 4.2.1, this indicator is too far from impact to be robust unless additional steps are taken to ensure that the programme achieves the desired impacts. Distribution of cookstoves may not achieve the impacts envisaged for the programme. Additional safeguards could be necessary to ensure that sufficient action is being taken to promote use before the donor would feel comfortable making large disbursements on the basis of cookstove distribution.

In addition, this metric ignores developments among households not receiving a cookstove under the ICS programme. This omission could work in either direction, either leading to overestimates or underestimates of the impact of the programme. It is possible that the stimulus provided by the programme may cause households in woredas not directly affected by the scheme (at that point in time) to acquire a new or improved cookstove as a result of additional publicity/word-of-mouth; alternatively, the programme could result in some woredas that are not part of the programme (at that point in time) to be neglected, resulting in a diminished penetration of cookstoves in that locality. In either event, simply tying the payment to the number of ICS sold under the programme would not accurately capture the full change in outputs associated with cookstove use in Ethiopia.

Monitoring would be possible through the planned MRV framework, at little additional cost. The framework already includes monitoring cookstove sales at the woreda level. If this was to form the basis of a results-based programme, monitoring would need to be independent of the government and donor. However, the envisaged framework would otherwise require little extension to meet the needs of a results-based scheme.

4.3.3 Hybrid distribution and usability indicator

If annual household surveys are not possible, it may be beneficial to combine output and outcome indicators. As described above, output indicators are available more frequently and at a lower cost. If it is not possible to run annual household surveys, a second-best solution could use less frequent surveys to supplement regular disbursements made on the basis of distribution.

Some disbursement could occur annually on the basis of cookstove distribution, with additional, less regular payments following completion of an infrequent household survey. A proportion of the RBA payment would be linked to the quantity of cookstoves distributed with the remainder linked to the multi-tier



measure of usability. For instance, a payment of US\$2 could be made for each cookstove sold, with an additional payment of US\$1 million for every 0.1 increase in the multi-tier indicator above the baseline.

This hybrid system would combine an annual payment linked to sales with a less frequent ‘top-up’ if periodic survey data – undertaken less frequently than annually to reduce costs - demonstrated that the cookstoves sold were being used in accordance with expectations. Disbursals could be paid out every year, as required by Energy+, while maintaining a positive incentive for promoting use. This would provide some security of aid disbursal for the recipient, by keeping a portion of the revenues dependent on results that they can provide relatively rapidly, and which are a necessary first step to achieving broader goals. It would also maintain an incentive to promote use once wide penetration was achieved.

Proximity to impact may be slightly weaker than for results based solely the multi-tier framework. As discussed above, cookstove sales do not guarantee use, and the payment levels would have to be designed carefully to ensure that there was sufficient incentive for promotion of use. Overemphasising sales could result in risk of gaming.

The cost of monitoring would be higher than if disbursement was based on cookstove distribution, but lower than if based on annual surveys measuring usability. Household surveys would still be necessary to verify additional attributes. Monitoring of cookstove sales would also be required, but this is likely to be an important indicator for internal government use regardless of the result chosen, and is already included in the MRV.

By splitting disbursement between two different indicators, this hybrid approach risks confusing priorities and complicates communication. Ideally, an indicator should provide a single, well-articulated goal. By splitting disbursement, a hybrid approach risks confusing priorities or implicitly indicating that distribution of cookstoves is valued equally to improvements in usability of energy for cooking. As a result, the incentive effect may be weaker, and this would have to be managed carefully were this indicator adopted.

4.3.4 Conclusion

Figure 6 below summarises the findings of each of the potential indicators against each of the three key criteria.



