

An approach to designing energy delivery models that work for people living in poverty



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Front cover: Villagers in Monze, Zambia stand in front of CAFOD-funded solar panels and borehole. Clara Nkete, 68 years old, says: "The community boreholes and the community garden have brought unity to our village. We work together as one family." Photo: Simon Rawles / CAFOD

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Introduction

This paper is the first output of a new, action research project by CAFOD and IIED aimed at building our organisations' and our partners' understanding of the enabling factors and barriers to delivering modern, secure, safe, sustainable and affordable energy services to people living in poverty. The overall aim is to understand how better to tailor energy services to the long-term needs and wants of people living in poverty, on the basis that this is crucial to ensuring their sustainability and maximising their developmental benefits.

IIED has already developed a conceptual framework for designing successful models for delivering energy services to poorer groups, as outlined in its recent *Linking Worlds* paper (see below). IIED and CAFOD now aim to refine this framework further and, ultimately, to develop it into a practical approach or methodology for partners and other actors operating in different local contexts. As such, it will require further adaptation in order to design successful energy delivery models, defined here as models that provide developmental benefits over the long term.¹

This paper is the first output from this project. It outlines a participatory framework or approach for designing energy service delivery models for people living in poverty, building on previous research by IIED, Practical Action and other experts on energy delivery design processes.² The next step will be to 'test' this approach through discussion with partners on the ground, with the aim of developing it into a methodology for project implementation in different local contexts.³ The proposed approach – and any subsequent methodology developed with partners – is not intended to replace the existing knowledge and experience of energy practitioners and is not presented as a 'one-size-fits-all' solution. The authors realise that delivering energy services to people living in poverty, particularly to those living in acute poverty, raises complex issues related to questions of affordability, scale-up, capacity gaps and other context-specific challenges.

Rather, this paper presents one approach – and two tools – that could be used to design energy service delivery in

a more holistic and participatory way. The authors hope that, through its further development and deployment, it will contribute to deepening our understanding of what factors are crucial to designing energy delivery models that work for people living in poverty. As this joint CAFOD–IIED project progresses, it is hoped it will also be of interest to a wider audience, particularly in the context of current discussions among decision-makers, donors and practitioners (such as social businesses, development agencies and civil society organisations) on approaches to implementing and scaling up access to energy services for people living in poverty (so-called 'bottom-up energy solutions').⁴ In so doing, it should also help to build the evidence base for more informed decision-making and advocacy.

The starting point for our approach is the insight that successful delivery of energy services to people living in poverty (the end users) requires understanding and aligning their needs and wants with the differing priorities and interests of a range of actors or stakeholders. This also requires a 'people-centred approach' that begins by building a detailed understanding of the end users' needs and wants and the specific context for intervention, i.e. an understanding of the opportunities and constraints arising from the end users' specific socio-economic and cultural context. The aim is to integrate this understanding into the design of delivery models from the outset.

The approach does *not* aim to solve key, structural questions, such as the affordability of energy services *per se*, but rather tries to understand and build the financial sustainability of the specific energy delivery model. For instance, it advocates going beyond the numbers of absolute affordability to explore the underlying socio-cultural factors that influence demand for energy services. In other words, the approach to designing and implementing the energy delivery model can itself influence the willingness of end users to pay for the energy services. Equally, the overall financial sustainability of the delivery model can be improved by building sustainable access to finance into the model from the outset – whether through loans or, in the case of those living in acute poverty, long-term energy access subsidies.

¹ This next stage began with a workshop in Nicaragua in June 2013, funded by CAFOD and hosted by CAFOD partner the University of Central America.

² This includes Practical Action's *Poor people's energy outlook* and discussion with, and forthcoming research by, members of the DELIVER network.

³ The main focus of this paper is on the importance in designing successful delivery models of building an in-depth understanding of end users' needs and wants and of the context for intervention, and aligning end users' needs with the interests of other stakeholders. It does not focus in depth on implementation and on monitoring and evaluation.

⁴ For instance, discussions over the design and implementation of the UN's *Sustainable Energy for All* initiative. See: <http://www.sustainableenergyforall.org/>

Following on from this, the paper does not provide an absolute definition of the approach's intended end users ('people living in poverty'), as the aim is for the approach to be applicable to a range of contexts of energy poverty where practitioners and policy makers may operate. Although models for delivering energy services to people living in poverty may differ, it is also clear that successful delivery to the very poorest sometimes requires addressing the needs of the so-called 'middle poor' – for example, local energy supply and maintenance businesses may be more sustainable if they deliver a range of services to end users in different socio-economic categories in their catchment area.⁵

In summary, the approach outlined in this paper aims to:

- build a shared understanding from the outset among all those participating in designing an energy delivery model of the needs and wants of end users living in a specific context of poverty;
- ensure that all stakeholders have sufficient incentives to participate in the delivery process.

Its argument is that, by specifically building from the outset an in-depth understanding of the context for intervention and of how this interacts with end users' needs and wants, the energy delivery model is more likely to be successful (i.e. to produce developmental benefits for end users over the long term).

The paper is structured as follows:

Section 1 outlines the conceptual framework for the 'energy delivery model', based on existing research by IIED, Practical Action and other experts. It provides an outline of those factors that the authors consider to be crucial in influencing the success or failure of initiatives to deliver energy services

to people living in poverty, such as geographical location, the varying needs and wants of end users, and their different socio-economic and cultural contexts.

Section 2 proposes a three-phase approach to designing an energy delivery model that factors in analysis of such considerations from the outset: **Phase 1** involves identifying and engaging the end users and mapping all the stakeholders potentially involved in delivering the energy services; **Phase 2** involves analysing in more depth the end users' needs and wants, their local socio-cultural context and the local market conditions; and, finally, **Phase 3** involves designing a delivery model that takes into account the shared understanding of end users' needs and wants and the analysis of the context for intervention generated during Phases 1 and 2. A participatory approach is central to all three phases.

Section 3 discusses guidelines for implementing this approach and, in particular, suggests two innovative tools that can be used to carry out the analysis in **Phase 2**. These tools, the **Delivery Model Map** and **Delivery Model Canvas**, are adapted from existing, business-oriented tools for designing the delivery of energy services to people living in poverty. It should be emphasised that these tools are envisaged as a 'work in progress' that can be further developed and adapted to different local contexts. Finally, **Section 4** provides a list of existing tools to help those designing a delivery model to use a participatory approach in the different phases of the process, and **Section 5** provides a select bibliography.

Box 1: About CAFOD and IIED

As the official Catholic agency of England and Wales for overseas development, **CAFOD** works with more than 500 partners in more than 40 countries to alleviate poverty and promote a safe, sustainable and peaceful world. CAFOD's collaboration with IIED aims to identify the crucial factors in designing energy services for the communities our partners work with, particularly those living in acute poverty.⁶ The aim is to ensure that any energy access projects carried out as one component of our climate change adaptation and sustainable livelihoods programmes will result in sustainable poverty reduction.⁷

The **International Institute for Environment and Development** (IIED) is an international policy research organisation, working with partners on five continents to

build a fairer, more sustainable world. IIED's Energy Team researches the potential of policy initiatives to improve people's access to sustainable energy, to promote socio-economic development and reduce poverty. Making such initiatives relevant to specific social, cultural and political contexts, learning from successful experiences and scaling up successful pilot projects are all key challenges facing development practitioners and other actors seeking to design and implement energy access projects. Working with partners in developing countries, IIED performs in-depth case-study analysis of projects and country contexts to explore how to overcome these challenges. IIED's approach also aims to build an 'evidence base' for advocacy work with government, business and civil society, in order to catalyse changes in policy and practice.

⁵ For further specific examples, see Wilson *et al* (2012)

⁶ Most women and men in acute poverty live in middle-income countries. A lesser but still substantial number live in low-income countries. This is true both by multidimensional acute poverty measures (see: <http://www.ophi.org.uk/wp-content/uploads/OPHI-MPI-Brief-2011.pdf?cda6c1>) and by dollar-per-day poverty lines (see: <http://www.ids.ac.uk/idsproject/the-new-bottom-billion>).

⁷ For instance, in Kenya 80 per cent of people live in rural areas, and 90 per cent of those people do not have access to electricity. CAFOD and its partners have recently begun a community-based green energy programme in Kenya supported by the ACP-EU Energy Facility aimed at increasing access to modern, affordable and sustainable energy services in eight districts in the most vulnerable arid and semi-arid regions. The project aims to benefit 407,702 households through 138 schools and health centres and 69 rural community-based groups. The regions covered are in the Eastern and Rift Valley Provinces: the districts of Kyuso, Mwingi, Mutomo, Kitui, Garbatulla, Isiolo, Kajiado North and Kajiado Central.

