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Energize the BoP!

Energy Business Model Generator
for Low-Income Markets

A PRACTITIONERS' GUIDE



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Partners

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Photo: Susanna Ullrich



At least 250 businesses have already been established to provide energy services for consumers at the base of the global income pyramid (or “BoP”). In fact, many more probably exist, as these are simply the documented cases we have found in the course of our “Energize the BoP” research. But if this is true, how is it possible that 1.4 billion people still lack access to electricity? Why have so few of these businesses grown to a larger scale?

The reason, and the impetus for this guide, is that most businesses targeting the BoP do not have a sustainable business model. We see the same mistakes being made over and over again. Too many of these ventures set off to enter the market with rushed, little or even no market research and fail to consider how sales and service processes can support their technology. Too many also fail to consider the kind of human resources needed to grow their business in local contexts. Nevertheless, we absolutely believe in the power of business to energize the BoP. This guide is intended to strengthen this power by supporting entrepreneurs in taking the right steps toward doing sustainable business in the BoP. It is conceived as a business model generator for those addressing the BoP’s energy market in particular. Drawing upon the documented experiences of 250 businesses, 35 of which we have analysed in depth, the generator is divided into four chapters:

- **Business Case** presents the rationale for venturing into the low-income market.
- **Customer Interface** shows how to interact with low-income customers.
- **Development Process** provides advice on starting, implementing and growing a business.
- **Support Directory** collects useful contacts and links.

We are not alone in our passion for enabling energy businesses. As soon as we established this project, researchers and organisations began approaching us, asking to be part of it. Others joined at our request. The long list of acknowledgements impressively illustrates this enthusiasm. We thank every one of these partners for contributing their experience, financial resources and time.

The product of these combined efforts is a very practical guide. It is aimed at practitioners who target low-income consumers today, or who plan to move in this direction. The content should prove useful for companies of all sizes and backgrounds, from the start-up to the large utility, from companies offering grid connections or mini-grids to those selling off-grid appliances such as lamps or stoves.

Like any reliable guide, the generator covers the most important factors to consider. However, because the BoP energy market is an emerging market, this guide is necessarily incomplete. As companies continue to innovate and experiment, we continue to learn. We therefore encourage all readers to add to the knowledge presented here by sharing your experiences with us via email. Your narratives will not only be integrated into our training programme, but will help shape the future of energy business at the BoP.

Sincerely,

Christina Gradl and Claudia Knobloch

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Forewords



Photo: BMZ

BMZ  Federal Ministry
for Economic Cooperation
and Development

Dear Entrepreneurs,
As you can tell from its name, the Federal Ministry for Economic Cooperation and Development (BMZ) considers economic co-operation an integral component of development policy.

There can be no sustainable development without sustainable economic development. We therefore recognise the business sector as an essential partner. Companies develop products and services that enhance the quality of life for millions of people every day. However, low-income populations in developing and emerging economies often have no access to these products and services. When it comes to energy, 1.4 billion people worldwide lack access to electricity and an even larger number rely on traditional biomass to cook and heat their homes. Inclusive business models can produce innovative solutions that provide low-income households with access to energy in cost-efficient, safe and sustainable ways, while creating opportunities to scale-up value chains in our partner countries. For entrepreneurs doing business in demanding environments, the challenges are great, but not insurmountable.

This publication guides you through the business model development process and offers practical advice. Creative solutions already under way by companies successfully serving base of the pyramid customers are showcased here. We hope that these examples and the information provided here will support and inspire you to create and implement inclusive energy business models that benefit you and your customers.

Hans-Jürgen Beerfeltz

State Secretary
Federal Ministry for Economic Cooperation and Development (BMZ)



Photo:
Andreas Pohlmann/E.ON

e-on

Energy markets around the world face enormous challenges. Providing climate-friendly and affordable energy are the calls to action. The energy industry bears a particular responsibility to include within these markets the millions of people worldwide living at the base of the pyramid (BoP).

The energy sector can promote sustainable development in these markets by applying smart technologies and better business models. We can also deepen our know-how by learning from the needs and constraints of people living at the BoP. This drives innovation in developing products and services attuned to these markets.

As an international provider of energy solutions, E.ON draws upon a broad range of experience and technical expertise in the areas of energy generation and supply. This study addresses further important issues regarding markets in developing and emerging economies. At the same time, it provides E.ON with valuable insights and practical recommendations. As a practitioners' guide, this publication helps us evaluate the introduction of our competencies into new markets — responsibly and sustainably.

E.ON is committed to providing cleaner and better energy for all markets now and in future. The goal is to promote viable businesses that create a win-win situation. Sound energy solutions should expand the scope of opportunities for the people at the base of the pyramid as well as the companies involved.

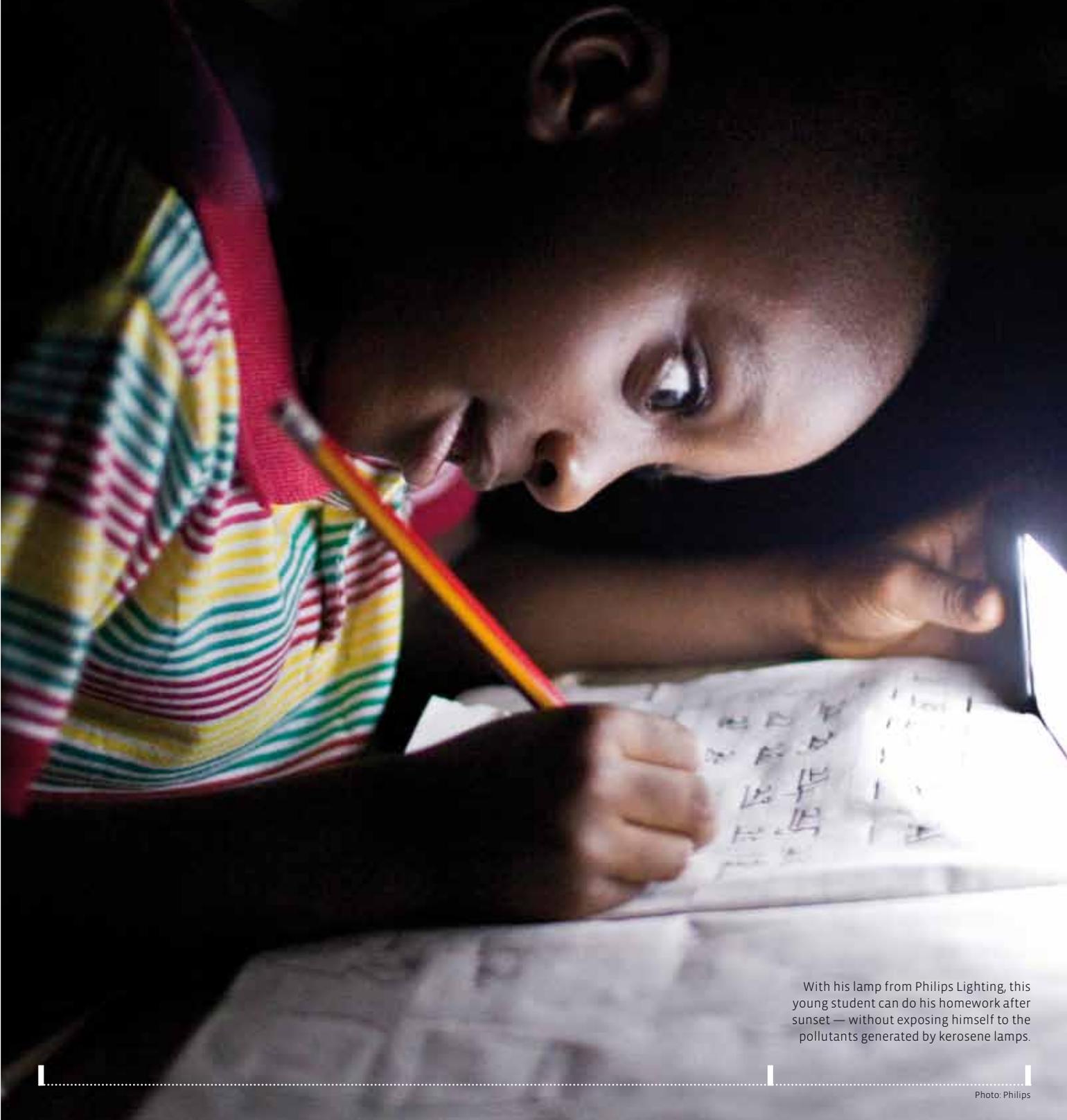
Energizing the BoP also means energizing the future. This is a future we aim to shape sustainably.

Prof. Dr. Klaus-Dieter Maubach

Member of the Board of Management E.ON AG
Research & Development, New Build & Technology,
Corporate Responsibility, Health/Safety & Environment

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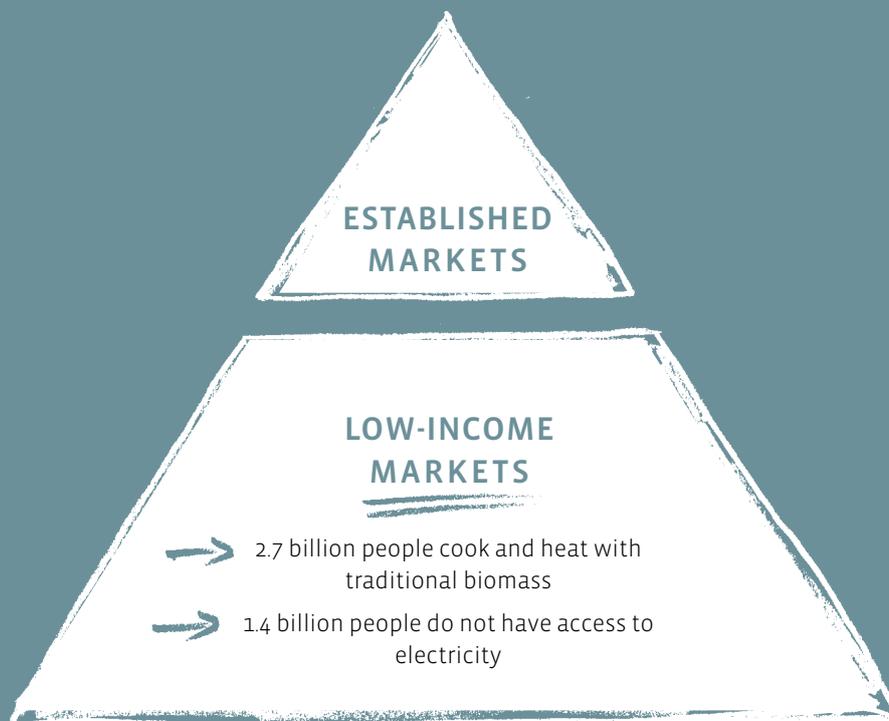
Business Case



With his lamp from Philips Lighting, this young student can do his homework after sunset — without exposing himself to the pollutants generated by kerosene lamps.

WHY VENTURE INTO THE LOW-INCOME MARKET?

- 1.4 billion people around the world lack access to electricity, while 2.7 billion people cook with traditional biomass. This “energy poverty” hinders economic and social development.
- The 4 billion people living on less than \$3,000 per year spend \$433 billion per year on energy.
- Technical solutions providing clean, affordable and reliable energy services to this target group already exist. Leapfrogging is possible.
- Developing sustainable business models is the key to entering low-income markets.



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User needs: 1.4 billion without access to electricity

Access to clean, affordable and reliable energy is a fundamental driver of economic growth, environmental sustainability and social development. Just as farmers need pumps to irrigate their fields, and workshops need energy to power machines, service providers require computers and telecommunication devices in order to provide modern services. Hospitals, too, need energy to keep vaccines cool and run modern operating rooms. Energy also fuels the future by allowing students to study into the night with proper lighting. TVs and radios inform and entertain, while modern domestic devices such as refrigerators and stoves reduce women’s burdens and help raise standards of living.

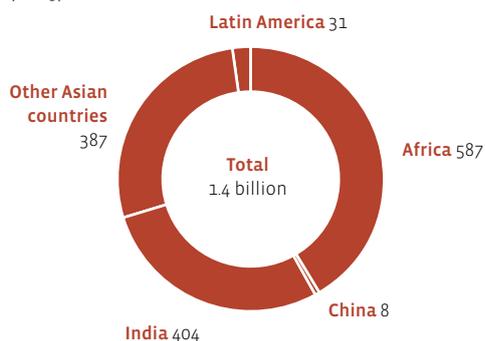
Nevertheless, billions of people lack access to clean, affordable and reliable energy: 1.4 billion have no access to electricity and must rely on candles or kerosene for light and diesel for productive uses. The lowest electrification rate is found in sub-Saharan Africa, where only 31% of the population has access to electricity. Around 76 million people in Nigeria and 68 million in Ethiopia lack connection to energy supplies. Around the world, 2.7 billion people cook on traditional three-stone fires using wood or dung. Most live in rural regions of emerging and developing countries.²

The traditional use of biomass and petroleum-based fuels carries a number of serious disadvantages:

- Fumes from indoor fires cause health problems. The World Health Organisation estimates that every year nearly 2 million people die from diseases related to indoor smoke — mainly children and women who prepare meals.³
- In addition to health problems, collecting wood consumes time that could be used productively or for educational purposes. Girls and women all over the developing world spend hours each day collecting firewood.
- Unsustainable harvesting of wood and other biomass accelerates deforestation, causing a loss of biodiversity and absorptive capacity for CO₂. Black carbon from incomplete combustion of fossil fuels or biomass also contributes to climate change.⁴
- Energy from kerosene or candles is much more expensive than electricity from the grid; the disadvantaged pay expensive rates for low-quality services. The high cost hinders economic productivity.