Figure 6. The most appropriate results indicator would either be the number of improved cookstoves sold or a hybrid indicator

	Output	Outcome	Output/Outcome
	Cookstove distribution	Multi-tier framework	Hybrid indicator
Proximity to impact	Significant risk of improvements not leading to impact	Improved performance as measured by indicator likely to lead to impact	Maintains incentive to encourage use, but some disbursement still based on distribution
Appropriate incentive effect	Easy to disseminate, government can influence performance	Attributes intuitive though indicator can be difficult to explain, government can influence performance	More complex incentive scheme, may be hard to communicate priorities
Ease of monitoring	Requires limited extension of planned MRV framework	Under current MRV arrangements would require additional annual household surveys, likely to be expensive	Requires semi-regular household surveys, but largely based on supply side data

Source: Vivid Economics

Each of the three indicators identified could potentially form the basis for a results-based scheme.

They each offer a different balance between the three factors that should be considered when choosing an indicator.

The choice depends upon the extent to which resources can be dedicated to monitoring. The multi-tier framework is the best choice in terms of proximity to impact and, while may be some complications to overcome, should provide an appropriate incentive effect. However, the costs of monitoring are likely to be high. If they are affordable, or will be covered by international development partners, the multi-tier framework offers the best option. Otherwise, either a distribution based indicator or a hybrid indicator should be used to limit monitoring costs.

Using the number of cookstoves sold maintains agent control of the result and ease of monitoring, but creates distance between result and desired impact; an indicator integrating additional attributes should be preferred if household surveys are feasible. A key problem with the distribution of cookstoves is ensuring their continued maintenance and use. Provision of cookstoves is generally insufficient to guarantee use; often, consumers will engage in ‘stacking’, where less efficient cookstoves continue to be used for some particular purposes, or will fail to maintain cookstoves, resulting in a loss in efficiency. Even if use is assured, access to high quality cooking solutions may still be limited due to insufficient or inconvenient access to fuel. However, in the absence of household surveys, measuring cookstove sales could still provide an acceptable basis for an RBA provided the access scheme requires significant household contributions at point of sale.

A hybrid indicator can be used if the annual disbursement requirements make linking exclusively to the multi-tier framework infeasible, but it is still possible to schedule less frequent household surveys to measure usability. It represents a mid-point between the output and outcome indicators discussed above. The proximity to impact is improved by maintaining an incentive for improvements in the multi-tier framework. Communication may be harder than when linking exclusively to a single indicator, and there is some risk of splitting priorities. Nonetheless, this may provide the best option if regular household surveys are possible, but will not be available each year.

Given the uncertainty over the final MRV framework, this report will consider each of these possible indicators throughout the remaining sections. The final choice of indicator depends upon the amount of resources available for monitoring; more expensive monitoring procedures enable the choice of an indicator that more closely mirrors the values of stakeholders.

4.4 Conclusion

The identification of strong candidate indicators implies that conditional aid could be effectively applied to promote improved cookstoves. Any of the three results that we have identified could be used within an RBF or RBA scheme. Choosing between the three requires a trade-off between desirable features of a result – increased costs of monitoring allow for better proximity to impact and reduced risk of gaming. More complex indicators will also decrease agent control, with further implications of increased costs for the programme as a whole. The appropriate indicator therefore depends upon available resources, and upon the priorities of the Government of Ethiopia and Energy+.



5 Choosing between RBA and RBF

Conditional aid to support cookstove provision could be provided either through RBF or RBA. An RBF scheme in this context would target specific service providers in each woreda of interest. Arrangements would be made with each service provider, offering a specified incentive for each cookstove provided. By contrast, an RBA would directly target the incentive at central government, encouraging them to enter into further arrangements with local governments as well as cookstove providers and distributors.

GIZ, in collaboration with a number of national governments, is currently pursuing an RBF to encourage cookstove deployment in two rural woredas of Ethiopia (GIZ, 2013). The RBF will support rural-based energy and agricultural cooperatives to buy stoves from existing urban production centres and sell these stoves to rural households; with the incentives paid ex post to the cooperatives against the sold and verified stoves, following independent verification. This RBF scheme allows cooperatives to engage in business by retailing ICS to rural households. Incomes are expected to be reinvested for purchasing of new ICS, promotion and the consolidation of a long term independent supply chain that can persist when the RBF incentives conclude.