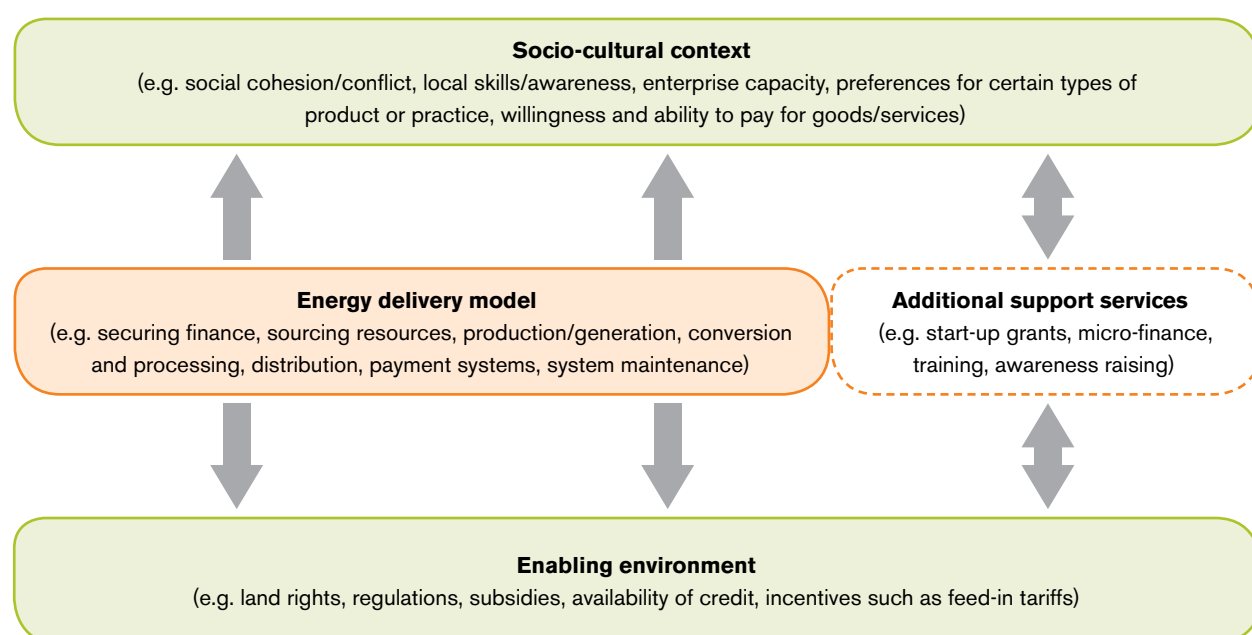
1. What is an ‘energy delivery model’?

An energy delivery model is the combination of the technology, finance, management activities, policy support, legal arrangements and relationship types required to supply energy to a group of people or end users⁸ (in this context, to groups of people living in poverty). The design of such models must consider the broader environment in which the service is to be provided, or ‘context for intervention’, which includes the ‘enabling environment’, i.e. the institutional structures and public policies, the existing transport and communications infrastructure, the local capacities and the wider socio-cultural context in which the end users live.

Delivering energy services to the poorest people is a particularly challenging task. It requires understanding the end users’ specific needs and wants, how these relate to the energy services available, and how these services can be delivered by a sustainable supply chain comprising different inputs and different actors performing their individual activities within the specific local context.

In fact, the term ‘energy delivery model’ has been defined in different ways, although always with an emphasis on the crucial role played by the enabling environment and support services (see below), often as part of the delivery model itself. Practical Action Consulting has played a key role in developing this idea (as part of its ‘ecosystems approach’⁹),

Figure 1: Map of the pro-poor energy delivery system, showing the four building blocks of the delivery model and their inter-relation (Source: Wilson *et al*, 2012)



⁸ An *end user* is a person who uses a product or a service. The term is used in the fields of economics and business. A product may be purchased by several intermediaries, who are not end users and who are located between the manufacturer and the end user, or it may be purchased directly by the end user as a consumer. In this paper, end users are the receivers and beneficiaries of the energy service.

⁹ See: <http://practicalaction.org/energy-delivery-model>

devising an energy delivery model tool for practitioners as part of the Policy Innovation Systems for Clean Energy Security (PISCES) programme (PAC *et al.* 2009).¹⁰ In turn, Wilson *et al.* (2012) see the socio-cultural context as crucial: this research is the source for the approach adopted here, which uses four key building blocks to define and describe the delivery of energy services:¹¹

- **The delivery model** – the set of activities and group of actors that are necessary to deliver the service(s)
- **The enabling environment** – the external environment (e.g. formal government or public policies) that influences and enables the delivery model
- **The socio-cultural context** – the wider socio-cultural context in which the activities and the actors who carry them out are embedded
- **Supporting services** – any external support that the delivery model might need due to weaknesses in the enabling environment or a need to adapt to specific circumstances of the social-cultural context (e.g. social funds, loans or externally supported technical training).

The delivery model

An energy value chain starts with the harvesting/extraction of the energy source or fuel and includes each phase of energy delivery (technology design and installation, processing, distribution and marketing) to the final energy end-use, usually made possible by conversion equipment and appliances. Governance, management and ownership structures across the supply chain are integral parts of the model, along with options for financing and payment systems. Participants in the delivery model include a range of different actors, often working in partnership to achieve common targets: the private sector, state actors such as national and local government agencies, civil society organisations (non-governmental organisations or NGOs, community-based organisations or CBOs, cooperatives etc.), bilateral and multilateral donors and other development bodies.

In addition, an energy delivery model that targets poor communities and that aims to be socially, economically and environmentally sustainable would need to be based on essential principles such as those outlined in Box 2.

The enabling environment

At the government and public policy level, this means the structures, regulations and incentives that support or hinder the delivery of energy services. This includes economic policies and laws (e.g. trading and quality standards, benchmarking and standardisation of technologies, rights of access to natural resources, property and land tenure, tax and tariff regimes, business regulation, tax exemptions and government incentives). It also includes: institutional frameworks and governance, including the level of

transparency and accountability in the administration of public and private affairs; and local and national infrastructure, for example, the state of transport and communication systems and of the electricity grid. Further influential factors are: global and national consumer trends and tendencies (e.g. energy prices, carbon markets and international trade regulations) and the presence and extent of particular natural resources in the locality or country (e.g. solar radiation, wind, geothermal wells, and oil and gas fields), all of which will strongly affect the types of energy solutions considered.

Although these factors are beyond the direct control of the actors involved in designing the delivery model, they inform its design. Some factors can potentially be influenced by activities such as awareness-raising, lobbying of decision-makers or support from development actors.

The socio-cultural context

'Target markets' of end users are located within a particular context, with social and cultural norms that determine the way

Box 2:

Principles of a well-designed *pro-poor* energy delivery model

- Explicitly designed to have a positive human development impact, creating health, education and livelihood benefits.
- Economically sustainable over its entire life cycle (so including, where required, financial support in the form of subsidies, start-up grants and livelihoods support. These should be factored in explicitly from the outset).
- Technologically appropriate to the context (i.e. it can be locally managed and maintained) and capable of meeting the energy needs and wants of end users.
- Environmentally sustainable and socially inclusive. This requires robust assessment and on-going monitoring of its potential and actual environmental and social impacts (both local and national).
- Emerges from negotiations among multiple stakeholders, including end users, which results in a common definition of objectives and agreement on an implementation framework.

Ideally:

- Not a 'one-off' intervention but adaptable to different contexts and replicable or scalable to reach greater numbers of people living in energy poverty.

¹⁰ Practical Action Consulting (2009) *Small-scale bioenergy initiatives: brief description and preliminary lessons on livelihood impacts from case studies in Asia, Latin America and Africa*. See: <http://www.pisc.es.or.ke/pubs/pdfs/FAO-PISCES%20Case%20Studies%20Final%20Report%2020409.pdf>

¹¹ The term 'energy delivery model' is defined slightly differently by Practical Action in its energy delivery model tool. See <http://practicalaction.org/energy-delivery-model> and Bellanca, R. & Bloomfield, R. *Delivering energy for development* (forthcoming)

people live and work together, how they behave and their demand for particular goods and services.

The 'socio-cultural context' firstly means the norms and behaviours of the potential end users of the energy services, such as: their preferences for specific goods and services or established practices (e.g. cooking habits); the level of individual and community education; the level of average income and income variation; and their ways of interacting with the private and the public sectors (e.g. their familiarity with different technologies, such as mobile phone banking). It also includes more intangible factors, such as: their expectations from, and level of trust in, delivery of public services; their willingness to pay for services; their awareness of different energy options; and, finally, how generally conservative/progressive their attitudes are towards the introduction of new technologies.

Secondly, the socio-cultural context means the social structures/organisation of the communities where end users live. This includes: their leadership structures, levels of entrepreneurial activity and experience of shared/participatory service delivery and cooperatives; how gender relationships, and particularly the status and role of women, are understood; their level of social cohesion or conflict; and their skills base.

The acceptance, and likely success, of a particular energy delivery model are influenced by these factors. This is not only in terms of the 'product' being delivered to the end user, but also the success of the process of bringing together different stakeholders (including the end users) to participate in the design, manufacturing, distribution of, and on-going support to, the energy services.

Additional supporting services

Ideally, energy services operate in situations where markets work: i.e. where energy technologies are proven and where the enabling environment is sufficiently supportive (e.g. start-up credit can be accessed from banks; the government has put in place appropriate incentives; transport infrastructure such as roads and harbours are in a good condition, and so on). This also includes a favourable socio-cultural context (e.g. people can afford services or subsidies are available for poorer sectors of the population and there is a high level of awareness about different energy options, and so on).

However, delivering energy services to poor communities often involves overcoming barriers due to a weak enabling environment and the wider socio-cultural impacts of poverty, such as the remoteness of communities combined with lack of transport infrastructure (the so-called 'last mile' distribution challenge).¹² Overall, it often involves operating in a context where markets are not yet formed or are emergent and/or fragile i.e. where infrastructure, capacity and services supporting each link in the delivery chain are not (fully) available.



Collecting water from a solar-based purification system supplied by CAFOD. Chila Union, Mongla District, Bangladesh.

Photo: Paula Nyunt / CAFOD

The kinds of services that, typically, have been provided to support such delivery models include: providing access to micro-credit for end users to bypass the start-up costs; strengthening the capacity and skills base of local communities and other actors; carrying out outreach to increase community awareness of innovative technologies; and lobbying of decision-makers – including private institutions such as banks – for reforms in the enabling environment.