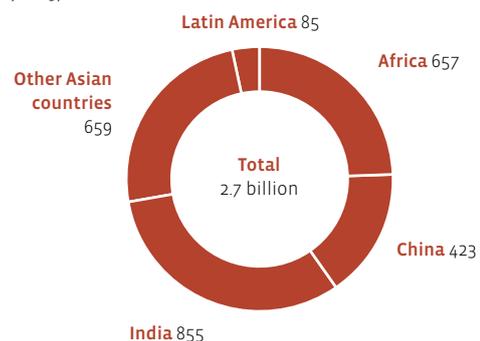
In many countries, the public sector is unable to provide energy services to low-income households. The extension of power grids to remote areas can be financially untenable due to low population density and low consumption levels. Private companies therefore play an important role — often in collaboration with other stakeholders such as NGOs and governments — in serving the needs of the “unconnected”.

FIGURE 1
People without access to electricity
(in millions, 2009)



Source: IEA/OECD (2010) Energy Poverty

FIGURE 2
People relying on the traditional use of biomass for cooking
(in millions, 2009)



Source: IEA/OECD (2010) Energy Poverty

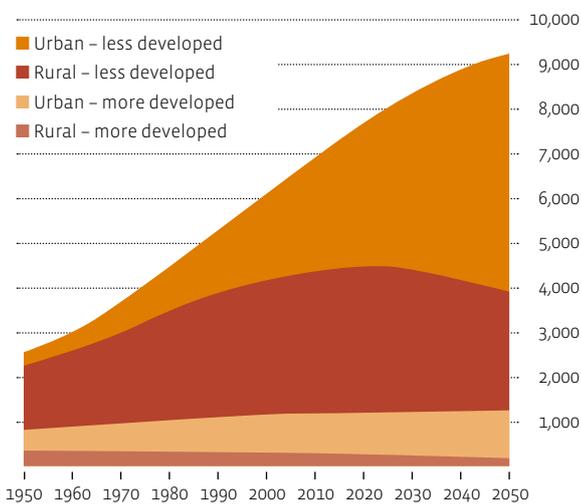
Market development: rising populations, growing political support

The global energy market at the base of the economic pyramid is already vast, and will grow further in the decades to come.

The global population is increasing at a high rate. From today's almost 7 billion people (2011), it will rise to more than 9 billion in 2050, the UN estimates. Virtually all of this growth will take place in emerging and developing countries, outside the OECD.⁵ The global urban population will double as cities experience a disproportionate share of this population increase.⁶

According to the New Policies Scenario of the International Energy Agency, 1.2 billion people in 2030 will still lack access to electricity.⁷ The global electrification rate will rise from 79% in 2009 to 85% by 2030 — but with profound regional differences. Whereas China will reach universal electrification, only 50% of people living in sub-Saharan Africa will have access to electricity. In absolute numbers, around 650 million Africans will be without access to electricity.⁸ Innovative approaches will be required to close this gap. Taken together, these figures show there is a huge and growing potential market for companies that supply clean, affordable and reliable energy services to low-income households.

FIGURE 3
Population growth, 1950—2050
(in millions)

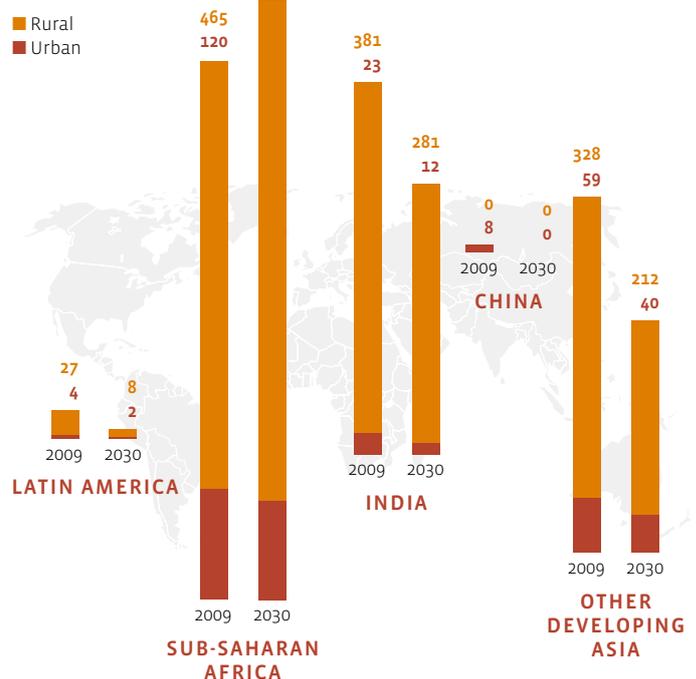


Source: UN Population Division (2008) World Population Prospects: The 2008 Revision

Governments in developing countries are waking to the potential of private energy services for this target group. The Indian government, for example, established a national goal for universal access to energy with its Rural Electrification Policy in 2006. In order to achieve this aim, it created a number of new financing arrangements, including subsidies for the installation of renewable energy plants.

Small and large companies are responding to the demand. However, most of the business-driven energy projects at the base of the global income pyramid have yet to gain significant scale. The landscape of players is diverse, ranging from multinational companies and large utilities to small and medium-sized renewable energy companies, to social entrepreneurs from developing countries, to spin-offs from design centres at universities.

FIGURE 4
World population without access to energy,
2009 and 2030
(in millions)



Source: IEA/OECD (2010) Energy Poverty

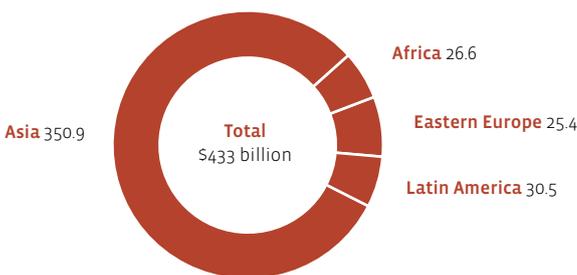
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Market size: almost half a trillion dollars

Most people without access to electricity live in poor parts of emerging and developing countries, in slums and rural areas. The 4 billion people that live on less than \$8 per day (adjusted for local purchasing power parity) spend an estimated \$433 billion on energy per year, according to IFC and WRI estimates. These “Next 4 Billion” make up the base of the global income pyramid, or the “BoP”. The largest regional market is Asia (including the Middle East), with annual spending estimated at \$351 billion among a total of 2.9 billion people.

Next to food and housing, energy is the biggest expense for low-income households. An average 9% of the overall BoP household expenditure is spent on energy. Households with an annual income of up to \$500 spend an average of \$148 per year on energy, equivalent to around \$0.40 a day. Those earning between \$1,000 and \$1,500 per year spend nearly \$1 a day. These per-customer amounts are comparatively small, but in sum they represent a market of significant size.⁹

FIGURE 5
Energy expenditures of those with annual incomes below \$3,000
 (in billion \$ PPP, 2006)



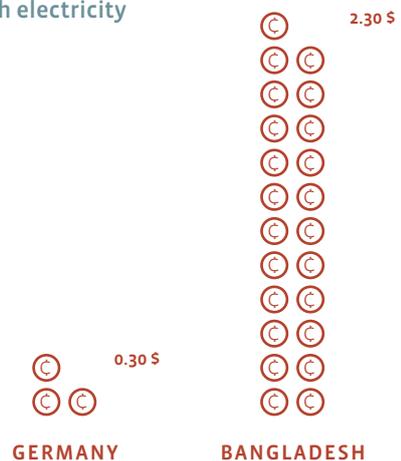
Source: WRI/IFC (2007) The Next 4 Billion.

In some countries, the BoP comprises the largest share of the energy market. It accounts for 90% of spending on non-commercial energy in countries such as Indonesia and Nigeria, and more than 50% in countries such as Brazil, India and Uganda.¹⁰

A common phenomenon in low-income markets is the “poverty penalty”. This refers to the fact that poor people have to spend more than wealthier ones on the same product or service. A study performed by MicroEnergy International showed that 1 kWh costs \$2.30 in rural Bangladesh, compared to about \$0.30 in Western Europe.¹¹ The cost of lighting can also be much higher, as shown in a report from Guatemala for 2000. In that year, 1 kWh of light cost \$0.08 from the grid, \$5.87 from kerosene and \$13.00 from candles.¹² People in these contexts are therefore well prepared to pay affordable sums for clean, reliable energy services.

Most energy-related expenditure is focused on cooking, heating and lighting. While energy for cooking and heating is often provided through the traditional use of biomass, such as wood or charcoal, low-income households generally use paraffin candles and kerosene lamps for light. Spending is very flexible for all of these fuels, as products and services may be purchased in micro-amounts. As BoP incomes are not only low, but typically also irregular, low-income consumers tend to value this flexibility. This “competitive advantage” is worth considering when developing pricing models for inclusive energy businesses.

FIGURE 6
Cost of 1 kWh electricity
 (in \$)



Source: MicroEnergy International

Connection types and technologies: on the grid, off the grid and mini-grids

Companies use a variety of technologies to provide low-income households with clean and affordable energy. With regard to the business model, the connection type is more important than the way the energy is produced, as it defines how the company will interact with the customer.

– **Grid connection:** For households, public community facilities or local small business that are reasonably close to existing transmission and distribution lines, getting connected to the grid may be the best and most economical option. Users typically pay a one-off fee for the initial grid connection, and thereafter a monthly service fee based on the electricity they use. Providers of such services have generally been existing utilities in developing countries. In South Africa for example, ESKOM has connected 3.8 million households to the grid since 1991.¹³ These electricity providers often find innovative ways to collect payment, introducing items such as pre-paid cards or collective meters for an entire neighbourhood. Many utilise social networks to increase the financial sustainability of their efforts, for example by partnering with existing co-operatives or community organisations to organise connections on a local level.

– **Mini-grids:** Remote villages can be electrified by setting up small power plants that provide enough energy for the village's household and productive needs. Mini-grids are usually run either by a local entrepreneur or a village co-operative, but larger companies can also find a business case here. French energy provider EDF developed two mini-grids in Mali in partnership with a leading Dutch energy company, NUON. The technologies used to generate the power range from biomass/biogas to hydro to solar energy, or in some cases, a combination of different sources or the application of hybrid systems (a combination of technologies). Renewable energy sources are often backed up by a diesel generator in order to ensure a 24/7 energy supply.

– **Off-grid systems and appliances:** In some cases, mini-grids cannot be operated profitably in rural areas due to the small number of potential customers, geographical constraints or the income structure of the community. Off-grid systems can play a key role in these contexts. Such systems (or “appliances”) provide a single household with energy. For example, solar home systems installed on hut rooftops can provide enough energy for lamps and for charging mobile phones. In other cases, solar-powered lamps can provide lighting, and improved cookstoves powered by gas or oil can make smoke-free meals possible. These products are frequently produced locally and sold by the producers themselves, or through sales agents or local retailers that often also provide post-purchase service and ensure the collection of payments. The market for off-grid systems and appliances is quite diverse, attracting attention from established multinational corporations (MNCs) such as Philips and Shell and informal entrepreneurs alike.

Although the connection types presented here require very different business models and customer approaches, inclusive energy enterprises encounter many similar issues and solutions along the way. The insights collected in the chapters “Customer Interface” and “Development Process” can therefore inform the activities of a broad range of inclusive energy providers.

The state's role: providing access, security and incentives

Energy is heavily regulated and subsidised around the world. Governments have a vital interest in securing universal energy provision, because it is a prerequisite for economic growth, social development and equality. For this reason, energy generation and distribution was for many years monopolised by public companies. Indeed, many of today's energy utilities are still public companies or have only been recently privatised. Governments and national regulations continue to play a crucial role in the setting up of an energy business.

Particularly in developing countries, where access to energy is not universal, governments often set up policies that provide incentives for the private sector to invest in electrification of rural areas and slums. For example, India's Rural Electrification Policy of 2006 established a national goal for universal access, assigned responsibilities for implementation and created new financing arrangements that benefited the private sector.

Another driver of regulation is the need to comply with international limits on CO₂ emissions. This is an important motivation in emerging economies such as China or India, whose economic growth has led to a fast-increasing demand for energy. In these cases, factories and the middle class are the largest contributors to emissions and can therefore have the largest impact in minimising emissions. However, people that are not yet connected to the grid can "leapfrog" to the use of environmentally friendly energy sources. This idea is supported by many of the international public organisations and donors that support governments in developing countries in creating an environment supportive of renewable energy use.