As argued in the theoretical report, there are three main factors that will influence the appropriate target choice for this scheme:

- the recipient should be in the best position to influence the chosen result
- intervention characteristics may imply that the programme can only be cost-effectively implemented at the national scale, or would be better managed locally
- recipient characteristics may imply that certain recipients are unlikely to respond to a results-based approach

5.1 Recipient influence over result

Depending upon the result chosen, government may be in a better position to influence performance than service providers/implementers. Governments tend to have control over a much wider array of possible tools than service providers. They can adjust the regulatory environment, introduce manufacturing standards or invest in public infrastructure. In other words, they have a greater ability to shape the broader environment within which service providers operate, while service providers are largely limited to operating within the environment determined by government. As a result, the government has the ability to influence a wider array of factors than an individual service provider.

The government seems likely to exert more control over usability of cooking solutions, as measured by the multi-tier framework. The multi-tier framework includes many factors beyond ownership of an improved cooking stove. For instance, to reach higher tiers of access, households need to have convenient and affordable access to fuel, as well as possession of a cooking solution which is both regularly available and adequate for the needs of the household. Deficiencies in any one of these attributes is sufficient to prevent scoring highly on the multi-tier framework, but it is unlikely that an individual service provider could hope to improve performance across all six attributes; not only ensuring that households have access to efficient stoves, but also ensuring that they have convenient and affordable access to fuel, for instance. National government is therefore likely to be a more appropriate target for an outcome indicator.



Service providers/implementers are in a better position to provide a defined output, such as distribution of cookstoves. If the targeted indicator measures a specific physical change in energy infrastructure, it will often be easier to identify the service providers who are able to effect this change and will therefore be appropriate targets for a results-based finance scheme. In the case of cookstove distribution, manufacturers and distributors of cookstoves can be directly targeted and reasonably expected to be able to influence the extent to which households have access to improved cookstoves.

5.2 Intervention characteristics

Implementing the GIZ RBF scheme more widely would require contracts to be entered into with a very large number of cooperatives, which will increase the cost of the programme. Cooperatives may form a convenient vehicle for targeting a specific woreda, but it is likely to be infeasible for a foreign principal (Energy+), with limited in-country presence to attempt to identify and negotiate individual contracts with cooperatives to cover all 670 rural woreda and 100 urban woreda. Even if private or third sector implementers were identified across the country, the capacity of many would be unknown, and the programme would therefore be risky.

Other approaches are possible, such as providing a subsidy to registered cookstove manufacturers, but attribution will only be possible if payment is conditional on distribution rather than on the multi-tier index. With distribution, it is possible to identify exactly which manufacturer or distributor provided the cookstove to the household and therefore which body should receive the subsidy. This is much harder when collecting data via household survey rather than on the supply side. If multiple cookstove promoters and distributors operate within a single area, it is difficult to determine which one was responsible for improvements in access for an individual household identified through the survey.

Government structures in Ethiopia are federalised, with an emphasis on local government, allowing a central incentive provided to the national government to cascade down to more localised schemes. This would avoid the costs and risks involved with entering into many different RBF contracts with many different implementers. Instead, a single contract could be drawn up with the central government, who could then use their existing links to local institutions to effect change. The incentive would be expected to ‘cascade’ down the levels of government, with the federal government delegating to regional bodies, who would in turn work through government institutions at the zonal and woreda level.

There are also important aspects of the National Cookstove Program that require a co-ordinated, nationwide approach. For instance, the Ethiopian government has identified several critical components for the successful delivery of the program that can only (or most efficiently) be delivered at the national level. These include, for example, strengthening federal workshop and laboratory systems; national promotional campaigns; and the development of a business incubator for improved cookstoves⁶. This important role for the national government in the successful delivery of the scheme’s ambitions further supports the use of RBA over RBF.



5.3 Recipient characteristics

The Ethiopian government is well prepared for the implementation of a national programme. As outlined in Section 2.1, there are already a number of ongoing cookstove initiatives within Ethiopia, and the government has engaged in extensive planning for the roll-out of the National Cookstoves Programme. An RBA could benefit from these existing plans.