For example, providing services to customers who have limited or zero ability to pay may require public subsidies and/or supportive micro-finance schemes. Access to market finance for such energy services will be hindered by their perceived high risk, due to the fact that projects have components considered highly innovative or experimental by investors (such as off-grid or mini-grid non-conventional energy technologies) and the fact that they address marginalised customer segments. Potential supporting services could thus include lobbying conventional finance organisations such as banks to re-evaluate, or evaluate differently, the perceived risk. One useful example here is that of SELCO in India, which

¹² The term 'last mile' has its origins in the telecommunications field but has since been applied to supply chain management. Transporting goods in bulk has lower cost with economies of scale. The last leg of the supply chain is often less efficient because the goods have to be transported to individual end-user locations. These costs can be even higher for very remote areas with poor transport connections and low demand for a set geographic area. This has become known as the 'last mile' problem.

targeted 'champions' in banks, taking them into the field to observe its delivery model; this subsequently led to the creation of a supporting financing service.¹³ This service has now become so 'mainstreamed' that it could be considered part of the enabling environment.

¹³ UNDP (2011) *Growing inclusive markets, SELCO: solar lighting for the poor*. See: http://www.growinginclusivemarkets.org/media/cases/India_SELCO_2011.pdf

2. A pro-poor approach to designing energy delivery models

This section describes three phases of designing a delivery model which are, to some extent, iterative. It also outlines two tools that can be used in this process, the **Delivery Model Map** and **Delivery Model Canvas** (discussed in more detail in Section 3), which have been adapted from existing, business-oriented tools. Other, existing tools (e.g. tools for stakeholder mapping, needs assessment, monitoring and evaluation tools) are also useful for this process (see Section 4). Each phase is discussed in detail below, followed by a hypothetical example for illustration purposes (see boxes).

The three phases of the design process are as follows:

Phase 1: Identifying demand

In the real world, interventions to create energy products and services to benefit end users have different entry points. These relate to: the different socio-economic groups that the services are intended for (e.g. those living on below US\$2 a day or the 'middle poor'); different geographical contexts (e.g. urban slums or rural villages); different delivery technologies (e.g. solar power or hydro); or the different rubrics under which services are to be delivered (e.g. providing low-carbon solutions or improving agricultural productivity).

An 'initiating agent' – the organisation (public, private or civil society) that wants to carry out an intervention – will begin with a specific entry point (or points) that define the target group for the intervention and its geographical and socio-cultural context. Energy service delivery usually requires the participation of many different stakeholders who each have their own entry point(s) and criteria for participation. These range from businesses keen to increase their sales to development agents who want to improve the livelihoods of the end users. At the centre are the end users and their needs and wants.

While different actors are likely to have differing reasons for participating in the delivery model, **Phase 1** uses stakeholder engagement and a participatory approach to stakeholder mapping to tease out these different drivers and interests, to identify the potential roles each stakeholder can play, and to develop a shared understanding of the end users' needs and

wants. This process also allows potential 'energy gaps' to be identified. However, the outcome of this mapping could also be the realisation that access to energy services is not the end users' priority and there is no rationale for an intervention. However, if energy gaps are identified, a number of possible solutions will emerge. These ideas must deliver value both to end users and to other stakeholders, and are referred to as 'value propositions'.

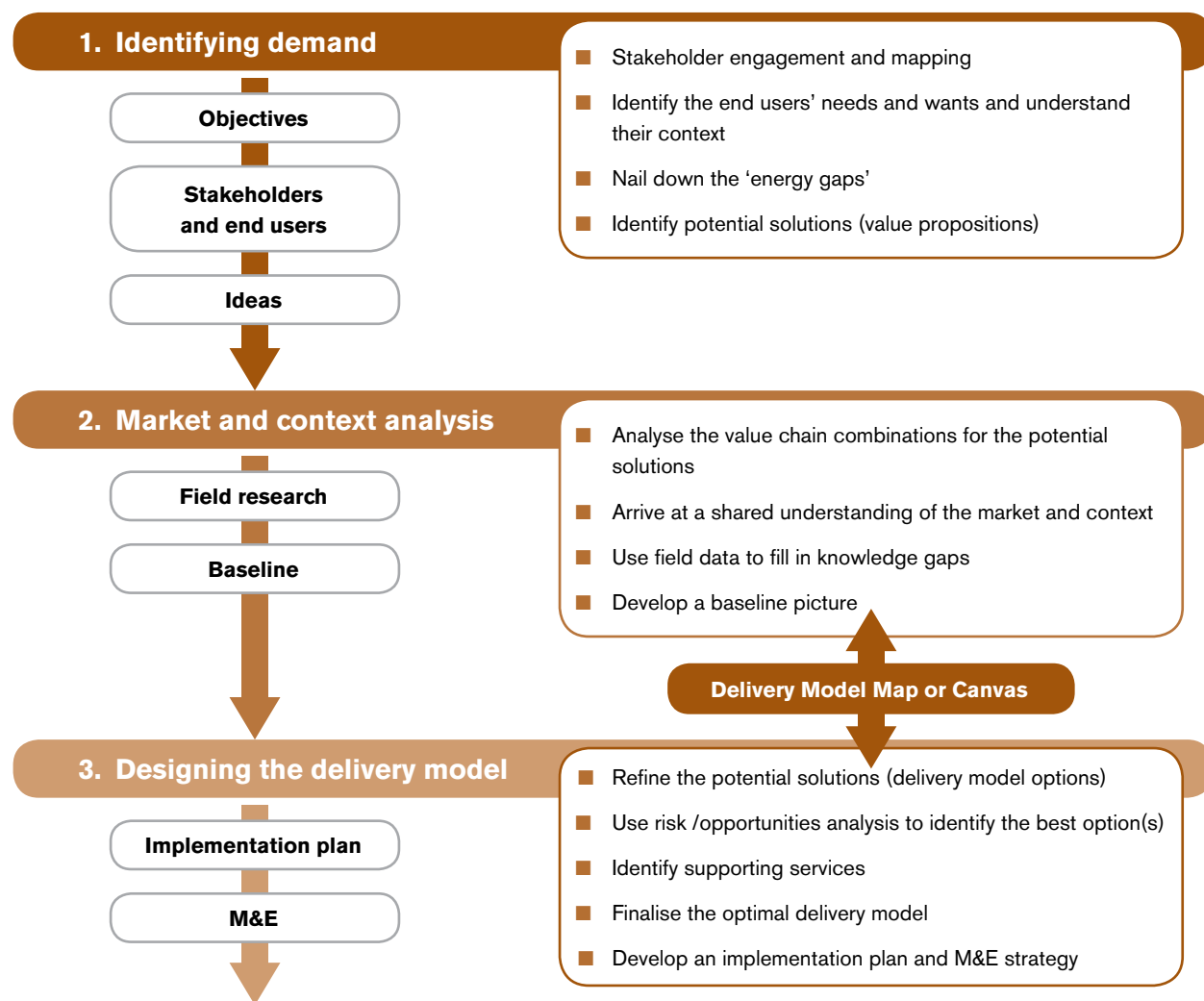
Phase 2: Market and context analysis

The purpose of this phase is to test the *feasibility* of the potential value propositions by analysing which value chain combinations would be required for their implementation. In other words, what is the combination of people, resources and processes that would provide energy services sustainably to the end users – taking into consideration the characteristics of the enabling environment and their specific socio-cultural context? This analysis should also be participatory, involving all the stakeholders. Two innovative *visualisation tools*, the **Delivery Model Map** (see Figure 3.2) and **Delivery Model Canvas** (see Figure 3.3), adapted from existing tools aimed at developing delivery models for businesses, can assist the analysis (see Section 3). It should lead to the identification of information gaps that can be answered by additional field research. The data collected during the field research can also be used to build a baseline picture of the current status of energy service delivery. The full energy delivery model can be constructed once this baseline picture has emerged, and once stakeholders have developed a shared understanding of the local market and local context for intervention.

Phase 3: Designing the delivery model

Informed by their shared understanding and by the analysis, the stakeholders revisit the different options for delivering energy services and evaluate their respective risks and opportunities. During this process, the need for additional supporting services might emerge, which will also require further analysis. Once a viable delivery model has been agreed, an implementation and monitoring plan can be developed. At the end of this phase, the ideal outcome

Figure 2: A pro-poor approach to designing energy delivery models in three phases: Demand, Market and context analysis, and Design.



is a well designed and sustainable energy delivery model developed through an inclusive, participatory process.

Sections 2.1, 2.2 and 2.3 (below) describe each of the three phases in more detail. Each phase has a number of activities in which a running example is provided to illustrate what the step means in practice. The example is indicated with the symbol .

2.1 Phase 1: Identifying demand

Identify the context for intervention

Potential models to deliver energy services are always related to a specific context and arise within particular constraints. The context can include:

- **a geographical area**, for example a place or region that a government is targeting for development or where a civil society organisation works with local communities;

- **a target group of people or potential end users**, for example, smallholder farmers in a semi-arid region;
- **a specific objective** often dictated by the priorities of government policy or business interest, for example where the government's priority is to promote productive uses of energy as one means of improving subsistence agriculture.



A state agency is seeking to work with smallholder farmers to improve their livelihoods by increasing productivity in agricultural practices. One of their focus areas for increasing productivity is increasing mechanisation (e.g. access to electrical power for processing or irrigating crops, and/or more efficient vehicles for ploughing).