There are several useful tools in existence that help companies find their way through the multitude of policies. For example, the global policy network REN21 offers an overview of energy policies, with a focus on renewable energy all around the globe.¹⁴

Government action supports private investment in energy provision in three different ways: by providing market access, increasing investment security and offering direct incentives for investment. Private companies will only develop business on a large scale if these factors collectively contribute to creating a welcoming, business-friendly environment. Each is examined in more detail below.

– **Market access:** Unhindered access to energy markets is a prerequisite for all companies in the energy sector, not only to those serving low-income markets. This is true both for domestic and foreign companies. Governments need to open up energy markets to private investors in order to allow competition and attract foreign direct investment. Public private partnerships (PPPs), where the state contracts the provision of services out to private companies, have been frequently used as a mode of market access.

– **Security:** Private companies need to be able to calculate and manage risks. Investors seek political stability and reliable, long-term regulation on issues such as feed-in tariffs. The security of their investments with respect to events such as the nationalisation of companies is also a crucial concern.

– **Incentives:** Subsidies in the form of grants, interest-free loans or tax holidays for rural electrification and clean energy provision support business models that might not otherwise be profitable from the start, especially where they require large levels of investment. The promotion of climate-friendly energy solutions is supported through national, regional and global carbon markets such as the Clean Development Mechanism (CDM) under the UN Kyoto Protocol.

In addition to introducing policies addressing energy provision directly, governments can improve the general business environment for companies by enhancing infrastructure, cultivating knowledge and skills among the population, and facilitating access to formal markets for low-income people.

SEE CDM SPOTLIGHT
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Partners: combining capabilities, magnifying success

To reach low-income communities, businesses typically work with partners. Often enough, even domestic companies from developing countries do not have extensive experience doing business with people in poverty in an environment that lacks basic infrastructure, financial services and consumer literacy. NGOs, microfinance institutions (MFIs) or co-operatives are usually the partners of choice because they frequently maintain operations on the ground and have strong local networks that reach out to people in poverty.

– **Non-governmental organisation (NGOs):** NGOs are mission-driven organisations aiming to achieve social or ecological objectives. Many humanitarian and environmental NGOs in developing countries are involved in the energy business because it is so interlinked with topics such as health, education and climate change.

By partnering with companies, NGOs may pursue long-term viability and gain a much larger scale than would be possible without the economic power of the companies. They can provide their target groups with sustainable energy solutions that solve additional problems such as the prevalence of smoke-related diseases, or which grant people access to modern means of communication.

Companies benefit from such collaboration because NGOs can help carry out market research, to raise awareness of the benefits of modern energy solutions, assist with the distribution of products, and train sales personnel.³⁵

– **Microfinance institutions (MFIs):** MFIs offer loans ranging from \$10 to \$1,000, without asking for collateral in the manner of a conventional bank. One of the classic models is the group loan, where a group of borrowers bears collective responsibility for the credit. Individual lending models also exist. Borrowers include women who ideally invest the money in starting a small business or in improving the productivity of their farm. MFIs play an important role in financing all kinds of investments in slums and rural areas.

Some MFIs have discovered energy solutions as a new stream of revenues, and as a way to support their own customers' generation of income. MFIs can introduce stoves, lanterns or solar home systems as complementary products into their portfolio, thus diversifying their business revenues.

Energy businesses often choose to partner with MFIs in order to provide their customers with easy access to credit to finance high up-front investments such as an off-grid solar panel or a grid connection. Sometimes, MFIs take on other roles such as selling energy systems or providing after-sales service directly.

– **Co-operatives:** Co-operatives are organisations in which members have come together for a common purpose such as the purchase or sale of goods and services. Farmers' co-operatives are a widely used model in developing countries that facilitate access to markets. Co-operatives usually ensure high and reliable product quality by providing training and certification to their members. These bodies are therefore often interested in providing their members with ways to improve productivity.

Co-operatives play an interesting role in the energy sector in two ways. On the one hand, they can be used as a partner for the distribution and sale of solar home systems or appliances such as lanterns. On the other hand, co-operatives can also be formed to operate a mini-grid, or even to organise distribution and payments for grid connections.

Business model: a clear value proposition for all stakeholders

A business model describes how a business creates value. It depicts how the firm interacts with the actors in its “ecosystem”, including its customers, suppliers and business partners. More precisely, it defines the value proposition of the business to each of these actors and how transactions with them are organised in order to align incentives.

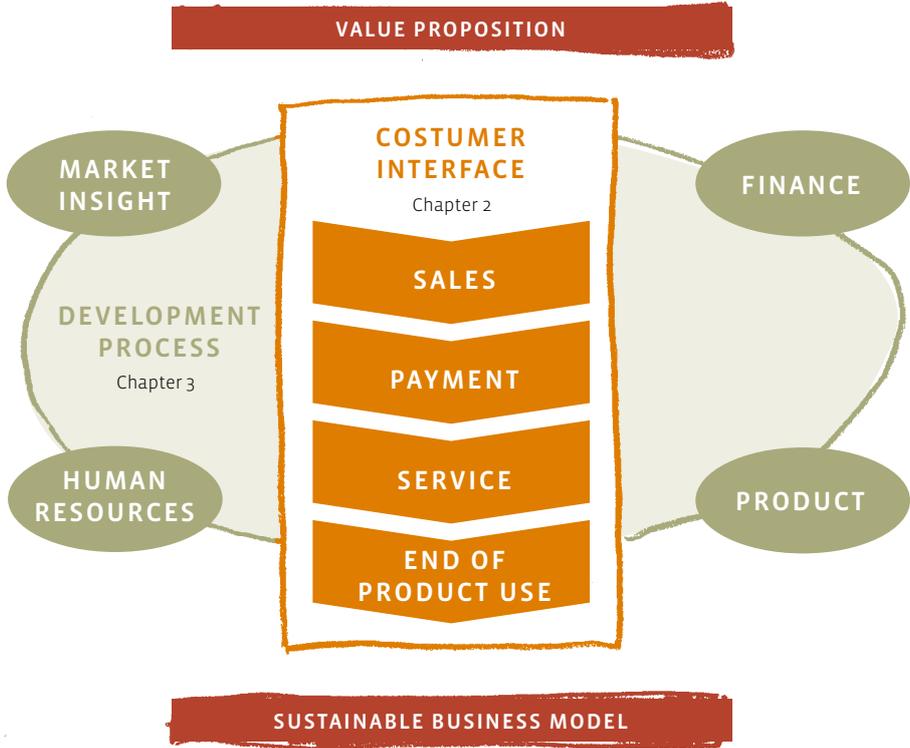
The heart of any successful business is a value proposition that truly meets the needs and wants of its customers. Entrepreneurs often build their business idea on a specific technology without critically assessing if and how this technology can create value for customers, what their alternatives are, and by which criteria they assess their alternatives. For example, many businesses have encountered reluctance among customers to purchase clean cookstoves because of cultural preferences and traditions. Solar cookers also have no value for users who want to cook in the evening when it is dark. A deep understanding of the preferences of one’s customers must therefore be the starting point for any business development.

Transactions with customers represent the most unusual challenge associated with building a new business model in low-income markets. Customers are typically embedded in market environments that are not only new for many businesses, but also difficult by many standards. The slums and villages in developing countries often lack the conditions that make business in more developed markets smooth, efficient and economically viable. In developing countries, market information is scarce, physical infrastructure such as roads are often poor, and legal frameworks and enforcement mechanisms are underdeveloped and unreliable. Furthermore, low-income customers in these areas lack information, and service providers able to organise anything from financial transactions to logistics and retail may simply not exist. In short, the cost of doing business in low-income markets is typically high. At the same time, low-income households have a very limited budget for spending on energy, and find it difficult to make high up-front investments due to the high cost of and limited access to credit.

A successful business model at the BoP must find innovative ways to interact with its customers without spending more than what the deal is worth. Therefore, the design and organisation of the customer interface is the focus of the second chapter. Four types of interactions are critical: sales, payments, service, and end of product use. The energy businesses analysed in this research have developed a number of promising solutions to typical issues and can serve as an inspiration for other business models.

A business evolves over time. Even though the basic value proposition may remain the same, processes need to be adapted as the business grows in order to enable greater efficiency. It is not always easy to have all the necessary resources for growth in place at any one time, namely financing, human resources, market insight and product. The third chapter therefore summarises promising approaches for developing these resources from the design phase to the implementation and growth phase. The fourth chapter serves as a reference guide to the broad range of organisations and practitioners with expertise in areas ranging from finance to capacity building to designing business strategies tailored to low-income markets.

FIGURE 7:
Schematic overview of the business model generator



Customer Interface



d.light sales representatives demonstrating the solar lamp “Nova D.Light” at a stall in Chamieyani, India. They explain the advantages of the lamp to convince potential customers of the product’s benefits.

HOW DO WE DO BUSINESS WITH LOW-INCOME CUSTOMERS?

- Interactions with customers are focused on four main areas: sales, payments, services and dealing with products at the end of their use.
- Companies often struggle with challenges in the market environment, in particular with regard to information about the market, regulatory burdens or complications, shortcomings in physical infrastructure, gaps in customers' knowledge and skills, and the limited access to financial services.
- The generic strategies to address these problems include engaging in market research, providing customer service, ensuring local representation, educating stakeholders and finding innovative financing solutions.

How it works

What most differentiates business in low-income markets from business in more upscale markets is the interaction with the customer. Limited infrastructure, informal markets, a lack of financial services and other constraints increase transaction costs and limit the applicability of standard business models. The generator therefore concentrates on businesses' interfaces with their customers. How can you convince the customer of your product's value if they have never heard of renewable energy? How can you ensure payments when your customers lack access to a bank account and have limited cash flow? How can you provide reliable service when there is no customer support in place? And what happens with your product at the end of its lifetime? Is it reused, recycled or just thrown away?

This chapter identifies the main constraints businesses face in each of the four key customer interface areas sales, payment, service and end of product use. It also lists strategies and concrete solutions that have proved successful. Practitioners can apply

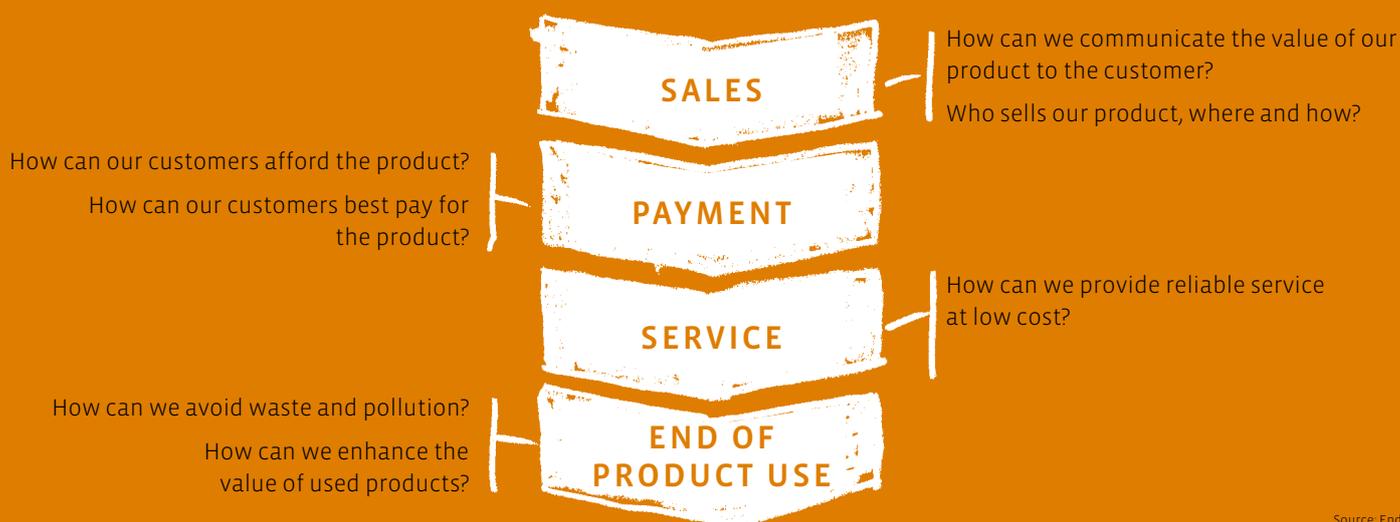
these ideas to their own ventures and use them to create a new business model or improve on an existing model. The next two pages summarise the general pattern of challenges and solutions, which is later applied to each element in more detail.

For each element of their business model, readers of the generator should ask themselves:

- What constraints do we face with our business?
- Which of the solutions can we apply to our business, and which solutions address the constraints most effectively?

Step by step, users can design a customer interface able to deal with typical issues in low-income markets. The four steps revolve around the following main questions:

FIGURE 8
Elements of the customer interface



Businesses face fundamental challenges in low-income markets and adopt broad strategies in tackling these problems. These general challenges and solutions are revisited throughout the sections on each of the four interface elements — sales, payments, service and the end of product use. Understanding this pattern can help practitioners develop their own innovative solutions.¹⁶

... CHALLENGES ...