As argued in Section 3, access to finance at the government level is reasonable and institutional capacity seems to be strong. The costs of implementing the programme are estimated to be around US\$15 million, or 0.6 per cent of current Ethiopian government final consumption expenditure. The Ethiopian government has consistently performed well on surveys estimating capacity and has been pioneering work on results-based approaches that could further its development objectives.

5.4 Conclusion

RBA should be preferred to RBF because of the fragmentation of producers and the preparedness of the Ethiopian government. Affecting national transformational change in cookstove use via RBF would require contracts to be drawn up with many different producers or cooperatives. This is not practical; the administrative costs would be too high. The Ethiopian government, on the other hand, is already well prepared to roll-out a national scheme. RBA is therefore likely to be preferable to RBF.

The government is also much better placed to influence usability of energy for cooking, which requires much broader initiatives than just distributing stoves. A results-based scheme basing disbursements purely on distribution could plausibly operate through service providers/implementers. However, the range of factors that determine the usability of energy for cooking are probably too wide to be plausibly influenced by a single implementer. Instead, if focus is likely to be on such an outcome result, the government is likely to be much better placed to be able to react to the multitude of issues that may be important.



6 Design characteristics

6.1 Payment type

In the theoretical report, two types of potential RBA funding were identified: grants and loans. Both payment methods can provide an effective incentive to the recipient government, especially if loans are provided on concessional terms. In addition, loans allow for some recycling of revenues, with repayments potentially shifted to additional results-based schemes elsewhere, providing significant impact with limited capital resources.

As Energy+ is the principal, grants appear to be the appropriate payment type in this instance. Energy+ work exclusively with grants, and lack the administrative capacity to make payment through loans. The use of a loan approach would likely require re-casting the programme as a multilateral initiative.

This is consistent with the analysis undertaken by the Ethiopian government. Investment plans for cookstove schemes in Ethiopia have identified grants as the appropriate source of finance for up to 90 per cent of total programme costs (Ministry of Water and Energy, 2012). Grants also have the advantage that the incentive provided, per dollar of capital, will be higher (or, equivalently, that the amount of capital that needs to be provided is lower)⁷.

6.2 Payment amount

As argued in the theoretical report, the payment amount should be negotiated between the donor and recipient. Both parties are equal partners within the results-based contract, and both have opposing interests over the payment amount. There is no single 'optimal' level at which the payment should be set, though we can define limits below and above which the contract would not benefit both parties.

The minimum appropriate payment amount is the estimated additional resources required to incentivise the recipient to achieve the result. This is equal to the marginal cost of achieving the result, minus (i) any financial returns from the result (for instance, through carbon finance), (ii) the resources that other external donors are willing to contribute and (iii) the value of the result to the recipient. If the incentive is set lower than this amount, the recipient will not be able or willing to cover the full costs of the intervention. They will not benefit from promoting the result, so the incentive will not be effective in encouraging improved performance.

However, it is also necessary to take into account the level of knowledge about costs as well as the fact that costs may fluctuate over time. If there is a high degree of uncertainty regarding costs then the principal may want to err in favour of giving a payment amount that is higher than the best case estimate of costs: the principal may prefer to risk a degree of overpayment rather than not achieve any results. A similar approach may be necessary if costs are expected to fluctuate over time (and the principal is not able or willing to quickly adjust the payment amount in response to the changes in costs). Similarly, the amount of external

:vivideconomics

⁷ The extent of this difference will depend on the concessionality of the loan; the more concessional loan – and hence the greater the 'net' transfer of resources to Ethiopia – the more it will resemble a grant and provide a more powerful incentive.



funding available for achieving the result may fluctuate unpredictably, and paying higher than the minimum will allow the donor to ensure that these fluctuations do not undermine the programme.