Carry out broad stakeholder engagement and mapping

Stakeholder mapping is a process whereby different stakeholders with an interest in a particular issue are identified. They include end users and all the actors that engage with them at the local and national level. The mapping should give the designers of the delivery model (broadly defined as all the different stakeholders who will participate in the project) an idea of whom to involve in future discussions, need assessments and market analysis. There are many existing tools that can be used to carry out stakeholder mapping (see **Section 4**).



In the case of the farmers, other stakeholders could include farmers' associations, community representatives, suppliers of agricultural tools and buyers of produce, energy service providers, financing agencies, international donors, technology providers, local authorities and the national government.

Carry out an energy needs and wants assessment

The needs and wants assessment should consist of a broad analysis of the livelihoods of the target group, aimed at identifying potential gaps in energy services that, if addressed, could improve their livelihoods and well-being (e.g. conduct a household survey). It should go beyond the immediate energy needs identified to build a comprehensive picture of their broader livelihood situation. This is because too narrow and early a focus on questions of immediate energy use (e.g. 'what lighting needs do you have in your home?') could lead the stakeholders to ignore the broader context or more structural needs of end users – for instance, in the example, the need to improve agricultural productivity. Understanding end users' needs and wants can best be achieved through discussing the different functions that the end users carry out (or would like to) as part of their daily activities – e.g. for a smallholder farmer, this could be milling crops or drying fruit. From this analysis, it should be possible to identify which kinds of energy services can best support and enhance these functions (if any).

Different stakeholders may have different views on, and perceptions of, what end users' 'needs and wants' are. External perceptions might not match the real-life demands of the end-user target group. There might also be a false assumption, for instance, that all end users have homogenous needs and wants. Moreover, the shorter-term wants of end users are often not the same as what they themselves identify as their longer-term needs (e.g. 'I want a working TV and radio in my house' as opposed to 'my highest priority over the next few years is to increase my crop production so as to bring in more income').

Balancing these shorter- and longer-term wants and needs is important in meeting demand for energy services, particularly

where the model requires end users to pay for services. To get a complete picture, the interests (and hence priorities) of the other stakeholders (identified in the stakeholder mapping) also need to be clearly understood to arrive at an energy delivery model that effectively integrates different roles and expectations. Tools that can be used for an energy needs and wants analysis are listed in **Section 4**.

It is important to highlight that the needs and wants assessment could also lead to the conclusion that *no* energy services are required – and that end users' priorities may lie elsewhere. It is important to avoid the trap of coming in with an external agenda (such as 'we do solar') and imposing this on the end users and local actors. This is not to say that organisations with a focus on particular energy services should not look for opportunities for delivering their services when participating in needs and wants assessments. However, if the assessment is carried out objectively, it may lead to the conclusion that *no* energy services are required or that a combination of certain services with other kinds of intervention is required¹⁴ (e.g. the need for improved adult literacy has been identified. The local school could be a possible tool to improving literacy through offering evening classes but it lacks lighting. A small community fund could cover the cost of solar lighting for the school. However, the village lacks teachers who are available in the evening and the teachers would also need extra training to teach adults. The local government does not have funds for adult education or a policy to train/attract suitable teachers.)



In the hypothetical example of delivering energy services for productive uses by smallholder farmers, different stakeholders could have competing or conflicting priorities. The needs and wants assessment might reveal that the end users' most compelling energy-related priorities are: to light their homes in the evening and to watch TV and to power mobile phones (for private use as well as to receive information on market prices for crops). Local and national government priorities could be to mechanise agriculture to raise productivity and standards of living in the target region. The energy service provider is interested in selling its solutions. Agricultural suppliers might be interested in increasing their business by widening the range of products they sell to include more expensive items such as electric-powered tools. International donors would like to see a greater uptake of low-carbon energy solutions. International technology providers could be seeking to expand into emerging markets and also assessing the potential of corporate social responsibility (CSR) style approaches highlighting the social and environmental benefits of their business activities.

Nail down the 'energy gaps'

The different drivers and priorities of the various stakeholders emerging during the needs and wants assessment will help to

¹⁴ It should be noted that there could be cost implications for a company carrying out such an assessment where the assessment concludes that their services are not those required.

identify 'energy gaps' and potential ways of filling these. The next phase of the process is to decide which of these gaps it would be most beneficial to address and how to do this in the optimal way – given the broader socio-economic, cultural and geographical context and any additional services required. It is important to understand why the gap exists, i.e. what factors have prevented the development of a market for the missing energy service, including any previous attempts to fill that gap and, most importantly, why these efforts may have failed. Some of these reasons may be related to the (lack of an) enabling environment or to the social-cultural context. Equally, there might be aspects of the enabling environment or socio-cultural context that could, when factored in to the delivery model, help to address the gap identified. Some solutions could be a better 'fit' with existing policies and/or be eligible for incentives at the local and national level and/or be easier to implement given the available natural and human resources.

 In the example, the stakeholder engagement and the needs and wants assessment has indicated that the reasons farmers are not thinking about mechanised agriculture are: their low awareness of available solutions, their low purchasing power and distribution/maintenance challenges due to poor transport infrastructure. There is no electricity grid nearby and grid extension would be expensive. On the other hand, the local area is well irradiated by sunlight all year round and the government has a pro-solar policy in place that has lowered taxes on imported solar equipment. There are private-sector sellers of PV panels in the region. The discussion leads to the conclusion that there is a gap in terms of government policies and support services aimed at stimulating mechanisation. The government agency has a focus on agricultural productivity through mechanisation but the end users have different priorities. Thanks to existing policy on low-cost solar imports, there are already private sector companies interested in delivering solar power to the household level to meet end-user top priorities of TV and mobile phone-charging. However, many of the poor farmers cannot afford the initial cost of these services – another gap.

Identify potential solutions and define objectives

At this stage, it is possible to start outlining a potential solution or solutions that could meet the priority needs identified by the end users, including a rough idea of how to implement it, so that the existing barriers can be addressed and overcome. The short-, medium- and longer-term aims of the intervention should be discussed and clearly agreed among the stakeholders, along with the expected outcomes and impacts from delivering certain services, as well as how these will be measured. At this point, the 'value' that implementing this intervention would deliver to a range of different stakeholders and across different time-frames has been identified. This is what is termed the 'value proposition'. What the stakeholders do not have a clear idea of yet is exactly *how* they will

implement this solution and *what* the end product or service will look like in detail.

 In the example, the decision is taken to set up a commercial venture that will provide farmers with solar energy services at the household level but also that the government should explore how to improve the enabling environment for mechanisation through introducing other incentives and support services. This could include decreasing import duties on agricultural appliances that can be powered by renewable energy and organising awareness campaigns that highlight the returns on investing in mechanised solutions. Some of these mechanised solutions will be unrelated to the household services. However, one pathway has been identified which links the two 'gaps' of mechanisation and the farmers' household needs identified, such as mobile phone-charging, lighting and TV-watching. The larger solar home systems support solar-powered water pumps for smallholder plot drip-irrigation and other productive uses. In order to satisfy different stakeholders' priorities, the energy solution will have to deliver results according to a varying set of criteria, and its results will need to be evaluated accordingly. Ultimately, its success will be measured in terms of whether and to what extent it achieves its initial goals, i.e. it will be important to ensure that farmers can watch TV and charge mobile phones (*their* priorities) and also that they are progressively exploring opportunities to adopt powered devices such as fridges and water pumps which can promote mechanised agricultural practices (the government's priority), preferably powered by sustainable energy sources such as solar (the priority of the international agency and private actor). Over the long term, the agricultural productivity and thus the livelihoods of people in the region are expected to have improved measurably.

2.2 Phase 2: Market and context analysis

Participatory planning and analysis using visualisation tools

The process so far has led to the broad formulation of an idea of how to address the energy gap or a 'value proposition'. The next step is to discuss and develop the idea in detail. This will involve answering questions such as:

- What does the market chain look like?
- Who would the main actors be?
- How can we ensure value is delivered to them so that they have an incentive to participate?
- Is the business proposition economically sustainable?
- What social-cultural and environmental factors need to be considered to ensure that the market chain operates well within the specific context?
- What other developmental benefits will it provide? Etc.

Innovative tools such as the **Delivery Model Map** (Figure 3.2) and **Delivery Model Canvas** (Figure 3.3) (which will be discussed in further detail below) can be used to guide this analysis and steer the stakeholders towards choosing options for the energy delivery model.

 In the example, the state agency invites to a workshop representatives from a farmers' association, an international donor organisation, local solar PV retailers, an international supplier and the person responsible for giving loans at the local bank. The **Delivery Model Canvas** is used to guide the discussion. The farmers' habits and purchasing power are not known and the following additional questions emerge: What would be a feasible price for the solar devices? What type of devices could deliver the priorities of lighting, TV-watching, and mobile phone-charging? How much would it cost to import the equipment? Are there sufficient local resources available in terms of skills and capacity to train a workforce to install and maintain solar devices in the region targeted? What is the state of relevant transport infrastructure, e.g. roads and harbours? Are regulations for importing the new products cumbersome? Would farmers be interested in, and prepared to pay for, refrigeration? Are there companies who could potentially provide this service and, if so, what could be done to facilitate this? And so on.

Field research and definition of a baseline

The analysis of the potential solution(s) is likely to uncover a number of open questions regarding the market situation and the wider context. In order to fill in these gaps, the missing data need to be collected through field research. Due diligence would also need to be carried out to assess whether the products/services match the functionality and quality needed to deliver the value proposition, and also on potential supply-chain participants to ensure they can deliver what is expected. This is also required to complete the baseline assessment and to show what kinds of barriers exist to delivering the solution or value proposition. There are various existing tools that can be used to carry out the field research and complete the baseline assessment (see **Section 4**).