Market information

- Customer profile information is limited (from the perspective of preferences, circumstances and spending patterns, for example).
- Energy markets are highly regulated. Market environments and regulatory processes often lack transparency, especially for foreign entrants.

Regulatory environment

- People lack legal land titles, leading to contract and credit issues.
- Due to previous bad experiences and a lack of formal protection, customers often lack trust in newcomers.
- Contracts with customers for continuous service are difficult to enforce through formal processes.
- A lack of security increases the risk of theft and damage to equipment.
- Gaining official approval for installations (setting up small grid systems, for example) can take considerable amounts of time.

Physical infrastructure

- People in remote areas are hard to reach, which increases the cost of installing and maintaining equipment (due to the lack of roads or phone connections, for example).
- Harsh natural environments can cause damage to equipment.

Skills and knowledge

- Companies find it difficult to recruit and retain skilled staff.
- Consumers lack awareness of products and services and their benefits.
- Customers lack the skills to install, maintain or repair equipment.

Access to financial services

- Customers find it difficult to obtain credit to finance high up-front costs.
- Customers do not have access to bank accounts through which to make payments.

... AND SOLUTIONS

Conduct market research

- Conduct market research with standard and specialised methods at different times of the day and year (using tools such as home stays, field trips, etc.).
- Test the product with customers.
- Build processes enabling continuous feedback from customers and staff.

Provide customer service

- Regularly visit customers for maintenance.
- Provide warranties (and be sure that you are able to fulfil the terms).
- Organise payment collection so that it is convenient for customers.

Ensure local representation

- Ensure local representation through existing local stores, the company's own subsidiaries or franchisees.
- Provide a local supply of spare parts and fuels.
- Divide service responsibilities between representatives and the company's own staff.

Educate stakeholders

- Educate and train customers, the company's own staff and local representatives.
- Raise public awareness.
- Involve and collaborate with local authorities.

Find innovative financing solutions

- Adjust payment solutions to fit customers' financial situations.
- Provide customers with access to microcredit.
- Facilitate income generation.
- Apply for government subsidies.

In order to sell energy products to low-income households, sales staff must be adept at understanding customer needs and constraints, and able to explain the use and benefits of the product. Businesses must have the capacity to reach out and contract with customers, which involves building customer knowledge and sales channels. Therefore, they often work with local communities and their authorities as well as organisations that have trusted relationships with the target group.

CHALLENGES ...

Limited understanding of customer preferences

In the early phases of low-income market entry, businesses often lack knowledge about the target group. Information about issues such as customer preferences, user profiles and payment barriers are not readily available through conventional resources. Research institutions and consultancies able to deliver this kind of information for low-income markets are rare. Products are likely to fail if they are not wanted, needed or considered appropriate.

Lack of legal title

People with low incomes in developing countries often do not have the legal title to their homes. For providers, the absence of a formal certification of ownership makes it difficult to sign contracts, especially for grid connections. At the same time, low-income people are hesitant to invest considerably in their homes or plot of land if the duration of their tenancy is unclear. As a result, entire regions may be excluded from the grid, which is often the case for slum areas in cities.

Inefficient delivery channels

Retail and logistics services are limited in low-income markets, particularly rural areas. Some villages may not have a central shop, requiring residents to travel to the next village for supplies or service. For businesses, poor road conditions can incur costs by making remote villages difficult to reach. Building distribution networks is also expensive, but may also provide opportunities for collaboration.

Limited skills among local staff

Local staff must have good communication and negotiation skills in order to sell the product effectively. However, the available personnel often lack the requisite education and training to sell energy solutions. Literacy skills may be limited and computer or bookkeeping skills entirely absent.

Limited knowledge of products and use

Target customers, whose experience is often limited to traditional forms of energy supply, are rarely aware of the functionality and comparative benefits of a solar lamp, improved cookstove or off-grid system. They may also not understand the advantages of a legal grid connection, especially if they have been tapping the grid illegally. In some cases, negative experiences with similar products in the past might have generated distrust.

Conduct market research

- **Use standard and specialised* methods.** Market research must be designed with the target group in mind.
- **Test product with customers.** Prototype testing can be conducted during markets, fairs, community meetings or directly at a customer's home. A test sale or auction of the product can yield information about the price customers are willing to pay.
- **Find specialised support.** Both local and foreign chambers of commerce can help with initial market research and establishing contacts. Export agencies can organise business trips and provide advice. Development agencies such as GIZ provide funding for feasibility studies and can facilitate exchange with local experts.

Collaborate with local authorities

- **Engage community leaders.** When developing community-level infrastructure such as mini-grids, working with community leaders is a must. They can have considerable impact on the decisions taken by community members.
- **Establish alternative contracting processes.** This might include, for example, relying on social pressure mechanisms by transferring responsibility for payment to the community as a whole. Such arrangements must have the consent of the appropriate legal authorities.

Create local representation

- **Build own** representation.** Businesses can open their own stores or recruit local representatives. Having direct control permits effective monitoring of staff performance and service quality. This helps build trust within the community and establish a strong brand.
- **Establish micro-franchises.** By offering a standardised business model, businesses can establish a network of local entrepreneurs.
- **Use existing networks.** Businesses can partner with existing local retail stores, trusted local NGOs, MFIs or co-operatives to sell their products.

Train staff and local representatives

- **Develop training programmes.** Businesses develop their own standardised training processes and material focused on recurring tasks and frequent challenges. These should be tailored to local contexts.
- **Organise on-the-job training.** Businesses also provide practical training for new representatives in cohorts of "trainees" or by having them accompany mentors.
- **Train via partners.** Training sessions can also be conducted by local implementation partners such as NGOs or local companies.

Educate target group

- **Use local communication channels.** Posters, radio and entertainment events can provide effective means of communication in low-income environments.
- **Educate customers.** Local representatives are well-placed to explain contracts, the product, its use and maintenance to customers. Simple informational material in the local language, with illustrations, can guide customers.
- **Organise and train communities.** When services are provided to a whole community, as in the case of mini-grids and grid connections, businesses often organise the community into user groups and implement group processes.

* SEE
'MARKET INSIGHT'
7.34

**
SEE
'HUMAN
RESOURCES'
PAGE 36



CASE STUDY

SKG Sangha, India

Using biogas to offer rural Indian households clean energy alternatives

SKG Sangha provides improved cooking technology — mainly improved wood stoves and family-sized biogas plants — to rural households in India.

Sangha stresses heavy community involvement in all stages of their implementation and sales process. Awareness of the biogas programme is raised through courses, field visits and radio broadcasts. Benefits of this technology are publicised through co-ordination with partner NGOs, who also help identify potential users. SKG Sangha members inform villagers of meetings, which are held in the local language.

SKG Sangha has grown rapidly, providing 92,000 domestic biogas plants in India and pilot schemes in Kenya, Ghana, Mali and Uganda. Its customer base currently stands at 1 million with a projected 5-year growth of 40,000 new families being added each year.

SOURCES

www.ashdenawards.org
www.skg Sangha.org

Low-income people typically conduct many of their transactions in the informal “cash” economy. Their incomes are not only low, but also irregular and uncertain. They often lack access to bank accounts or credit. This creates challenges in collecting payments, especially in the case of regular fees and big up-front investments. Businesses can ease customers’ payment difficulties by collecting fees locally, allowing flexibility and connecting or furnishing customers with microcredit. Helping members of the target group generate income also helps them meet payment obligations. Businesses can also generate revenues from other sources.

CHALLENGES ...

Affordability

Access to energy can increase people’s productivity. But realizing this potential requires that other conditions also be met, such as the availability of machinery or access to markets for one’s products. Where these conditions are not in place, the return on investment associated with better energy access may simply be too small, making the product unaffordable or simply unattractive to the customer. If the promise of increased income fails to materialise, people may be unwilling and unable to pay.

Calculations for what people should be able to afford are often based on their current energy costs and what they would be able to save by switching to the new energy source. In reality, the new energy source’s convenience often leads people to consume more energy, and many continue to buy fuel in addition.

Liquidity

Up-front expenses for equipment investments, as for a solar home system, can be high. Even if the return on investment justifies the investment’s cost (plus some interest), low-income customers often lack sufficient savings or access to credit at a reasonable cost.

Enforcement of payment

The slums and villages where most low-income people live typically lack access to the state’s formal enforcement mechanisms. Enforcing a contract by resorting to legal mechanisms such as courts might take years, could increase the risk of bribery and would in any case be unaffordable. In addition, bank accounts that facilitate payments via automatic deductions are rarely available in these contexts. Instead, people rely on informal mechanisms built on personal relationships and social networks to organise contract enforcement and payments. These may not be easily accessible to foreign entrants.

Lack of understanding

Customers often find it difficult to understand cost structures, especially with regard to payment plans. Where customers have previously tapped the grid illegally, without paying, they often fail to see why they should pay for a legal connection.

Collect payments locally

- **Task local representatives with collecting payments.** Regular visits by representatives to the customer's house make payment more convenient, and enables equipment to be maintained.
- **Build on existing social structures.** Microcredit groups, farmer co-operatives, regular markets, or other social structures and processes where financial transactions are organised provide convenient payment occasions for both the customer and the company.
- **Make the community responsible for the collection of payments.** Grid or mini-grid connections are often installed with a collective meter. A local representative is responsible for collecting the payments and for disconnecting people who do not pay.

Customise payment methods

- **Enable flexible payment schedules.** Adjusting the payment schedule to customers' cash flows can make it considerably easier to pay. For example, farmers might prefer to pay the majority of what they owe after the harvest. Providing flexibility in payment schedules and allowing for delays can also help.
- **Offer pre-paid cards for grid connections.** Pre-paid cards enable flexibility for the customer, while eliminating financial risk for the business. Small amounts make purchasing credit affordable even for poorer customers. In addition, pre-paid cards can be easily combined with subsidies. For example, customers within certain income segments can receive a basic amount of electricity per month through a state subsidy and purchase the rest as required.

Connect customers to microcredit

- **Forge links to local MFIs.** Most energy companies work with existing microfinance providers in what has been called the "two-handed" model: The energy company handles the technical aspects and the MFI the financial aspects of the contract.
- **Provide microfinance services.** In the "one-handed" approach, the energy provider also acts as a microcredit lender. Alternatively, existing MFIs can add energy services to their own portfolio.

Establish additional revenue streams

- **Seek subsidies.*** Subsidies are a regular feature in energy markets. For energy provision, two main types are used. Subsidies for installation pay for each device installed or each household connected to the grid, thus reducing the high up-front costs of gaining access to energy. Subsidies for use are mostly seen in the case of grid connections, defraying the cost of each unit of energy distributed.
- **Register for carbon credits.** The carbon market offers opportunities for renewable energy and energy efficiency projects to benefit from the sale of carbon credits.** The registration process can be lengthy and costly, however, so costs and benefits should be weighed critically before entering the process.

Introduce income-generating solutions

- **Provide productive inputs** such as machinery for local crafts, seeds and livestock, or irrigation systems as part of the business' product offering.
- **Create new market opportunities** by initiating new local activities such as sewing or food processing, or enabling access to markets for agricultural products or fabricated goods.

... AND SOLUTIONS



CASE STUDY

La Electricidad de Caracas (EDC), Venezuela

Transforming electricity pirates into legitimate customers

EDC provides formal, safe electricity services to low-income sectors in Venezuela, where slum residents previously tapped lines to access electricity illegally.

EDC uses two kinds of payment enforcement systems. Customers who can afford an individual connection use prepaid power cards that are similar to those used for mobile phone services. Lower-income customers may make use of collective meters. Groups of people are made responsible for these, allowing residents to co-ordinate payment and disconnect those who do not pay. Payment delays for the poorest customers with irregular incomes are permitted before service is disconnected.

The project was implemented in 2000. From 2004 to 2006, formal electric service user coverage increased from 110,000 to 460,000. Electrical losses due to theft also decreased from 18% to 15% of total use in this time frame. EDC has since installed hundreds of meters that benefit thousands of customers.

SOURCES

WBCSD (2008)

Connecting Low-Income Consumers: AES in Venezuela
www.laedc.com.ve

* SEE "ROLE OF THE STATE" P. 14
 ** SEE SPOTLIGHT "CARBON MARKET" ON P. 40

Both the installation of equipment and the ongoing provision of energy need to be reliable. When equipment breaks or the connection fails, immediate support is required. However, providing fast and high-quality service can be costly, especially in rural areas. Where service fails them or is too expensive, customers often try to fix problems on their own, sometimes doing more harm than good. To ensure reliable service, businesses provide regular maintenance visits. To make these visits effective, they train local representatives, supply spare parts locally, deskill product installation and maintenance, and educate customers.

CHALLENGES ...

High cost of service provision

Particularly in rural areas, poor roads and transportation systems make customer visits expensive. A trip with an off-road vehicle to fix a broken appliance may take a whole day and be costly in terms of staff time and fuel. In addition, maintaining skilled staff can be expensive.