The maximum appropriate payment amount is the value of achieving the result for the donor. This value should depend upon the extent to which they believe achieving the result benefits the individuals affected and achieves the goals of their organisation. Above this level, the donor will have to pay more for the result than the value they believe achieving the result generates. Their limited resources would likely be better deployed elsewhere.

It is impossible to establish, from an external perspective, exactly where either the upper or lower limit lie. Both are dependent on information which cannot be easily observed, such as the values that the recipient and the donor place on the result. It is also difficult to establish the minimum marginal cost of achieving improved access to cooking solutions.

A reasonable starting point for negotiations could be based upon the existing total cost estimates found within the programme investment plans. The remainder of this section uses these cost estimates found in Ministry of Water and Energy (2012). These values include neither the additional external resources used, nor do they refer to the value of the result to either the recipient or the donor. Nonetheless, they are likely to lie in the range of acceptable payment levels, and can provide an evidence based basis for reaching indicative values that could be referred to during the negotiations

The appropriate payment amount depends upon the choice of result to which the incentive is linked. The appropriate payment level differs depending on whether incentives are linked to cookstoves distributed or to the multi-tier index. Below we highlight some of the key considerations and approaches that might be explored before negotiations begin. The final sub-section addresses considerations regarding how frequently payment amounts should be updated, which apply generically regardless of the result to which the payment is linked.

6.2.1 Cookstove distribution

The additional cost to government of providing an efficient cookstove is estimated at US\$3.80. This is based on government estimates for the financing required to achieve the provision of an additional 6.8 million cookstoves between 2012 and 2015. It includes all capital and operating costs related to the production, distribution and promotion aspects of the national scheme such as the design of training programmes, national awareness campaigns, improving distribution channels, as well as selective subsidies in areas where, according to this study, purely market-based approaches are unviable. It corresponds to the US\$26 million of required funding identified in Section 3.2. It excludes any wider costs, such as the costs of building central government capacity or creating an MRV system. It is expected that these up-front costs would be covered by conventional grants, as per the intended first phase of Energy+ support. It should be stressed that these cost estimates are indicative based on the data available at the time of writing and are intended more to give a sense of a plausible ballpark estimate than to be a precise, definitive figure. Further discussion between the Government of Ethiopia and Energy+ would be required before any final decision on payment amounts is reached.

This estimate is similar to that identified by other stakeholders using a similar methodology. For instance, the Joint Implementation Note released in March 2013 (Govt. of Norway & Govt, of Ethiopia,



2013) calculated an incentive per stove of US\$3.47 necessary to pay down the financial barrier to the household and cover costs incurred to support production and distribution,

The incentive is equivalent to around 30 per cent of the production cost of a Tikikil stove, though, apart from, potentially, in certain rural areas, it is not expected that the intervention will take the form of a direct subsidy to sale or production (GIZ, 2013). Cookstoves differ significantly in their efficiency, and the above incentive is intended to cover the costs of providing training and loans to cookstove producers to encourage the adoption of best practice.

6.2.2 Multi-tier framework

A simple method for determining an appropriate starting point for negotiations is to estimate the cost of reaching and sustaining a particular value for the indicator and disbursing aid proportionally as progress is made towards this goal⁸. For instance, assume that the average score in Ethiopia for the multi-tier indicator is currently two and that it is estimated that minimum additional spending of US\$50 million (on top of government expenditure, carbon finance and other external sources) is necessary to increase the average score to three and *maintain it at that level over the period of the programme*. In this case, disbursing a total of US\$5 million for every sustained 0.1 increase in the index should be sufficient to cover costs and therefore to incentivise improvements in access to cooking solutions. This payment should be split over the full extent of the programme to promote continued achievement; for a five year programme, a payment of US\$1 million should be disbursed each year for every 0.1 increase in the index over the baseline.

Unfortunately, there is insufficient information currently available to provide a good estimate for the likely impact of the cookstove programme on Ethiopia's multi-tier index score. It is necessary to perform an initial, baseline survey using the multi-tier framework to assess the current state of access to cooking solution in Ethiopia. Following this initial baseline survey, the methodology described above could be applied; the effect of the programme on the multi-tier index score could be approximated along with the total cost of implementing the programme. This would provide a reasonable baseline value for the amount that should be disbursed per unit improvement in the index.