 As one way of filling the knowledge gaps, a survey is conducted among farmers to ascertain their preferences, aspirations, economic conditions, behaviours etc. In addition, comparable existing value chains are analysed, infrastructure in the region is assessed and research is carried out to obtain the other facts and figures required to design the delivery model.

final energy delivery model. This phase involves analysing the opportunities and risks of each potential solution, identifying the possible supporting services that will be required and, finally, selecting which resources, processes and stakeholders can best deliver the energy service to address the end users' needs and wants, resulting in the final delivery model. An implementation plan and monitoring and evaluation strategy should be drawn up and the project can then proceed to implementation.

Mapping and refining solutions

Armed with a shared understanding drawn from the market and context analysis and the field research, it is time for the stakeholders to map out the various potential solutions or delivery model options. Tools such as the **Delivery Model Map** and **Delivery Model Canvas** (see **Section 3**) can be used to compare the different options and weigh up the variables to reach a decision about which model has the best chance of succeeding (i.e. can deliver on the objectives agreed at the beginning of the process) and whether the 'value proposition' holds up to scrutiny.

 In the example, a hardware retailer who also provides installation services is ready to invest in expanding his business to include solar products. His operations are in an urban area of the target region. The products are generally too expensive for farmers to purchase but a local bank is interested in expanding its portfolio of loans to poor farmers, so long as the risk can be reduced through providing some kind of guarantee to cover defaults. NGOs active in the area provide micro-finance services but their operations are linked to their ability to fundraise and to the priorities of their international partners, and might be temporary. The farmers are highly attracted by the potential savings to be made through reducing kerosene use and being able to power communication gadgets, which suggests that they might be ready to buy these solar services. However, the farmers are unfamiliar with the more expensive products for productive uses, such as solar fridges and pumps, and the opportunities they offer to improve their livelihoods. Appliances such as TVs, radios and mobile phones are widely available in the urban area that farmers visit on a monthly basis. However, their maintenance would need to be organised locally in the remote areas where the farmers live. There are several options for organising the delivery of energy services. Should maintenance be provided by the retailer? Alternatively, should they hire freelance agents that can promote products in the countryside and at the same time service the existing installations? How can the remaining barriers (affordability, poor infrastructure, the farmers' lack of familiarity with the devices aimed at productive uses etc.) be addressed? What gaps remain in the delivery model and what kind of supporting services would be required to fill those gaps?

2.3 Phase 3: Designing the delivery model

This final phase uses the analysis and the data gathered during the field research to select the best option(s) for the

Identify supporting services

At this point, a risks/opportunities analysis is conducted to refine the value proposition by filtering out less favourable options and narrowing down the field to the optimal one(s). At the same time, any support services required to mitigate the risks and improve the delivery model – basically, to make the option viable – are identified. **Section 4** lists some tools that can be used to carry out risk assessments.

 In the example, one support service identified is a campaign informing farmers of the solar-energy solutions available and how they could be used to improve their livelihoods. This could be paid for by the main supplier, with government support (in the form of tax relief), and by the farmers' association, which manages the campaign and, in turn, receives project support from the international donor. In addition, funds are provided by the international donor to the local bank so that it can give micro-finance loans for farmers to buy solar home systems (SHSs) and more expensive appliances. Interest is kept to a minimum on the loans, which are paid back in small instalments by the farmers, who also cover management fees. As an additional incentive and to reduce perceptions of risk for early adopters of SHSs, for the first three years the government offers a small subsidy to cover the difference in cost between a smaller solar home system and one that supports the productive appliances such as the fridge and the water pump for irrigation. To address the problem of 'last mile' delivery, the energy service provider (the supplier) is encouraged to train locally based technicians who can represent the company at the local level and provide product information and maintenance. The training is paid for by the international technology providers through their CSR initiatives.

Implementation planning and monitoring and evaluation (M&E)

The final step involves defining the activities that are required to implement the delivery model i.e. drawing up an action plan and a monitoring and evaluation strategy, including specifying timelines and who is responsible for delivering these activities, and agreeing these clearly among stakeholders. The scope of this paper does not cover the implementation phase itself or go into detail on the activities carried out during implementation, but there are some tools listed in **Section 4** that can assist with these activities.

However, an implementation plan is likely to contain the following activities:

■ Pilot stage

Good practice suggests that the implementation of the delivery model should take place on a field pilot basis, before rolling it out at scale.

■ Testing and M & E

The implementation team monitors the system, tests permutations and documents the learning from this. This



Photo: Simon Rawles / CAFOD

Philip Nkete, 72yrs, watering his vegetable garden using a CAFOD-funded solar borehole. Matahatata village, Monze, Zambia.

feedback from the field is then shared with the design team, and the energy delivery model and the value proposition are revisited in the light of the feedback.

■ Roll-out of the product(s)/service

After any necessary re-engineering has been done and the process has been streamlined, the product(s)/ services are rolled out on a larger scale in the market through the channels identified in the design phase. Where necessary, this will involve training and capacity building.

■ Maintenance

The importance of maintenance and after-sales support have been emphasised throughout the design process. Again, this is an essential activity to ensure the long-term success and sustainability of the delivery model.

Finally, as discussed earlier in this section, the three phases of 'identifying demand', 'market and context analysis', and 'designing the delivery model' are to some extent iterative, i.e. they can be revisited both during and after implementation of the delivery model to re-test its assumptions and also to revisit the data used for the baseline.

3. Tools for a participatory approach to designing pro-poor delivery models

Visualisation tools, such as Osterwalder's **Business Model Canvas** and Practical Action's **Market Mapping Tool**¹⁵ can help different stakeholders to analyse the delivery model. They have already proven useful in designing more inclusive delivery structures.¹⁶ All stakeholders should be involved in designing the delivery model through participatory workshops, including end users, private actors, government officials, civil society organisations and development partners.

3.1 Using Osterwalder's Business Model Canvas to analyse a delivery model

According to Wilson et al (2012), one valuable tool for describing the key elements of a generic delivery model is Osterwalder's **Business Model Canvas** (Osterwalder, 2010) (see Figure 3.1).¹⁷

The strength of Osterwalder's **Business Model Canvas**, and its interest for would-be designers of energy delivery models, is that it encourages a dynamic analysis of all aspects of a business activity, providing a framework to guide decision-making by defining explicitly the following: the delivery model's value; the types of relationships it creates with partners¹⁸ and end users; and the resources and activities required to implement it. However, as Wilson et al (2012) point out, Osterwalder's tool is purely business-focused. To use it to design pro-poor energy delivery models with primarily developmental aims, it needs to be adapted and expanded.

A classic, business-oriented approach to a delivery model would strictly limit its objectives to the immediate outputs that the business activity or value proposition is meant to deliver and to whether or not it realises the expected economic return over the lifetime of the activity. Pro-poor energy delivery models, however, have broader and longer-term human

Box 3:

Osterwalder's **Business Model Canvas**

This is a visual tool for developing service or product delivery models. It helps companies make strategic management decisions about their business activities by mapping potential trade-offs. The categories in the model (underlined below) can be grouped as follows:

- **The value proposition:** the business idea itself
- **Infrastructure:** the set of activities, resources and network of partners required to operate the value proposition
- **Customers:** these are grouped in different segments, approached in various ways (relationships) and reached through the channels that allow the company to promote and deliver its products and to provide after-sale support, and allow the customer to evaluate and purchase them
- **Finance:** this is divided into all the costs to be balanced by the streams of revenue

development goals beyond (short- or longer-term) economic profitability. In addition, since there can be no lasting poverty reduction without addressing environmental degradation etc., environmental benefits must also be taken into account.

If the model is aimed at supporting poverty alleviation, and providing health, education and livelihoods benefits, including the creation of inclusive local value chains and building resilience to short- and longer-term environmental shocks and stresses through the sustainable management of natural resources, protection of local eco-system services and bio-diversity etc., then such benefits must be made explicit

¹⁵ See <http://practicalaction.org/market-mapping>

¹⁶ See, for example: Bloomfield (2012) *Bioenergy market system development* and Vermeulen et al (2008) *Chain-wide learning for inclusive agrifood market development*

¹⁷ See: <http://alexosterwalder.com/> or http://en.wikipedia.org/wiki/File:Business_Model_Canvas.png. Also, Wilson et al (2012) *Linking poor communities to modern energy services*

¹⁸ That is, all those actors who take part in the delivery model.

(Source: http://www.businessmodelgeneration.com/downloads/business_model_canvas_poster.pdf)



and appropriately valued and monitored alongside the goal of generating 'revenue streams' when designing a pro-poor energy delivery model. The timescale for monitoring and evaluating results under this model also differs, requiring an assessment not only of short-term deliverables but also medium- and long-term outcomes and impacts.

This, in turn, highlights another crucial difference between the value proposition as defined by the Osterwalder **Business Model Canvas** and that of a pro-poor energy delivery model. The latter is necessarily the product of negotiations between multiple stakeholders operating in a specific socio-economic and cultural context that goes beyond that of the classic delivery model. In this context, each actor has interests and drivers that must be properly understood and valued to obtain a successful result (i.e. to design a sustainable delivery model).

The next section will consider the specific ways in which Osterwalder's **Business Model Canvas** along with another useful tool, Wilson *et al*'s **Map of the pro-poor energy delivery system** (see Figure 1), can be adapted to promote participatory design of a pro-poor energy delivery model. Both tools are used to guide the designers of the delivery model through the different building blocks of delivery models to reach shared decisions about which solution is most appropriate for the particular situation and likely to be the most successful.