Availability of spare parts

Keeping spare parts at customer premises or at a nearby site can be expensive. Having large amounts of material stored without use creates “dead capital”. Delivering these parts can also be costly, especially in rural areas, due to poor logistics infrastructure.

Environmental damage

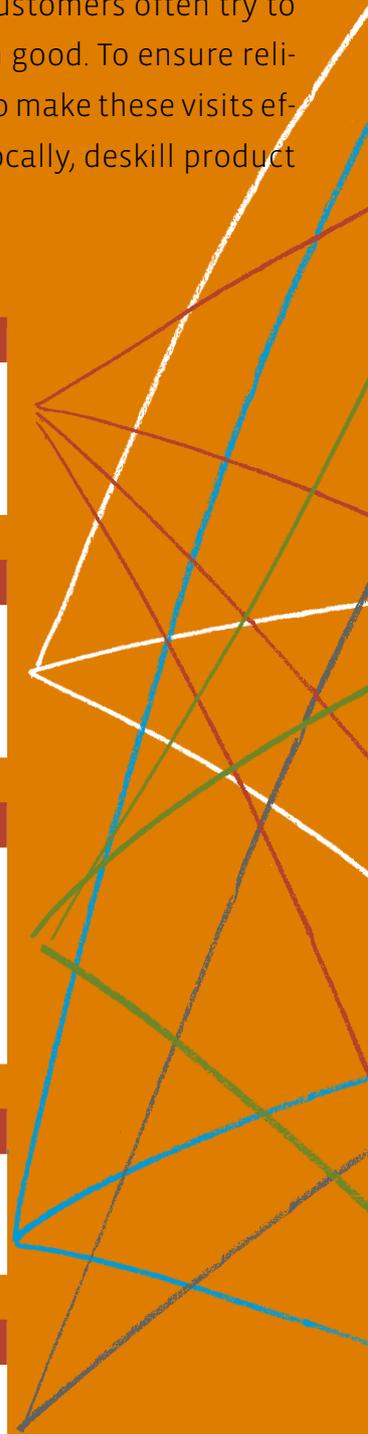
Products are often exposed to harsh environmental conditions, including extreme weather conditions and the incursion of animals. This increases the frequency of damage. Solar panels can break in a storm, biodigesters may suffer from extreme temperature fluctuations and wires are often eaten away by rodents. Products are subject to damage indoors as well, as slum and village housing is often inadequate, without proper insulation or protection from vermin.

Lack of customer skills

Customers sometimes try to avoid the costs of installation or service by installing, maintaining and repairing the product themselves. Without proper training and information, they often damage the product in the process.

Unskilled local representatives

The core of any service is the people providing it. But local representatives often lack the technical capabilities to provide maintenance and repair services. In cases where businesses rely on self-employed agents or the staff of other organisations, ensuring adequate skills can be a challenge.



... AND SOLUTIONS

Provide regular maintenance visits

- **Visit customers at defined intervals.** Customers want to know when to expect a maintenance visit and will rely on it. Regular visits facilitate access to spare parts, reduce additional service costs and create trust in the value of the product. Staff can ensure the proper handling and functioning of equipment.
- **Provide warranties including service.** The cost of service provision during warranty time (or even beyond) should be included in the regular product or service price in order to simplify the cost structure for customers and to avoid uninformed repairs by users.

Train local representatives to perform common service tasks

- **Provide training directly.** Training a group of trainers who can then pass on their skills can help create the required capacities.
- **Train through partners** such as franchisees, NGOs, or MFIs, in cases where these partners are responsible for local representatives. However, training sessions should still be standardised and rely on training material.
- **Divide responsibilities** in a “cascade” of service tasks. Simple tasks can be carried out by the customers themselves, more complex ones by local staff, and unusual ones by specialists.

Supply spare parts locally

- **Provide basic spare parts in advance.** Basic spare parts should be in stock with all local representatives or — for parts that need to be frequently replaced — stored directly with the customers so that common problems can be fixed quickly.
- **Use a limited variety of parts.** Using few and standardised parts in products wherever possible makes it easier to maintain a supply of spare parts.

Deskil product installation and maintenance

- **Deskil processes.** Customers and local representatives often lack technical skills. Making products simple to handle allows more tasks to be performed locally and avoids damage. Descriptions of standard solutions to the most common problems should be provided.
- **Adjust products.** Products should be designed in a way that is safe for assembly by customers or staff with little training. To avoid damage, products should be designed to withstand common environmental wear and tear. Ideally, the most common issues in product maintenance can eventually be avoided by updating the product to reflect past experiences.

Educate customers

- **Train customers** how to use and maintain the equipment when they receive it. When customers know how to handle the equipment properly, damage can be avoided, service costs reduced and the reliability of the equipment improved.
- **Provide customers with reference material** that explains handling and maintenance and outlines common issues and solutions. Guidelines should be simple, and in the local language, and make use of illustrations.

**CASE STUDY****Temasol, Morocco****For Moroccans living in rural areas, good service has a positive impact**

Temasol provides photovoltaic kits to remote rural households in Morocco. Customers receive key services. Regional branches have three to seven agents each: a supervisor and two to six technicians, who make use of cars to collect fees and answer questions at weekly markets. These technicians also fulfil contractual obligations such as fixing technical problems within 48 hours and visiting customers at least once a year. Customers sign a service agreement and pay a one-time connection fee before installation and a monthly fee thereafter. Fees are dependent on the level of service selected. Upon installation, customers are given hands-on training on how to use the equipment. Local branches receive spare parts required by customers to ensure proper maintenance. Temasol provides a full guarantee of service for 10 years.

Temasol connected 26,000 new customers (182,000 people) between 2002 and 2008. The company also scores well in satisfaction surveys, with customers saying the service provided has had a positive effect on their quality of life.

SOURCES

Brahim Allal (2011)

TEMASOL: Providing Energy Access to Remote Rural Households in Morocco.

* See P. 32 'PRODUCT'

End of product use

In order to create a sustainable product and avoid contributing to environmental degradation, businesses must consider what happens when their product's useful life comes to an end, as well as how customers deal with it afterwards. Many slums and rural villages where low-income people live lack modern waste management systems, which means that non-degradable waste quickly becomes a problem. Batteries, the toxic contents of which can cause health issues, are a particular concern. Businesses can avoid damaging residents' health and the environment, and can even create economic value, by using local fuels and environmentally friendly materials, maintaining and reusing equipment, and offering recycling services.

CHALLENGES ...

Additional waste associated with fuel

Buying fuel (e.g., kerosene, coal) can lead to additional waste from packaging. Plastic packaging does not degrade and thus subjects the streets and environment around low-income communities to long-term pollution if not disposed of properly.

Disposal of products

Products are disposed of when they are broken and cannot be fixed, or when they are replaced in a system upgrade. For example, when a community gets connected to the electrical grid, all off-grid solutions can become superfluous. Product disposal can create additional waste.

Lack of waste management systems

Due to a lack of proper waste management systems, products are often disposed of unsafely, leading to health issues and environmental pollution. Batteries are a particular concern because their toxic contents can contaminate groundwater, leading in turn to health problems for animals and humans. Broken bulbs or photovoltaic (PV) modules also need to be handled with care.

... AND SOLUTIONS

Use local fuels

- **Use local waste as biomass**, such as straw and husk from cereal production, or household waste for biodigesters. This also can save costs for the customer. In addition, biodigesting avoids carbon emissions.
- **Produce fuel locally**, from sources such as jatropha, palm or other oleiferous plants, or from cooking fat. Firewood and charcoal for improved cookstoves can also be produced locally. Local production creates a new income stream for communities. It also avoids carbon emissions associated with packaging and transportation. Ensure that local fuel production doesn't conflict with food production and avoid agricultural monocropping.

Use environmentally friendly materials

- **Replace harmful material**. Harmful, polluting, resource- and energy-intensive materials can be replaced by more environmentally friendly ones. The cost of this material is sometimes higher. But high-quality material can also extend the lifetime of the product, making the higher up-front investment worthwhile for customers.

Maintain and reuse equipment

- **Prolong product lifetime** by providing warranties and regular maintenance service, and ensuring the availability of spare parts*.
- **Reuse broken or unused equipment**. In low-income markets, things of value are reused as a matter of course. This can be facilitated by enabling the simple and safe disassembly of products. Using a small variety of parts and standardised components where possible makes the exchange and trade of parts easier. This also increases the local availability of spare parts. In addition, businesses can organise a market for used parts through their local service providers or other means.
- **Provide training on reuse**. In order to enable local service providers to reuse, dismantle and repair parts, training may be required.

Recycling

- **Establish a recycling service**. Local service providers can collect broken equipment or parts, especially batteries, at local collection points or during regular maintenance visits.
- **Collaborate with external recycling services**. Companies can co-operate with other organisations that collect expired batteries or other valuable material. These will often pay customers or the business for the scrap value.

**CASE STUDY****Sunlabob, Laos****Clean energy for Laos**

Sunlabob is a commercial company based in Laos that provides energy services to remote areas not connected to the public grid. A combination of energy sources — biofuels, hydro turbines and solar panels — is used to provide these services. Sunlabob pays special attention to the sustainability of its service. One such example is the rehabilitation of broken hydropower plants into functioning hybrid grids.

Maintenance of solar panels is also important. In order to prolong the equipment's life and improve efficiency, these must be kept clean and free of shadow. If a circuit is broken at any point, the entire unit ceases to function. Sunlabob addressed this issue through the training of local technicians. If a piece is too difficult to repair in the field, the local franchisee will attempt to fix it or replace the broken component. The customer is not charged for the time they spend without power, and if the fault was caused through misuse, the problem is clearly explained to the customer to avoid future issues.

Sunlabob's devices make use of rechargeable batteries. A charge controller is utilised to ensure that the battery is not overcharged. The service network manages empty batteries, which are returned for recycling.

SOURCES

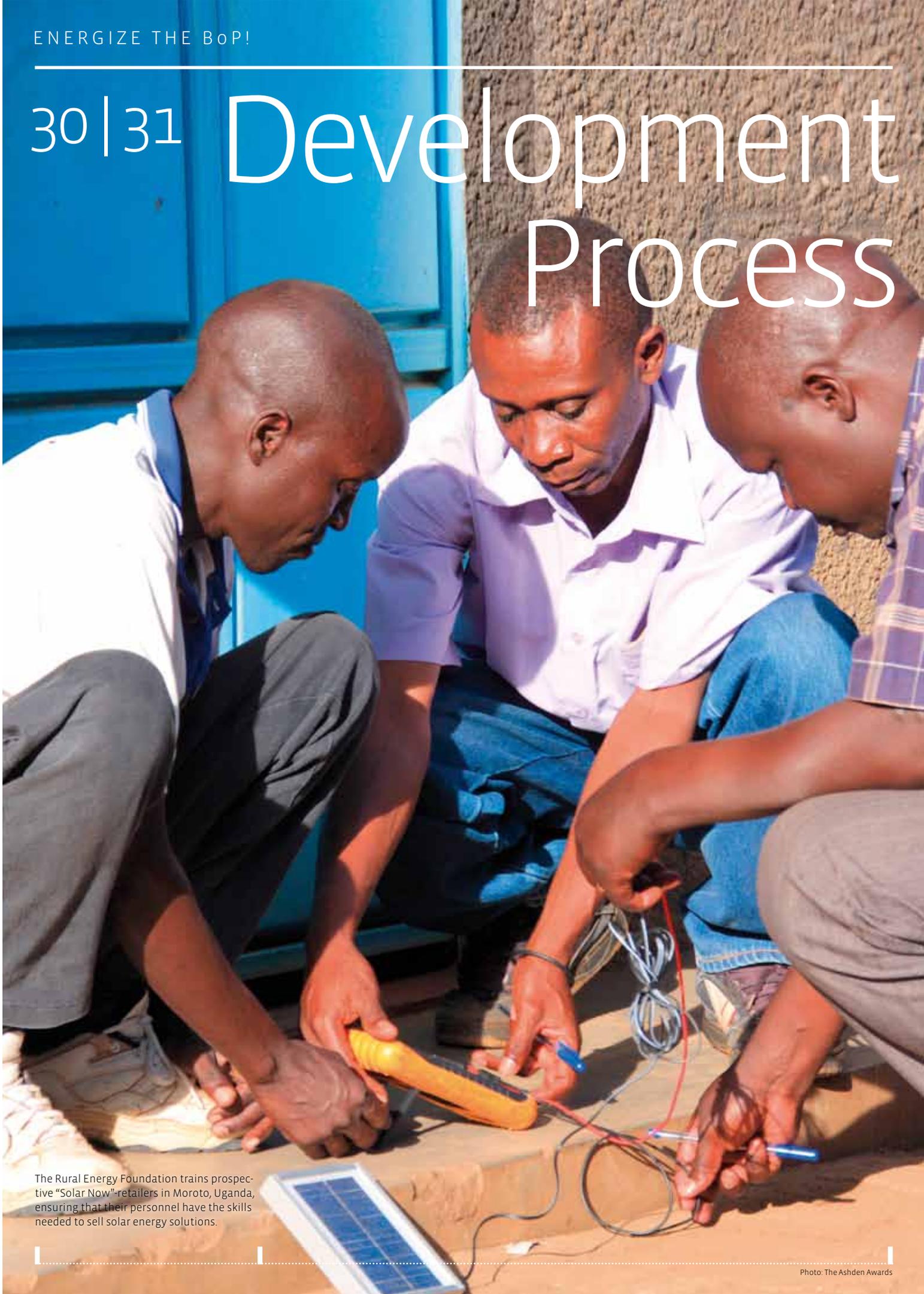
Andy Schroeter (2007)

Rental of PV Systems Provides Quality Lighting in Remote Laos Villages

ENERGIZE THE BoP!