6.2.3 Hybrid indicators

For the hybrid indicator, a decision would first need to be made about the relative incentive attached to the quantity of cookstoves distributed versus the incentive attached to improvements in usability. As argued above, the multi-tier framework is much closer to impact and, as far as is possible, the emphasis should be on incentivising improvements in household's usability of energy for cooking rather than distribution of cookstoves. The incentive for distribution should therefore only be large enough to mitigate problems with pre-financing. By attaching a small but not insignificant value to distribution, the RBA programme would allow the cookstove programme to earn returns on early successes of the scheme, which can be reinvested to ensure that funding does not run out before the first household survey is completed.



Once this is established, both individual aspects of the indicator could operate as described in Section 6.2.1 and 6.2.2. A reasonable starting point for negotiations could take the processes described above and scale down the payments on the basis of the split decided between each of the two aspects of the hybrid indicator. For instance, a one-third to two-third split between the distribution and the multi-tier framework aspects of the indicator may seem to balance concerns over pre-financing with the desire to maintain proximity to impact. This would suggest that an appropriate payment level for distribution would be one-third the payment level that would be chosen if distribution was the sole indicator being applied, whereas an appropriate payment level for improvements under the multi-tier framework would be two-thirds the payment level that would be chosen if the multi-tier framework was the only indicator being applied.

6.3 Baseline

The baseline defines the level of results over and above which payments will be made. For instance, suppose that cookstove penetration was measured using a household survey, which determined the proportion of households who owned an improved cookstove. At one extreme, a payment could be made for every household that was found to have an improved cookstove, but this ignores the fact that improved cookstoves were already in use before the start of the programme. Instead a baseline could be set at, say, 20 per cent, with payments only made for improvements in cookstove penetration over and above this amount.

The baseline, like the payment amount, may need to be updated over time. Updating the baseline every time a payment is made implies that only one payment is disbursed for each improvement in results. Another approach would be to keep the baseline fixed, disbursing additional payments each year for any improvement over the baseline level. For example, if ICS penetration was initially at 20 per cent, increased to 25 per cent in year one of a programme and 30 per cent in year two of a programme, then an ‘updating’ baseline would be 20 per cent in year one and 25 per cent in year 2, meaning that only the additional 5 per cent improvement in each year would receive a payment. A ‘fixed’ baseline would have a baseline of 20 per cent in both years and pay for the 5 per cent improvement in year one and a 10 per cent improvement in year 2.

Whether the baseline should be updated regularly depends upon whether continued expenditure is necessary to maintain improved results, or whether results can be achieved with a one off expenditure. If a one off expenditure will improve results permanently, it should only be necessary to make a single payment. If, on the other hand, results need to be maintained with continued expenditures each year, the baseline should be fixed and payments should be disbursed regularly to compensate for the costs of maintaining results.

If the RBA is tied directly to cookstove sales, a single payment should be made for each additional cookstove disseminated. This is a simple and transparent baseline, and is based on the assumption that there is no value to disbursing additional cookstoves to households who have already benefited from the scheme.

If the RBA is tied to the multi-tier framework, payments should be based upon a static baseline derived from an initial household survey. An improvement in access to cooking solutions is valuable each and every year that it is sustained. Updating the baseline to take into account improvements achieved the following year risks providing no incentive to maintain high performance. Rather, the baseline should be maintained at the initial observed level and payments should be split over the course of the programme.



If the RBA is tied to a hybrid indicator, the disbursements for each individual component can work on the basis described above. The portion of the payment tied to cookstove sales can be made for each additional cookstove disseminated, whereas the portion of the payment tied to the multi-tier framework can be made for improvements upon a static baseline derived from an initial household survey.