3.2 The Delivery Model Map and Delivery Model Canvas

Figures 3.2 and 3.3 show two visualisation tools aimed at facilitating the engagement of stakeholders in a participatory analysis of the delivery model. They have already proven very useful in the design of more inclusive delivery structures.¹⁹ The aim of these tools is to encourage the participation of all the stakeholders in designing a delivery model, through workshops involving different market actors, government agents, civil society and development partners, and end users. For each tool, examples are given of issues and questions to explore – with the proviso that these are to be treated as indicative and not definitive. Stakeholders can use the examples to build their own tailored questions on issues that arise from their particular context to assist with the participatory design process.

In the **Delivery Model Map** (Figure 3.2), the basic framework from Wilson *et al*'s **Map of the pro-poor energy delivery system** (Figure 1) has been taken and populated with elements of the Osterwalder **Business Model Canvas**. In doing so, we have renamed elements of Osterwalder's model as follows: the term 'customer' has been substituted by 'end user'. 'Partners' are now called 'stakeholders', to refer to looser relationships that are not strictly part of a traditional delivery model (e.g. with government and local authority agencies, development partners and end users) and also to underline their active participation in the design and implementation of

the delivery model. We have also changed the three broad groupings listed in Section 3.1 of 'infrastructure', 'customers' and 'finance' to 'delivery infrastructure', 'end users' and 'accounting' respectively. The last of these, 'accounting', has an additional element, 'other costs/benefits', to reflect not only budgeting for financial resources but assigning a value to, and taking proper account of, the developmental and other benefits that the solution is intended to deliver.

The **Delivery Model Map** also populates the original Wilson *et al* building blocks for the 'enabling environment', 'socio-cultural context' and 'supporting services' with a set of factors which are (non-definitive) examples of what issues to consider when designing the delivery model (as described above). In particular, the 'enabling environment' category contains broader thematic areas (economic policies and laws, infrastructure, global trends, institutions and natural resources) while the 'socio-cultural context' category is roughly divided into an individual sphere (e.g. end-user preferences) and a collective sphere (e.g. social cohesion).

In the **Delivery Model Canvas** (Figure 3.3), Osterwalder's **Canvas** constitutes the starting point, with the various elements renamed as described above, (including using the grouping categories of 'delivery infrastructure', 'end users' and 'accounting'). The core changes made are to expand on Osterwalder's categories by introducing into his **Canvas** elements such as the 'socio-cultural context' that are adapted from Wilson *et al*'s **Map**.

The **Delivery Model Canvas** reflects the overall pro-poor approach to designing delivery models by explicitly integrating developmental and environmental sustainability benefits into it, for example by including positive socio-environmental impacts as well as additional economic revenues within the 'value proposition'. A specific 'socio-environmental benefits' element has also been added in the 'accounting' building block for the measurement of non-monetary targets. Moreover, each block includes new elements aimed at capturing the 'triple bottom line' of social entrepreneurship. In addition, elements have been added so that the socio-cultural context and enabling environment can be taken into consideration. For example, socio-cultural characteristics that refer to individuals (e.g. preferences and habits) are included in the 'end-users segments' section, while those referring to communities (e.g. cohesion, level of skills and capacity) are included in the 'end-users relationships' section. Questions around the need for additional supporting services have been incorporated into the 'key resources' section.

Again, delivery models that target the very poor and operate in situations where markets are absent, fragile or emerging, are likely to require external support. These support services could be economic, both monetary and in-kind (e.g. government subsidies or incentives and donor funding), but could also include capacity building and advocacy in favour of enabling public policies etc. Therefore, the introduction of 'supporting services' is specifically highlighted in the 'key resources' section and they are factored into the overall framework in the category 'revenue streams'.

¹⁹ See, for example, Bloomfield (2012) and Vermeulen *et al* (2008) – for more details, see footnote 16