30 | 31

Development Process



The Rural Energy Foundation trains prospective "Solar Now" retailers in Moroto, Uganda, ensuring that their personnel have the skills needed to sell solar energy solutions.

WHAT RESOURCES ARE REQUIRED TO DEVELOP A BUSINESS?

- A business needs to continually develop its resource base, from the design phase through implementation to growth.
- Four basic types of resources are essential for any energy business: the product itself, market insight, human resources and finance.
- Promising approaches can help companies manage these resources successfully.

How it works

The development process checklist is a tool to plan in advance the development of your business. Any business must ensure the availability of four key resources at each stage of its development:

- **Product.** The product — be it a solar home system or a grid connection with ongoing service provision — is at the heart of the business. Products should do more than simply fulfil customers' current expectations regarding quality, benefits and price. They must also allow for business growth, so that production can keep up with demand.
- **Market insight.** A thorough grasp of customers' preferences, budgets, constraints and product use is essential for the successful development of a business, as is understanding the competition and underlying market conditions, including potential political incentives.
- **Human resources.** People execute business processes. They need the right skills and training, but also the motivation, to be effective and efficient. This relates both to the business' own staff and to business partners.
- **Finance.** Funds sufficient to finance investments and operating expenses must be available. While operating expenses should be covered by revenues, at least after the start-up phase, investments often require outside funding.

The development of a business can be divided into three elementary phases: design, implementation and growth. The chart below depicts the main activities in each phase. For each phase, a different set of resources will be required. For example, a business might require a prototype of the product during the design phase, but engage in mass production during the growth phase. Therefore, the challenges will also differ in each stage.

Note that there are only a few businesses that have managed to enter the growth phase and gain significant scale. Hence, the observations from the case studies included in this report, which were supported by expert interviews, are stronger in analysing the design and implementation phases. Further research and — above all — a larger number of successful businesses will be required to learn more about the growth phase.

As a user of this checklist, it may be helpful to go through each resource and identify the challenges you are likely to face in each stage. You can also explore the approaches that seem most promising for your business. Working through the various resources and stages will help you foresee challenges and plan for effective solutions!



In order to offer an attractive product, businesses must understand customer needs and preferences.* At the same time, they need to develop production processes that guarantee good quality while continuously bringing cost per unit down over time. Continuous improvement on the production side enables businesses to keep prices low and increase revenues. A number of specialised institutions can help with product design.

*
SEE
"MARKET
INSIGHT"
NEXT PAGE

SEE
PAGE 44

DESIGN

Description

Design products that meet customer preferences, with good quality and at an affordable price.

Challenges

- Products are often developed primarily from a technical perspective, without sufficient consideration of cultural patterns and consumer preferences.
- Building prototypes is expensive. Prototype testing can require many iterations, thus increasing the cost.

Promising approaches

- Design the product to ensure low costs while reflecting local preferences and the local environment. Base product development heavily on market research.
- Involve the target group in the product design, through means such as idea competitions or focus groups in which users can design their own models.
- Involve students from design schools to help with the initial concept and prototype development.
- Test prototypes with the target group. Show the product at markets. Auction it to households to help understand consumers' willingness to pay.

**CASE STUDY****Bosch und Siemens Hausgeräte GmbH (BSH), Philippines****Getting it right: improving products through redesign**

BSH is one of the world's foremost manufacturers of home appliances. The company first introduced its sustainable, efficient plant-oil-based cookstove in the Philippines. From 2004 to 2006, BSH conducted field tests of the product involving over 100 families in urban and rural areas, using coconut oil as fuel. BSH is constantly seeking to improve the user-friendliness, cost and efficiency of its cooker, and used field testing as the basis for several modifications that eventually included two complete design overhauls. For instance, testing in Indonesia revealed that palm oil was highly problematic due to its high melting point and viscosity, so BSH studied differ-

ent blends of oils to improve usability. Castor oil and jatropha, a non-edible seed that grows on marginal land, were ultimately determined ideal for use in the cookers.

BSH products are well accepted amongst trial groups. A new, improved version of the product designed for mass production was launched in May 2010 in Indonesia. This initiative, which has projects in Indonesia, India, Ethiopia and Costa Rica, has sold approximately 1,500 units to date.

SOURCES

<http://stoves.bioenergylists.org/bshprotosupdate>

IMPLEMENTATION GROWTH

Description

- Adjust products according to experience and feedback.
- Source locally for enhanced impact.

Challenges

- Producing a comparatively small number of units at a low price can be difficult.
- Changing established production procedures is always costly.

Promising approaches

- Produce locally, working with local workshops or small producers where local production costs, quality and import tariffs allow. Sometimes, allowing local producers to adapt the product is the best means to product development and market success.
- Improve products based on customer feedback.

Description

Standardise products and processes for mass production.

Challenges

- Capturing economies of scale.
- High quality standards must be maintained even with larger production runs.

Promising approaches

- Standardise the product for mass production. Reduce the variety of parts to facilitate product upgrades and spare parts management.
- Manufacture abroad. Working with high-quality producers in other developing countries can keep costs low and avoid prohibitive time investments in building production and quality management capacities where they don't yet exist. Maintain a positive footprint by making sure producers adhere to human rights and good labour standards, and produce in an environmentally sustainable way.

Market insight

Understanding the customer, competition and general market conditions is crucial to the success of a business. Getting to know the market takes time and sometimes also innovative approaches. Feedback mechanisms should be built into a company's operations if it is to aptly adjust to changing conditions and secure long-term success. Experts from universities can help a company understand a market better and learn from the experiences of others.*

* SEE PAGE 44

DESIGN



Description

Conduct market research to understand market potential and limitations, customers' preferences and constraints, and the current competition.

Challenges

- Especially for businesses that are new to the environment, low-income markets can be complex and not easily accessible. Informal market and power structures are often difficult to understand. People's behaviour and preferences may seem "irrational" in the absence of a deeper understanding of their social and economic context.
- Cultural barriers complicate market research. Individuals' preferences and motivations are often tacit. Without relevant alternatives, they never become explicit, even to the people themselves. Communication is embedded in culture and may not be easily understood by outsiders. In addition, communication with foreigners is often "strategic", based on assumptions about the expectations and agenda of those asking questions.

Promising approaches

- Involve researchers and experts from universities, think tanks and other research organisations who can provide feedback on business model design. To meet them, attend conferences and other networking opportunities.
- Conduct feasibility studies with context experts such as local universities and research institutes, or the local experts inside development agencies and NGOs.
- Spend time with your customers to see the world through their eyes. Use processes of participant observation, conducting home stays of at least 24 hours.
- Tap the knowledge of your customer and make tacit preferences explicit. Conduct focus groups. Run idea competitions with the target group.
- Tap the knowledge of experts such as NGOs, local authorities and researchers through interviews.

**CASE STUDY****d.light design, Africa & Asia****Enlightened product design based on customer knowledge**

d.light strives to replace kerosene lanterns with solar lamps, providing rural and poor households with clean, safe and bright light.

In its early stages of product development, d.light addressed the challenge of understanding their customers' preferences by conducting field research in villages throughout South and South-East Asia, and later also in East and West Africa. The product design team spent hundreds of hours in villages speaking to customers and observing their lives, determined to provide the customers with what they needed and wanted without being influenced by previous assumptions. This research identified obvious needs, such as a light bright enough for studying and night-time income generating activities, as well as less obvious needs. For instance, customers like having multiple light settings, as this allows them to optimise their energy usage based on their needs. A mobile phone charging feature was also in high demand.

d.light tested evolving prototypes of solar-powered LED lamps, which received positive feedback after months of design refinement. d.light launched its first solar lanterns in 2008, and continued to conduct field research in villages in Africa and Asia seeking continual improvement of their products. Since that time, d.light has released new, more affordable models with additional features such as mobile phone charging.

d.light has grown quickly: They have sold over 600,000 solar lamps, and have allowed households a more consistent light and energy supply.

SOURCES
www.dlightdesign.com,
www.extreme.stanford.edu/success_stories/dlight_design.html

IMPLEMENTATION GROWTH

Description

Learn from operational experiences and feedback processes in order to improve approaches to implementation.

Challenges

- After the pilot, businesses tend to focus on implementing what has worked. As a result, systematic information gathering sometimes loses its priority.
- Once a concept has been proved, it becomes harder to challenge one's own assumptions.
- Changes in the environment can fundamentally alter the foundations of the business.

Promising approaches

- Gather and incorporate feedback from customers, staff and partners on a systematic and ongoing basis. Local representatives can be trained to ask for feedback during regular maintenance visits, to analyse the information obtained and to provide this data to the marketing department. NGOs and foundations can support market research and feasibility studies.
- Use existing networks to gain inside knowledge on changes in the business environment. Business associations and their events are good opportunities to learn about changes in the political environment. International conferences may reveal opportunities and threats based on factors such as donor development policies.

Description

- Implement continuous improvement processes to support the growth of the business.
- Identify new markets to replicate earlier successes.

Challenges

- Feedback processes can be quite time consuming. As the business grows, systematic information-gathering processes become increasingly relevant.
- Businesses may jump too hastily from success in one market to replication in another. Every country is different and requires its own careful market research.

Promising approaches

- Conduct regular surveys and collect performance data. These surveys can be carried out by local partners such as NGOs, franchisees, local governments or research institutions.
- Conduct market studies in new markets. Local universities and research centres, international NGOs and foundations can support market research and feasibility studies.

Employee skills and motivated people together form the basis of any successful business. In low-income markets, skills are often in short supply. Businesses have to provide training and find ways to retain trained staff, even where conditions may be harsh and unattractive to skilled people. People also need to be motivated to contribute to business objectives, both intrinsically by ensuring they understand and believe in the organisation's mission, and extrinsically through financial and other benefits.

DESIGN



Description

- When designing the business processes, businesses need to take into account the skills available from locally hired staff.
- During the business development phase, outside experts can provide critical ideas and questions.

Challenges

- Skilled staff members are often hard to find, especially in rural areas.
- Once skilled staff members are located, they can be expensive to hire and retain.

Promising approaches

- Critically assess the availability of potential local staff in the target communities. Learn about human resource issues from other businesses.
- Design processes and routines based on the availability of local capacities. Companies need to base their job descriptions and training plans on the skills and training potential already possessed by potential local employees.
- Define health and safety standards which are in line with the company's standards in other markets without limiting business development opportunities.
- Develop a training plan from the start.
- Work with university students or fellows from programmes such as Acumen or IDEO.
- Attract support from experienced managers looking for new experiences and a way to contribute to social objectives, perhaps during a sabbatical from other employment.



CASE STUDY

Électricité de France SA (EDF), Mali

Not just clients: engaging locals as employees and managers

In 1999 and 2001, France's EDF and its partners Total and Nuon created two rural energy services companies (RESCOs) in order to provide electricity based on solar home systems or small low-voltage village micro-networks to areas in rural Mali (near Kayes and Koutiala).

The RESCOs were designed to favour local ownership. All employees are Malian, and national and local authorities are involved. In order to guarantee local ownership, EDF gradually transferred its shares to Malian companies. EDF also offered strong support in the form of training programmes and management assistance.

The first RESCO employs 51 Malians (including the director) and provides energy to 53,400 people in 14 villages. The second is comprised of 15 decentralised offices and 34 employees; it supplies energy to 49,500 people. Management is in the hands of a Malian director, who is supported by two vice directors.

SOURCES

Christopher N. Sutton (2007)

The Role of the Utilities Sector in Expanding Economic Opportunity. Economic Opportunity Series, vol. 24. Cambridge: Harvard University.

IMPLEMENTATION → GROWTH

Description

Nurture and develop the skills of the company's staff and other local representatives.

Challenges

- Effective training processes must be designed and organised.
- Employing qualified staff at affordable rates can be difficult.

Promising approaches

- Develop standardised training procedures. This involves the formal definition of training contents and the creation of documentation in the form of checklists and other training material. Training can be provided directly by your own organisation, by outside trainers or through partner organisations.
- Check the effectiveness of training through feedback processes and quality evaluations.
- Provide clear job descriptions and career paths.
- Make your mission, vision and values explicit to staff and local company representatives.
- Select people that share your values. In interviews, understand people's motivation to work with your business, such as by considering their previous career choices.
- Empower local personnel. Using management staff drawn from the national market best ensures a familiarity with local contexts and markets.