In the longer term, the baseline should be reviewed to ensure that it is capturing the additional effects of the programme. After a significant period of time, it would be worth revisiting this baseline to ensure that it still represents a fair basis for making payments. This review would need to determine whether factors independent of the RBA programme had led to any increase or decrease in cookstove use. If, for instance, increased fuel prices had led to a decrease in cookstove use throughout Ethiopia, the baseline should be updated to take into account the increased expenditure required by government to maintain cookstove use at any particular level.



7 Conclusion

A relatively modest incentive has the potential to greatly increase welfare and reduce emissions

The potential benefits of increased cookstove use in Ethiopia are significant. A total of approximately 4.5 million households are expected to benefit from the ICS Programme. Table 2 itemises some of the costs that the government is hoping to recover from international development partners and benefits based on government documentation and the analysis contained in this report.

Table 2. The ICS programme could lead to 14 Mt of abatement, and the avoidance of up to 2,000 deaths per year

Benefits	Costs
A total abatement potential of 14 Mt of CO₂e over three years due to the effect of reduced degradation at a cost of US\$2-2.7/tCO ₂ e and	US\$12-17 million to be provided in grants to support capacity building, monitoring and verification, and other fixed costs of the scheme
Avoidance of 1,000-2,000 deaths per year due to indoor pollution (i.e. as a result of significant reduction in respiratory infections and complications)	US\$16-21 million to be provided conditional on the achievement of results
Creating 5,000 private sector jobs largely in rural areas	

Source: Vivid Economics, based on Ministry of Water and Energy, 2013b

In addition, the benefits from the proposed programme will have very strong gender-differentiated impacts in favour of women and children under the age of 15 years. This is because women and children are the main beneficiaries of: (1) reduced time spent on fuelwood collection⁹; and (2) reduced pollutants in the cooking area from the inefficient combustion of fuelwood.

On the other hand, overall expenditure to conduct the national improved cookstoves programme in Ethiopia is relatively modest. The cost of the programme that the Ethiopian government is seeking support from international partners for is estimated to be within the range of US\$30-40 million. Potentially only US\$20-26 million of these costs would be appropriate to recover through an RBA initiative.

Even applying a conservative estimate of the social cost of carbon of US\$20 per tCO₂e, the environmental benefits outweigh the support that might be provided by international partners by a ratio of five to one. With a social cost of carbon of US\$20 per tCO₂e, the abatement potential of 14 Mt of CO₂e over three years amounts to a saving of US\$280 million. By contrast, the total government costs of the



programme should not exceed US\$40 million, and up to US\$26 million could be made conditional on the achievement of results, and would therefore only be disbursed if the results were achieved.

Given the high value for money of this intervention for development partners, the capacity and preparedness of the government, cookstove interventions within Ethiopia seems to be a strong candidate for an RBA programme. An RBA programme also has significant advantages over an RBF in this context. The dispersed nature of producers, achieving transformational change will involve engagement of a very large number of different agents; it is more likely that the Ethiopian government would be able to manage the logistics associated with engaging such a large number of different stakeholders than a foreign principal with only limited in-country presence. There are also key aspects of the program the Ethiopian government itself, rather than individual producers, are best placed to manage.

If possible, disbursement should be made on the basis of an outcome indicator measuring changes in the usability of energy for cooking, not an output indicator measuring changes in availability of improved cookstoves. Cookstove programmes have consistently found that changes in household ownership of improved cookstoves are insufficient to guarantee use. Stoves may not always address local needs and households may continue to use traditional cookstoves instead of, or as well as, the improved cookstove (“energy-“ or “fuel-stacking”) (Accenture, 2011; Watson et al., 2011). The incorrect or increased usage of stoves can also undermine fuel savings or reductions in indoor air pollution (IOB, 2013). By contrast, measuring and rewarding outcomes (changes in the usability of energy for cooking) ensures that progress against the result is likely to lead to achievement of the programme objectives: improved household welfare and reduced environmental degradation. However, monitoring outcomes is costly, requiring regular household surveys. If monitoring outcomes is not possible, or cannot occur regularly enough to form the basis of a results-based programme, an output level indicator could still be used provided safeguards were put in place to ensure development impacts are achieved.