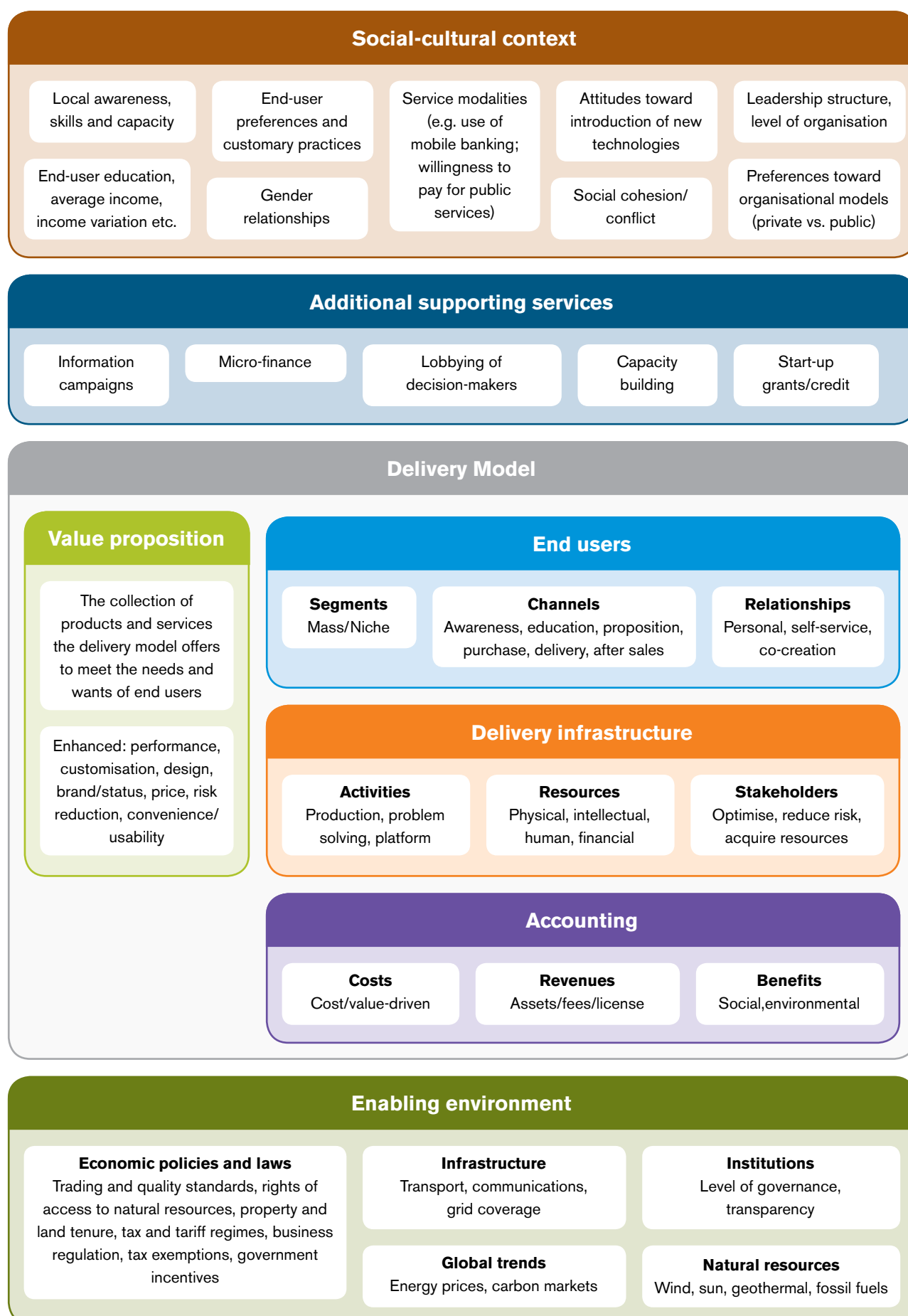
Figure 3.2: The Delivery Model Map

Figure 3.3: The Delivery Model Canvas

Delivery infrastructure		Value proposition	End users	
Key stakeholders (partners, suppliers, enablers, institutions) Who are our key stakeholders? Which key resources are we acquiring from them? Which key activities do they perform? What do they expect from us? What do we expect from them? How is value shared through the delivery chain, including with end users? How does the value proposition fit with public policies and government strategies?	Key activities What key activities do our value propositions, distribution channels, end-user relationships and revenue streams require? Which activities are contributing the most towards the value proposition? Which activities would improve the value proposition but are not essential? Are any of the activities disrupting existing businesses and power relations? Is there potential for conflict? CATEGORIES: <i>Production, problem-solving, platform/network</i> ASSESSMENT: <i>Impact on livelihoods, conflict mitigation strategy</i>	What value do we deliver to the end user? Which one of our end user's problems are we helping to solve? What bundles of products and services are we offering to each end-user segment? Which end-user needs are we satisfying? What social and/or environmental problems are we solving? How is the broader community benefiting? TYPES: <i>Quantitative, qualitative (includes positive socio-environmental impacts)</i>	End-users relationship What type of relationship does each of our end-user segments expect us to establish and maintain with them? Do end users expect services to be delivered by the public or private sector? What kind of organisation is this? EXAMPLES: <i>Personal assistance, dedicated personal assistance, self-service, automated services, communities, co-creation</i> ORGANISATIONAL STYLES: <i>Privately owned business, governmental agency, cooperative, intermediate agent (international NGO, local NGO, church)</i>	End-users segments For whom are we creating value? Who are our most important end users? Are there local norms, behaviours, attitudes toward innovation and risk that could affect the value proposition? Are there preferences and customary practices that could affect the value proposition? How are gender relationships affecting the value proposition? EXAMPLES: <i>Mass market, niche market, segmented, diversified, multi-sided platform</i>
	Key resources What key resources do our value propositions, distribution channels, end-user relationships, revenue streams and partnership relationships require? Are all resources within reach? Which supporting services might be added? TYPES OF RESOURCES: <i>Physical, intellectual, human, financial</i> TYPES OF ENABLING FACTORS: <i>Natural resources, global trends, institutional structures (their transparency and strength), economic policies, laws and implementation strategies, state of infrastructure</i>		Channels Through which channels do our end-user segments want to be reached? How are our channels integrated? How are we integrating them with end-user routines and preferences? Are there informal channels and how do they interact with the delivery chain? TYPES: <i>Own channels, partner channels</i> CHANNEL PHASES: <i>Awareness, evaluation, purchase, delivery, after-sales</i>	
Accounting		Other costs/benefits	Revenue stream	
Cost structure What are the most important costs inherent in our delivery model? Which key resources are the most expensive? Which key activities are the most expensive? CLASSES OF BUSINESS STRUCTURES: <i>Cost-driven, value-driven</i> CHARACTERISTICS OF COST STRUCTURES: <i>Fixed costs, variable costs, economies of scale, economies of scope</i>		What are the most important social and environmental costs inherent in our delivery model? What are the benefits? TYPES: <i>Social, environmental</i>	Where will the revenue streams come from? Can end users pay? Entirely or partially? How much does each revenue stream contribute to overall revenues? Are there available subsidies/incentives from donor/government programmes? Can civil society offer in-kind resources (human, physical, financial)? Can the end users offer in-kind resources (human, physical)? TYPES: <i>Asset sale, usage fee, subscription fees, lending/ renting/ leasing, licensing, brokerage fees, advertising, grants / subsidies, in-kind</i> PRICING: <i>fixed (list price, product feature-dependent, end-user segment-dependent, volume-dependent), dynamic (negotiation, yield management, real-time-market)</i>	

The Delivery Model Canvas explained

Figures 3.4 to 3.7 below explain the different elements of the **Delivery Model Canvas**, giving further detail about each element. The term 'we' is used here to refer to the individuals, agency, organisation or set of actors that are proposing to develop the energy delivery model. This could include the government, local or multinational companies, donors, CSOs, CBOs, development agencies, multilateral development banks etc. Most likely, it will be a consortium of several different kinds of organisation. Figures 3.4 to 3.7 highlight those aspects of the delivery model that will be less familiar to traditional development actors and, at the same time, the challenges that are typical of environments characterised by acute poverty and where the required markets structures are absent, fragile or emerging, with which private-sector actors will be less familiar. Both kinds of unfamiliarity need to be taken into account.

The different categories of the **Delivery Model Canvas** (Figure 3.3) have been grouped into the following:

- Value proposition
- End users
- Delivery infrastructure
- Accounting

The relevant elements of the Canvas are highlighted in Figures 3.4 to 3.7 below.



Photo: Paula Nyunt / CAFOD

Tania collecting water in the water harvester, part of a solar based purification system supplied by CAFOD. Chila Union, Mongla District, Bangladesh.

Figure 3.4: Value proposition

Value proposition		
What value are we delivering to the end users? Which one (or more) of our end-user problems are we helping to solve? What bundles of products and services are we offering to each end-user segment? Which end-user needs are we satisfying? What social and/or environmental problems are we solving? Are we creating any social and environmental risks? How is the broader community benefiting?	Characteristics ■ Quantitative – price and efficiency (performance, price, cost reduction, risk reduction) ■ Qualitative – overall end-user experience and outcome (product newness, design, customisation, brand/ status, appearance, accessibility, convenience/ usability, and comparison to available alternatives). Positive socio-environmental impacts (on livelihoods and environment) (job creation, education, people & animal well-being, natural resource and eco-system services protection etc.)	
	 Delivering customised solar products to smallholder farmers. The value delivered by the proposition consists of the following: the ability of the farmers and their families to access electric lighting for the first time, along with (enhanced) access to modern communications (TV, radio); the improvement of livelihoods by using appliances such as refrigerators and	water pumps for productive uses; the increased educational opportunities for children and others due to the availability of light for studying at night; and other benefits from actual and potential use of electric appliances (e.g. labour-saving for women, health benefits from reduced kerosene use etc.). The products are solar home systems (SHSs), customised according to needs and affordability and priced at minimum cost, and solar appliances (fridges, water pumps). Another co-benefit is the decreased use of diesel generators, leading to lower fuel costs for the farmers and also more environmentally sustainable fuel use. Products are imported but the rest of the value chain is local.

Figure 3.5: End users

End-user segments		
For whom are we creating value? Who are our most important end users? Are there local norms, behaviours, attitudes toward innovation and risk that could affect the value proposition (e.g. norms, attitudes etc. towards different energy options/ technologies)? How do end users' preferences, practices and gender relationships affect the value proposition?	Types of markets Mass market Niche market Segmented (e.g. by gender, age, income) Diversified (multiple segments)	
 Subsistence farmers. This is a niche market, segmented by income. The low-income groups value the affordability and appearance of the appliances; they are likely to be interested in solar lamps with a phone charger. Higher-	income groups could be looking at SHSs, fridges and water pumps. Crops are currently sold directly after harvest, as people are not in the habit of storing them and there is little openness to refrigeration, nor experience of	dealing with fridges. Women are generally the ones who grow crops, but men are more likely to visit town and sell crops and other products.
Channels		
Which channels do our end-user segments want to be reached through? How are our channels integrated? How are we integrating them with end-user routines and preferences? Are there informal channels and how do they interact with the delivery chain?	Types Own channels (store front), partner channels (major distributors) Channel phases Awareness (campaigns and marketing) Evaluation (how the value proposition is communicated to the end user) Purchase (how end users purchase products and services e.g. mobile banking) Delivery (how the value proposition is delivered) After-sales (post-purchase /end-user support /insurance /warranty / maintenance)	
 Mixture of store front for direct sales, and partner agents for promotion and maintenance. Awareness-raising and promotional campaigns are carried out with the support of development partners. Communities are given demonstrations of products at markets. For evaluation, products are put on display in the shop in town and	displayed at special events in villages. The 'pitch' is that these systems are certified with a label by the international retailer. Examples of other similar products being used in neighbouring communities are used for demonstration. For purchase/delivery/after-sales, small products are bought directly from shops in the town, while SHS solutions are customised according to	needs, then delivered, installed and maintained (through agents) for the duration of the warranty contract. Required supporting service: Micro-loans and awareness-raising for end users; funds to initiate loans and service; and capacity building for agents to carry out the installation and maintenance.
End-user relationship		
What type of relationship does each of our end-user segments expect us to establish and maintain with them? Do end users expect services to be delivered by the public or private sector?	Examples Personal service (in a shop); dedicated personal service (shop with customer support); self-service; automated services (personalised self-service); community-based (platform for end user/company interaction); co-creation (participation of end user in the final outcome of the energy product/service) Organisational structures: Privately owned business, government agency, cooperative, intermediate agent (NGOs, CBOs, church)	
 Retailer with shop in the town and agents in countryside. Clients purchasing more costly products are offered customised services. From	time to time, communities in the countryside are offered demonstrations by agents as part of their promotion strategy. Micro-finance	loans are made available. Insurance cover is provided for the period of the micro-finance loan. Maintenance services are offered.

Figure 3.6: Delivery infrastructure

Key activities		
What key activities do our value propositions, distribution channels, end-user relationships & revenue streams require? Which activities contribute the most towards the value proposition?	Which activities would improve the value proposition but are not essential? Do/would any of the activities disrupt existing supply chain and power relations? Is there potential for conflict? What other social and environmental risks are created by the key activities?	Categories Production Problem-solving Platform/network Assessment Impact on livelihoods & environment Conflict and risk mitigation strategy
 Activities are partially related to problem-solving – for example, how to connect and build different distribution channels and processes to build trust with end users. Activities are also the 'nuts and bolts' of running the energy	service – for example, acquiring products from international producers and physically selling products from a store/mobile unit; assembling and customising products; and training and	managing agents for remote promotion and maintenance. Required supporting service: Technical training for agents
Key resources		
What key resources do our value propositions, distribution channels, end-user relationships, revenue streams and partnership relationships require? Are all resources within reach? Which supporting services might be required?	Types of resources Physical, intellectual (brand patents, copyrights, data), human, financial Types of enabling factors ■ Cannot be influenced Natural resources: availability of solar, wind, fossil fuels Global trends: fuel prices, carbon markets Institutional structures: transparency and level of good governance (leadership & effectiveness of different ministries, existence of independent oversight, corruption risks etc.)	■ Can be influenced: Economic policies, laws and implementation strategies: professional trading and quality standards (accountants, lawyers, electricians), and product standards (safety, quality); rights of access to natural resources; property and land tenure regulations; tax and tariff regimes and exemptions; business regulation; and government incentives. State of country's infrastructure: roads, telecommunications (phone, TV, radio), postal service; electricity grid coverage & 'last mile' challenges.
 The following resources are available. Physical resources: shop premises in town and storage for imported goods. Human: shop employees, and management and agents. Financial: funds to start revolving loans and funds to invest in imported goods. There is a reduction in import taxes for solar products. Constraints: replacement parts need to be imported from abroad. Also, there is no electric	grid connection and no plans to expand in the area. The business needs to branch out in the countryside using locally based agents due to the poor state of transport infrastructure. Required supporting services: Investor to provide funds for a revolving fund and capacity building for banks so that they will give micro-finance loans. (This means building relationships	in a hostile sector, looking for banks that are more 'open' and building individual trust relationships with 'champions'.) Micro-loans and awareness-raising activities to encourage buyers; capacity building for agents to do installation and maintenance of systems; and lobbying decision-makers to improve the state of the railway from the harbour to the town.
Key stakeholders		
Who are our key stakeholders? Which key resources are we acquiring from them? Which key activities do they perform? What do they expect from us? How is value shared through the delivery chain, including with end users? How well does the value proposition fit existing policies and government strategies?	Motivations for partnerships: Optimisation and cost reduction. Reduction of risk and uncertainty; acquisition of particular resources and activities Types of stakeholders: Partners, suppliers, enablers (who can give permission, endorsement, credibility, visibility), institutions (government and local authorities), and end users	
 International equipment suppliers provide products. Retailers of appliances and gadgets (TVs, radios, phones) sell devices that enable end users to use energy services. Local authorities give import permissions and	establish procedures. National authorities give discounts on import taxes. Local bank manages micro-loans. International donor gives initial funding for micro-loans and lobbies government for support.	Required supporting service: International equipment suppliers provide training as part of their corporate social responsibility (CSR).