Description

Standardise and outsource company activities.

Challenges

- The quality of outsourced services can be difficult to control.
- Staff with valuable experience is important and hard to retain.

Promising approaches

- Offer more substantial monetary and non-monetary benefits (kindergartens, health insurance) as inducements to retain staff.
- Provide coaching for staff members, enabling each person to grow through personal career development planning.
- Standardise human resources processes and enable such departments to continuously learn and improve.
- Develop micro-franchising models to enable collaboration with small-scale entrepreneurs. Self-employed staff has a clear motivation to contribute to a business' commercial success while working independently.
- Take on additional partners (e.g., in other countries) to replicate the business elsewhere. Select trustworthy partners and monitor their quality.
- Introduce success indicators and control them personally. Measure employee performance on the basis of previously defined milestones.

Financing the start-up and expansion of an energy business is challenging. However, a number of organisations are today supporting enterprise-based approaches to energy provision for low-income households. Inclusive energy businesses can access funds in the form of grants, prizes, equity and debt funding, and benefit from preferential conditions.*

* SEE PAGE 44

DESIGN

Description

Funding for the development of the concept and the prototype, as well as for pilot testing and proof of concept.

Challenges

- Because new businesses do not have a proof of concept, uncertainty about model viability and return on investment is high.
- Risk capital for businesses that operate under the challenging conditions of low-income markets is scarce. Enterprises that aim to solve a social issue but cannot promise competitive returns find it hard to convince investors.
- Loans are expensive and hard to obtain on a commercial basis when the risk of failure is high, especially for start-up companies.

Promising approaches

For start-ups and SMEs:

- Participate in business plan competitions to get exposure to and feedback from investors, gain credibility and potentially win start-up money.
- Win a start-up grant. Some organisations provide full grants, while others provide only partial funding or want a portion of the money back.
- Attract seed funding from social and private investors.
- Join an incubation space. These spaces not only provide free or affordable work space, but in many cases also offer networking and coaching opportunities.

For large corporations:

- Start projects in the corporate social responsibility (CSR) or research and development (R&D) departments, in order to create the financial and organisational flexibility for “trial and error”.
- Build a “hybrid business case” that creates benefits for various departments such as human resources, marketing and R&D, and ask for monetary or in-kind contributions. For example, the human resources department can use new business development initiatives for leadership training.
- Partner with local businesses able to shoulder some of the risk in implementation.

**CASE STUDY****Selco, India****Financial backing turns ideas into reality for SELCO India**

SELCO uses solar photovoltaic modules to provide electricity to rural areas in India.

Since 1995, SELCO has operated 25 energy service centres, installed over 115,000 solar home lighting systems as well as the largest solar water heating system for a single client in India, and has supported numerous solar entrepreneurs.

SELCO began with no financial backing. The founder, Harish Hande, met Neville Williams while in Sri Lanka. Williams would become SELCO's co-founder and order its first commission, a 100-home solar project.

The two founded the company with INR 15,000 (the equivalent of about \$430). In 1996, financial backing was assured with a \$150,000 loan from Winrock International through USAID, with the condition that a certain number of systems be installed. By 2000, SELCO had paid back this loan. SELCO's first investor was E+Co, an investor that makes clean energy investments in developing countries. Their initial investment totalled \$107,500. Other major investors today include the Lemelson Foundation and Good Energies.

SOURCES
www.selco-india.com

IMPLEMENTATION → GROWTH

Description

Finance investments for implementation and rollout.

Challenges

- Funding needs to be flexible to respond to changes in the business plan, such as slowed rollout or product adaptations.
- Administrative burdens associated with public funding, subsidies or social investor money can be high.
- Local commercial banks are often wary of projected returns from energy businesses targeting low-income customers.

Promising approaches

- Attract additional equity investment from specialised investors.
- ^{*}Work in partnership with international development organisations.
- ^{**}Register for carbon credits under the compulsory or the voluntary carbon market.
- Use subsidies provided by the government for installation of equipment and grid connections.

Description

Attract investment for expansion and replication.

Challenges

- In many cases, the (financial) return on investment for businesses in low-income markets cannot compete with that of businesses in more established markets.
- Political uncertainty in some developing countries limits the availability of larger investments due to the high risks of losing an investment completely.

Promising approaches

- Use investment capital provided by development banks, such as ADB, IADB or IFC.
- Identify local private equity investors.
- Use ongoing subsidies from governments for electricity provision.

* SEE SPOTLIGHT ON "developPP.de" ON P. 41

** SEE CDM SPOTLIGHT, PAGE 40

Accessing the carbon market

The level of carbon emissions has steadily increased since the age of industrialisation, a fact that today is rapidly changing the global climate. Such changes may severely impact humanity's well-being, through rising temperatures and sea levels and a larger number of extreme weather events such as storms and floods. To mitigate climate change, companies and countries have set emissions-reduction goals. These goals can be legally binding, as when they are set under cap-and-trade schemes such as the Kyoto Protocol or the European Union Emissions Trading System, or can be fully voluntary, as when part of a company's core mission or slate of CSR initiatives.

Apart from curbing emissions resulting from their own operations, companies can also purchase carbon credits on the global market. These credits are produced by project or company activities that would not take place without the revenues generated by the sales of those credits, and are accredited, monitored and registered under strict systems of control. The Clean Development Mechanism (CDM), a part of the Kyoto Protocol, registers carbon credits that can be used for obligatory (legally binding) emissions reductions, while the Voluntary Carbon Market (VCM) generates credits for voluntary reductions.

The volume of carbon emissions trading has been steadily increasing in recent years. The base unit of trade is typically one metric ton of CO₂-equivalent, denoted as tCO₂e. Despite a difficult year for the market due to the global economic recession, total volumes in 2009 grew to 8.7 billion tCO₂e, representing a market size of \$144 billion.¹⁷

Prices for CO₂e units vary greatly. There are a number of "standards" available for carbon emission reductions projects. In the compliance market, a Certified Emissions Reduction (CER) of one tCO₂ issued under the CDM is worth around \$17.5. A Voluntary Emissions Reduction (VER), which can be certified under a number of different voluntary market standards, can bring between \$2 and \$7.

The Gold Standard is a certification body focusing on projects that specifically create sustainability co-benefits for the communities they serve, for example by protecting biodiversity or creating income generating opportunities for low-income people. Gold Standard certification may be obtained for CERs as well as VERs, and typically adds a price premium to the final value of the generated carbon credit, as certain investors may seek "boutique" credits generating social value.

To register for carbon credits, companies must go through a lengthy and fairly resource-intensive process. For companies that have no previous experience with the carbon market, it is advisable to draw on the support of an expert, either a professional project development company or specific market support actors. *SEE P. 45*

A main challenge in registering for carbon credits lies in defining the methodology by which the savings are to be measured, and in getting approval for this choice. Companies can see what projects and methodologies have been approved by studying the UNEP Risoe Centre's CDM Pipeline. Adopting a methodology that has already been used successfully can save considerable time, and also significantly reduces project uncertainty.

The scale of the envisioned activity may present a particular difficulty for off-grid inclusive energy businesses. As carbon certification carries significant transaction costs, entrepreneurs should analyse whether carbon finance will truly be of benefit. Partnerships with similar project activities, through "Programmes of Activities", as well as development under the Gold Standard micro-scale facilities, are options that inclusive energy entrepreneurs may consider in developing their business models' carbon finance components.

develoPPP.de — Development partnerships with the private sector

The develoPPP.de programme supports co-operation between the private sector and development organisations. Hence the three “Ps” in develoPPP, which stand for public-private partnerships.

Development partnerships bring together the innovative forces of the private sector with the resources, knowledge and experience of development organisations, for the purpose of nurturing progress in BMZ’s partner countries and improving people’s lives in a sustainable manner. In these joint projects and programmes, both sides share responsibility, costs and risks.

develoPPP.de is implemented by Deutsche Investitions- und Entwicklungsgesellschaft (DEG), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and sequa GmbH under a commission from the BMZ, Germany’s Ministry for Economic Cooperation and Development. The develoPPP.de programme was set up in 1999 and conceptually reworked in 2009.

Since then, the three organisations have organised idea competitions several times a year for German and European companies. The best approaches can receive co-financing of up to \$273,000 (€193,000).

The competition categories “develoPPP.topic” and “develoPPP.innovation” cover complementary aspects and approaches:

develoPPP.topic

Ideas competitions under this heading have a sector-specific focus on areas that exhibit a major development-policy need. The topics are regularly reviewed and redefined and are assigned to one of the three implementing organisations: DEG, GIZ or sequa.

The current topics are assigned as follows:

- **DEG:** Resource and climate protection, energy
- **GIZ:** Agri-business and conservation of biodiversity, water and sanitation
- **sequa:** Vocational education, basic and further training

develoPPP.innovation

In this category, businesses are encouraged to take the initiative in ideas competitions that are not restricted to specific topics. Companies can submit particularly innovative proposals built around their specific field of know-how.

develoPPP.alliance

In addition to the ideas competitions, develoPPP.de also offers the chance to engage in particularly broad-impact projects and programmes with a beacon effect. The resulting strategic alliances are development partnerships encompassing several partners, countries and larger investments, and frequently serve as catalysts for change throughout entire sectors.

DEG, GIZ and sequa have initiated over 1,800 projects in partnership with the private sector since 1999, working on behalf of BMZ. For more information, see www.develoPPP.de.

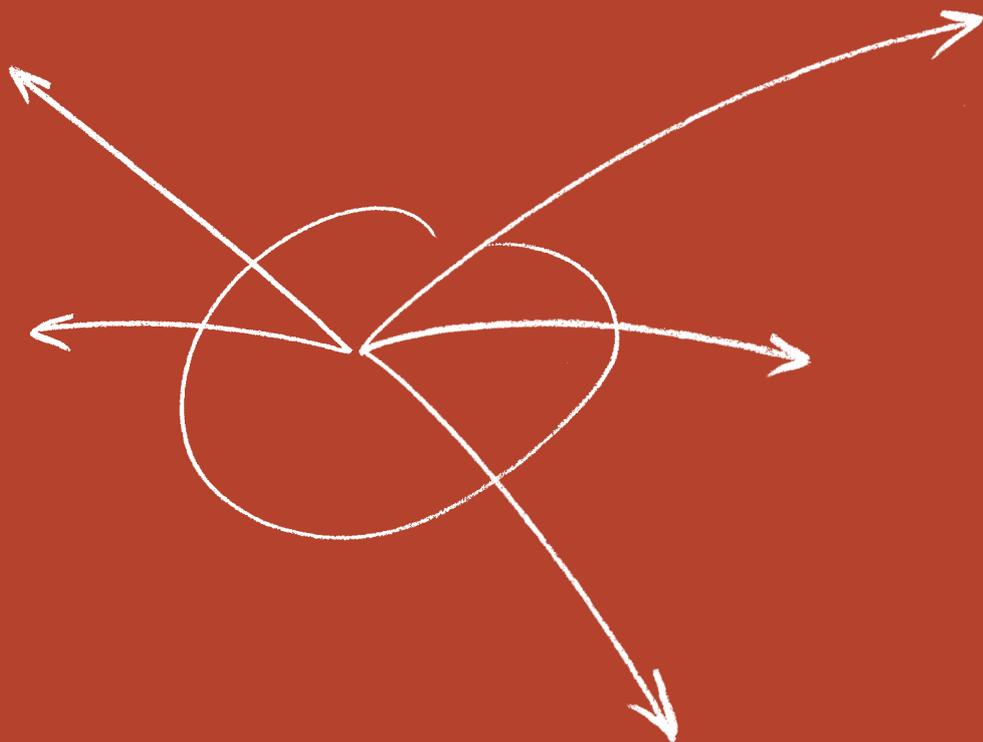
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Support Directory

Unfortunately, tapping into a network often means stealing electricity, like here in Bihar. The support directory helps you tap reliable expert and knowledge networks instead.

WHERE DO WE FIND SUPPORT?

There is a wide range of institutions able to support entrepreneurs and companies in their efforts to provide low-income people with sustainable and reliable energy services. The following list includes institutions offering support in the areas discussed in the previous chapter — product design, market insight and financing — as well as other, more general, areas. In addition, a list of suggested further reading provides links to useful documents and websites.



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Product design

The following list identifies several potential partners for product design. Their dedication to extremely affordable products, innovative technology and proven results could be an important asset in the development and implementation of your business.