There are three indicators that could be used as a trigger for a results-based payment in support of the cookstoves programme. These indicators balance three competing criteria: the requirement that an indicator is a sufficiently good measure of the desired impacts from the initiative that the development partner is willing to accept that when this indicator has been achieved, the initiative can be considered successful; the requirement that the indicator provides an incentive effect, such that achieving improvements in the indicator is sufficiently within the control of the recipient that they do not risk expending substantial effort and cost and yet still not receive any funding; and the requirement that the indicator can be monitored at a reasonable cost. From a wide range of candidates, three broad approaches appear to score well against the three criteria of proximity to impact, ease of monitoring and appropriate incentive effect. The choice between the three depends upon the extent to which resources can be dedicated to monitoring.

- A *disbursement (output) indicator* based on the number of ICS sold meeting a certain pre-defined quality criteria. This would appear to be the approach that would be consistent with the current plans for MRV of the Program as outlined by the Ethiopian government (which does not envisage comprehensive household surveys to assess the way in which cookstoves are being used). However, this approach has a significant risk in that payment would attach the incentive to a results indicator that is ‘far’ from the ultimate objectives of the scheme.



- A *multi-tier (outcome) indicator* based on the application of the ESMAP proposed approach to measuring access to modern cooking solutions. ESMAP is devising an index to measure access to modern cooking solutions that takes account of six key attributes: capacity, duration/availability, quality, affordability, convenience and health and safety. They have devised a methodology for aggregating these attributes to construct an index, which approximates household access to cooking solutions. Improvements in this index could then be used as a trigger for payment. However, this would require annual household surveys (which, in turn, may or may not require additional financial support from international development partners). In addition, depending on the approach taken to aggregating performance on different attributes it may sometimes be challenging for stakeholders to fully understand, and hence appropriately respond to, the incentive arrangements.
- A *hybrid indicator*. This approach would separate the RBA payment into two components. One component would be paid proportional to the number of stoves distributed. The second component would be paid out in a way that was proportional to improvements under the multi-tier framework. Performance against this usability metric could be assessed less frequently than annually, in which case there would be the potential for a periodic ‘top-up’ to the incentive payments made in relation to the distribution of stoves. This approach has the advantage of providing an incentive payment that is closer to the overall desired results of the program than the distribution indicator but which places less onerous demands on the monitoring framework.

The report also provides discussion about some of the more detailed design characteristics for each of these three approaches.

- In the case of the simple indicator, it suggests that a single payment is made for each ICS distributed. The cost per cookstove appears to be around US\$3.80. This is broadly consistent with estimates made by other stakeholders and could form the starting point for negotiations over the payment level. Payments would only be for each additional cookstove distributed.
- For the index indicator, a baseline survey would be needed to establish the current performance of Ethiopia against the chosen index. The expected improvement in the index if the program was to fully meet all of its objectives, and the agreed costs of meeting these objectives, would also need to be calculated. Payments would then be made proportional to the improvement in the index score over time.
- For the hybrid indicator, a decision would first need to be made about the relative incentive attached to the quantity of cookstoves distributed versus the incentive attached to improvements in usability. As far as possible, the emphasis should be on the latter; the former should only be rewarded insofar as it is necessary to prevent problems with pre-financing. Once this was established, the quantity based aspect of the indicator would work as in the simple indicator and the quality-based payment could be made using the same methodology as for the index indicator.

In all cases, it is envisaged that the Energy+ payment would be paid as a grant.



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Company Profile

Vivid Economics is a leading strategic economics consultancy with global reach. We strive to create lasting value for our clients, both in government and the private sector, and for society at large.

We are a premier consultant in the policy-commerce interface and resource- and environment-intensive sectors, where we advise on the most critical and complex policy and commercial questions facing clients around the world. The success we bring to our clients reflects a strong partnership culture, solid foundation of skills and analytical assets, and close cooperation with a large network of contacts across key organisations.