Figure 3.7: Accounting

Financial cost structure		
What are the most important costs inherent in our delivery model? Which key resources are the most expensive? Which key activities are the most expensive?	Classes of business structures: Cost-driven (leanest cost structure, low-price value proposition, maximum automation and extensive outsourcing); value-driven (focused on value creation, premium value proposition and positive developmental/environmental impacts) Characteristics of cost structures: Fixed costs (salaries, rents and utilities); variable costs (depending on the amount of goods produced); economies of scale; economies of scope (incorporating other businesses)	
 Value-driven. The most important costs are running the shop, visiting end users in remote areas, acquiring products and paying agents.		
Revenue streams		
Where will the revenue streams come from? Can end users pay? Entirely or partially? How much does each revenue stream contribute to overall revenues? Are there available subsidies/incentives from donor/government programmes? Can civil society offer in-kind resources (human, physical, financial)? Can the end users offer in-kind resources (human, physical)?	Types Asset sale; usage fee; subscription fees; lending/ renting/leasing; licensing; brokerage fees; advertising; grants/subsidies; in-kind Pricing ■ Fixed: List price; dependent on product feature, end user segment, volume ■ Dynamic: Negotiation (bargaining); yield management; real-time-market	
 Revenue stream comes from end users through asset sale. In addition, there could be	subsidies, carbon credits or green investment funds and donation.	
Social and environmental costs and benefits		
What are the most important social and environmental costs inherent in our delivery model? What are the benefits?	Types of costs/benefits: ■ Social Polarisation of social or ethnic groups, impacts on gender relationships, job creation, health and well-being and empowerment ■ Environmental Polluting or restoring, natural resource exhaustion or sustainability, degradation or protection of eco-systems services and contribution to resource management (positive/negative)	
 Information/educational opportunities and increased income for farmers. Strengthened resilience through enhanced energy security, more sustainable resource management and protection of eco-systems services.	Increased adaptation due to the possibility of pumping water. Job creation throughout the value chain. Displaced kerosene lamps and diesel generators mean possibly decreased CO₂ emissions and improved health through	addressing the health impacts of kerosene combustion and from the provision of solar refrigeration, water filters etc.

4. List of tools to assist in designing the delivery model

This section lists some existing tools that can be used in the various stages of designing the energy delivery model. This includes tools for stakeholder mapping, needs assessment, the identification of gaps in energy services, risk assessment, and monitoring and evaluation.²⁰

Stakeholder mapping tools

- Planning Tools: Stakeholder Analysis, ODI (2009) <http://www.odi.org.uk/publications/5257-stakeholder-analysis>
- Areol Action research and evaluation online – *Session 4: stakeholders and participation* <http://www.aral.com.au/areol/areol-session04.html> (note: the stakeholder analysis process listed at the end of this page can be found at <http://www.aral.com.au/resources/stake.html>) *HEDON stakeholder analysis guide* <http://www.hedon.info/docs/E-MINDSET-Stakeholder-Analysis.pdf>

Needs assessment

- *A Guide to Assessing Needs: Essential Tools for Collecting Information, Making Decisions, and Achieving Development Results*, Watkins et al (2012), World Bank <https://openknowledge.worldbank.org/handle/10986/2231>
- *A community needs assessment guide: a brief guide on how to conduct a needs assessment*, Sharma A et al / University of Chicago (2000) <http://chfs.ky.gov/NR/rdonlyres/60830211-1431-4396-BB6D-991BA9D8EC23/256907/ACommunityNeedsAssessmentGuide.pdf> (Book on conducting needs assessment including organising a focus group and surveys – some focus on US communities but is more widely useful)

- *Needs assessment – an overview*, Altshuld J and Kumar D (2010), Sage http://books.google.co.uk/books?id=6ijU2jnBhEcC&printsec=frontcover&source=gbs_v2_summary_r&cad=0#v=onepage&q&f=false (Organisational perspective but useful toolkit and background theory)
- *Community needs assessment FAQs*, Rotary Club (2006) http://www.rotary.org/RIdocuments/en_pdf/mg_cna_faq.pdf (Two-page, quick, frequently asked questions on needs assessment. Field data collection)

Baseline analysis & participatory methods

- *Household solar water heating project baseline survey*, HEDON http://www.hedon.info/docs/Baseline_Example_Questionnaire_for_solar_water_heating.pdf Supplied as example survey by a HEDON member – follow-up survey also available: http://www.hedon.info/docs/Follow_up_SWH_questionnaire_solar_water_heating.pdf
- *A training manual for practitioners on participatory local development*: Chapter 10, FAO (2005) Training module on PRA tools <http://www.fao.org/docrep/006/ad346e/ad346e0f.htm>
- *Overview of Participatory Rural Appraisal (PRA)*, FAO (online) http://www.fao.org/participation/english_web_new/content_en/linked_Pages/PRA_overview.htm
- PRA, Wageningen [http://portals.wi.wur.nl/ppme/?Participatory_Rural_Appraisal_\(PRA\)](http://portals.wi.wur.nl/ppme/?Participatory_Rural_Appraisal_(PRA))
- *Participatory methods in the analysis of poverty*, IDRC http://www.idrc.ca/en/ev-85060-201-1-DO_TOPIC.html

Risk assessment tools

- *Mindtools risk/impact probability chart* http://www.mindtools.com/pages/article/newPPM_78.htm
- *JISC risk management infokit* <http://www.jiscinfonet.ac.uk/infokits/risk-management/>

²⁰ This list was compiled by IIED (Garside) as part of on-going work on the SUNGAS project exploring de-centralised energy delivery in Nigeria (see <http://www.sungas-nigeria.org>). It is intended that learning from monitoring and evaluation approaches used on the project will form part of a toolkit to be published at the end of the project.

Monitoring and evaluation

- *Results-based monitoring guidelines for technical cooperation*, GTZ (2008) http://www.csr-weltweit.de/uploads/tx_jpdownloads/wirkungsorientiertes-monitoring-leitfaden-en_01.pdf
- *GTZ results assessment – Survey on impacts of the Stove Project in Transmara, Western and Central Cluster of Kenya*, GTZ (2009) <https://www.giz.de/Themen/en/dokumente/en-kenya-results-assessment-stoves-2009.pdf> HEDON, M&E in energy, various links to surveys and studies on household energy <http://www.hedon.info/> MandESIG:Examples (Case-studies contain example surveys, indicators, and approaches)
- 'Toolkit: Six steps to results-based management', HEDON *Boiling Point 55* (2008) <http://www.hedon.info/docs/BP55-Djedje.pdf>
- *Measuring success and setbacks: How to monitor and evaluate household energy projects*, GTZ/HERA (1996) <http://www.docstoc.com/docs/7177584/Measuring-Successes-and-Setbacks---How-to-Monitor-and-Evaluate> (Useful guide on M&E in energy, taking the perspective of defining and measuring successes and setbacks)
- *Energy indicators and methodologies for sustainable development*, European Environment Agency & International Energy Agency et al (2005) http://www-pub.iaea.org/MTCD/publications/PDF/Pub1222_web.pdf (Referring more to national-level energy indicators, but has some useful indicators on energy use at household level)
- *Evaluating household energy and health interventions: a catalogue of methods*, WHO (2008) (Although focused specifically on health and indoor air pollution, this guide also has some generally useful points for choosing M&E approaches with a catalogue of examples) http://www.who.int/indoorair/publications/methods/full_catalogue_method.pdf
- *'Most Significant Change' (MSC) Technique – A guide to its use*, Davies R & Dart J (2005) <http://www.mande.co.uk/docs/MSCGuide.pdf>

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An approach to designing energy delivery models that work for people living in poverty

Access to modern, safe, affordable and sustainable energy is increasingly recognised as crucial for development. Designing the delivery of energy services that can meet the needs and wants of end-users, in particular those of men and women living in poverty, is a complex task that requires a range of skills (technical, managerial and financial) and cooperation between multiple stakeholders. Equally, successful scaling requires adapting delivery models to different local contexts rather than simple replication.

This paper outlines an approach to designing sustainable energy services for people living in poverty. It provides guidelines for participatory analysis to identify the potential actors in the energy supply chain, using innovative visualisation tools to build a 'delivery model' that has a greater chance of being socially, financially and environmentally sustainable. A crucial starting point is to understand the context for intervention: this includes the local socio-cultural context, the enabling environment and the supporting services that will influence its viability. It also involves understanding in depth what the demands are for an energy service, and the value it can deliver with respect to broader needs and wants of the end-users.

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