Aprovecho

Organisation dedicated to inspiring a sustainable culture; projects section includes several focused on energy, particularly in the area of technology
www.aprovecho.net

Catapult Design

Multitude of services concentrated on the design of products for the poor; ready-made and custom products are available
www.catapultdesign.org

Design for the Other 90%

Designers, engineers, students and professors, architects, and social entrepreneurs devising cost-effective ways to increase access to basic needs, including energy, for the poor
www.othergo.cooperhewitt.org

Design That Matters

Creates products that improve social enterprise services in developing countries
www.designthatmatters.org

D-Rev

NGO that invents and develops products and services that are reliable, cost-effective and affordable, providing simple, scalable and sustainable solutions within many areas of concern for the poor, including health care and energy
www.d-rev.org

IDEO

Award-winning design firm with a human-centred approach to innovation and growth
www.ideo.com

Massachusetts Institute of Technology D-Lab

Fosters technologies and sustainable solutions for international development
www.d-lab.mit.edu

Practical Action

NGO working with low-income communities to introduce technology
www.practicalaction.org

Stanford — Entrepreneurial Design for Extreme Affordability

Focus on extremely affordable product design
www.extreme.stanford.edu

TU Delft — Industrial Design Engineering Faculty

Product Engineering section focuses on constructing products for mass or series production, using many innovative energy sources
www.io.tudelft.nl (Product Engineering)

Winrock International

Assists the disadvantaged in increasing economic opportunity in a number of areas, including energy, through project design and other capabilities
www.winrock.org

Market insight

University centres and institutes as well as private market research institutes can support companies in designing and executing market research. They may also be able to provide first advice based on existing experiences. The centres and institutes listed here without descriptions work on energy provision in developing countries.

UNIVERSITY CENTRES AND INSTITUTES

Centre for Research in Energy and Energy Conservation, Makerere University, Uganda
www.creec.org.ug

Energy and Resources Group, University of California
www.erg.berkeley.edu

Energy Futures Lab, Imperial College London
www3.imperial.ac.uk/energyfutureslab

Fraunhofer Institute for Solar Energy Systems (ISE)

ISE conducts research on the technology needed to supply energy efficiently and on an environmentally sound basis in industrialised, threshold and developing countries
www.ise.fraunhofer.de

Graduate School Microenergy Systems, Technical University Berlin

www.planen-bauen-umwelt.tu-berlin.de/microenergysystems/menue/willkommen/parameter/en

Group for Sustainability and Technology, ETH Zurich
www.sustec.ethz.ch

Indian Institute of Technology
www.iitd.ac.in

MicroEnergy International
www.microenergy-international.de

Modi Research Group, Columbia University
www.me.columbia.edu/fac-bios/modi/lab.html

Renewable and Appropriate Energy Laboratory, University of California
<http://rael.berkeley.edu>

Stellenbosch University, Centre for Renewable and Sustainable Energy Studies
<http://academic.sun.ac.za/crses>

Stockholm Environment Institute
www.sei-international.org

Sussex Energy Group, University of Sussex
www.sussex.ac.uk/sussexenergygroup

Solar Energy Research Institute Singapore
www.seris.nus.edu.sg

Twente Centre for Studies in Technology and Sustainable Development
www.utwente.nl/mb/cstm

Tyndall Centre For Climate Change Research
www.tyndall.ac.uk

University of Cambridge Centre for Sustainable Development
www.g.eng.cam.ac.uk/sustdev

MARKET RESEARCH ORGANISATIONS

HED Consulting
Company providing advice on household and small-enterprise energy for developing countries, with a focus on improved cookstoves
www.hedconsulting.com/what.html

Lighting Africa
Through the provision of market research, distribution channel analysis and market trend assessments, Lighting Africa enables the industry to develop effective business models and make informed market decisions
www.lightingafrica.org

MART

Market research and consulting services focusing on low-income markets
www.martrural.com

Mobile Metrix

Market research in low-income markets
www.mobilemetrix.org

Financing

This section provides an overview of the many financing opportunities available to companies working in developing countries' energy sectors. These include investors and donors specifically focused on business models targeting low-income populations and/or clean energy projects and competitions rewarding innovative new ideas.

INVESTORS AND DONORS

Acumen Fund

Invests "patient capital" to strengthen and scale business models serving the poor
www.acumenfund.org

African Development Bank

Supports efforts in Africa to reduce poverty in a sustainable way through projects, financing, technology assistance and other services
www.afdb.org/en/topics-sectors/sectors/energy-power

Arc Finance

Links energy enterprises focused on clean energy projects for the poor with financial institutions
www.arcfinance.org

Asian Development Bank

Supports efforts in Asia to reduce poverty in a sustainable way through projects, financing, technology assistance and other services
www.adb.org/Clean-Energy

E+Co

Invests services and capital in small and growing energy businesses in developing countries
www.eandco.net

European Bank for Reconstruction and Development

Aims to promote environmentally sound and sustainable development in the energy sector; operational focus stretches from central Europe to central Asia

www.ebrd.com/pages/sector/powerenergy.shtml

Good Energies Foundation

Supports a range of initiatives providing sustainable access to renewable energy

www.goodenergies.com

GroFin

Connects the growth finance sector, which provides risk finance, with small and medium-sized businesses in emerging markets

www.grofin.com

Inter-American Development Bank

Supports efforts in Latin America and the Caribbean to reduce poverty in a sustainable way through projects, financing, technology assistance and other services

www.iadb.org/en/topics/energy

International Finance Corporation

Supports developing countries' private sectors through investment and advisory services

www.ifc.org/sustainableenergy

LGT Venture Philanthropy

"Impact investor" investing in emerging market organisations, seeking to raise the quality of life of less advantaged people in a sustainable way

www.lgt.com

ResponsAbility

A leading asset manager for social investments, specializing in microfinance, SME financing, fair trade and independent media

www.responsability.com

Solar for All

Strives to advance change through entrepreneurship, technology, and venture capital;

www.sfa-pv.org

COMPETITIONS**The Ashden Awards**

Awards granted to innovative sustainable energy projects; includes knowledge and media centre containing energy sector case studies

www.ashdenawards.org

BiD Network

Provides network, searchable archive of proposals and business plans, and access to finance through investors and funds; conducts several competitions

www.bidnetwork.org

Global Social Venture Competition

Social business plan competition providing mentoring, exposure and \$45,000 in prizes

www.gsvc.org

Echoing Green

Invests in and supports emerging social entrepreneurs

www.echoinggreen.org

New Ventures

Provides business development services to environmentally focused SMEs in emerging markets, with centres in Brazil, China, Colombia, India, Indonesia and Mexico

www.new-ventures.org

SEED Initiative

Supports small-scale and locally driven entrepreneurs in integrating social and environmental benefits into their business models

www.seedinit.org

Social Enterprise Innovation Network

Conducts the Tech Awards for innovators worldwide applying technology to benefit humanity

www.sein.net

Wisions

Disseminates sustainable energy solutions and successful implementation models, especially in developing countries; provides financial support through SEPS, its support scheme

www.wisions.net

World Bank Development Marketplace

Competitions for sustainable ventures; includes current projects, stories, contacts and toolkits

<http://wbi.worldbank.org/development-marketplace>

Carbon market

These partners are experts in the area of the Clean Development Mechanism (CDM), and are oriented toward the alleviation of poverty. Through technology and innovation, they aim to reduce the overall amount of harmful emissions produced during development and industrialisation.

CDM Bazaar

An extensive listing of carbon market project developers

www.cdmbazaar.net

The Gold Standard

A Swiss non-profit organisation that operates a certification scheme for premium-quality carbon credits

www.cdmgoldstandard.org

International Finance Corporation — Carbon Finance

Mobilises funds for a variety of measures aimed at reducing carbon emissions

www.ifc.org/carbonfinance

MicroEnergy Credits

Links microfinance institutions lending for clean energy to the carbon markets

www.microenergycredits.com

UNDP MDG Carbon Facility

Provides technical assistance and ensures that projects meet Kyoto Protocol standards while delivering benefits to the environment and broader human development goals

www.mdgcarbonfacility.org

UNEP Risoe Centre

Aims to incorporate environmental and development aspects into energy planning and policy worldwide, with special emphasis on assisting developing countries

www.uneprisoe.org

UNFCCC

Climate change convention with technology, financial mechanisms and more

www.unfccc.int

Voluntary Carbon Standard

A comprehensive quality assurance system used to account for greenhouse gas emission reductions and credits

www.v-c-s.org

World Bank Carbon Finance Unit and Community Development Carbon Fund

Facilitates financial rewards for the reduction of greenhouse gas emissions in developing countries through the use of carbon credits

www.wbcarbonfinance.org

Platforms

Acting as platforms, some organisations conduct advocacy and facilitate networking.

ADVOCACY**Alliance for Rural Electrification**

Aims to develop self sustained markets for renewable energies by providing technological and financial solutions

www.ruralelec.org

Climate Group

Works with government and business leaders to advance policies and technologies

www.theclimategroup.org

Electricity Governance Initiative

Collaboration of civil society actors, policy-makers and other stakeholders to promote transparency in decision-making processes concerning energy

www.electricitygovernance.wri.org

International Chamber of Commerce

Working to use the global economy as a force for growth, job creation and prosperity; includes extensive policy on energy

www.iccwbo.org/policy/environment

United Nations Foundation

Climate and energy team works with the UN to achieve universal energy access, improved efficiency and more

www.unfoundation.org/global-issues/climate-and-energy

NETWORKING**Canopus Foundation**

Provides business development assistance for social entrepreneurs in developing countries working in the field of clean energy technologies. Co-founded and manages in collaboration with Ashoka the Solar for All Initiative (www.sfa-pv.org)

www.canopusfund.org

Global Alliance for Clean Cookstoves

Public-private initiative to save lives, improve livelihoods, empower women and combat climate change by creating a global market for clean and efficient household cooking solutions

www.cleancookstoves.org

e8 Network

Promotes development through electricity sector projects via projects and human capacity building

www.e8.org

Ease Partnership

Compilation of over 40 case studies on sustainable energy and company network

www.ease-web.org

Energy Access Foundation

Supports the expansion of rural energy delivery capacity and engaging in microfinance

www.energyaccessfoundation.org

Energy for All

Partnership working to bring together key actors from a number of fields to share ideas, practices and drive change; includes case studies and many other resources

www.energyforall.info

Energy Future Coalition

Combines expertise and advocacy in bringing together business, labour and environmental stakeholders to identify new directions in energy policy; develops and brokers public-private partnerships

www.energyfuturecoalition.org

Global Leadership for Climate Action

Task force of world leaders addressing climate change through international negotiations; provides a framework for mobilizing political will to meet protocols as it draws input from high-level networks

www.globalactionnow.org

GVEP International

Partnership seeking to reduce poverty through access to modern energy services, operating in Africa and Latin America

www.gvepinternational.org

Household Energy Network

Network of practitioners, policy-makers, and business owners pursuing a more affordable and efficient energy sector; includes a journal and many resources

www.hedon.info

Partnership for Clean Indoor Air

Aims to promote safe heating and cooking practices through capacity building, technical assistance, project implementation, and knowledge management

www.pciaonline.org

Project Development Programme East Africa

GIZ programme on behalf of the German Federal Ministry of Economics and Technology that provides information packages and advice on markets and promotion opportunities in East Africa

www.gtz.de/en/weltweit/afrika/kenia/32110.htm

REDCO Alliance

Network of rural energy companies promoting innovation and capacity building to underserved households and businesses in developing and emerging economies

www.redcoalliance.org

Solar Cookers International

Promotes awareness of solar cooking and skills; includes publications and education resources

www.solarcookers.org

SW Solar

Overview of German solar companies and institutions and projects; provides information about rural electrification

www.rural-electrification.com

Further reading

All reports can be found on the Internet by entering the document title into a standard search engine. We have therefore omitted publishers and the place of publication in the following references.

REPORTS

The Secretary-General's Advisory Group on Energy and Climate Change (AGECC) (2010)

Energy for a Sustainable Future.

Calls for the development community to make energy a major institutional priority

Asian Development Bank (2009)

Powering the Poor.

Case studies focusing on different types of energy and project implementation

Deutsche Energie-Agentur GmbH (2010)

Renewable Energy Solutions for Off-grid Applications.

Providing electric power and heat for regions without grid power or connected to a weak grid.

Informs about potential and possibilities of renewable energies in off-grid environments

EASE Network (2011)

Business Models for Energy Access.

Provides an overview of 26 business models for energy access projects and markets

GIZ (2010)

What difference can a PicoPV system make?

Provides early findings on small photovoltaic systems — an emerging low-cost energy technology for developing countries

GVEP International (2009)

Cookstoves and Markets: Experiences, Successes and Opportunities.

Sets out to tackle the question of why the adoption of improved cookstoves has been so slow in developing countries

Hystra (2009)

Access to Energy for the Base of the Pyramid.

Examines energy access projects under way that target the poor

International Energy Agency (IEA) (2010)

Comparative Study on Rural Electrification Policies in Emerging Economies.**Keys to successful policies.**

This report analyses the policies of Brazil, China, India and South Africa, determining the pre-requisites to successful rural electrification policies

IEA/UNDP/UNIDO (2010)

Energy Poverty.**How to make modern energy access universal.**

Special report of the World Energy Outlook 2010 on the Millennium Development Goals

Lighting Africa (2010)

Solar Lighting for the Base of the Pyramid.

Overview of an Emerging Market.
This reports finds that Africa will be the world's largest market for solar portable lights by 2015

Practical Action (2010)

Poor People's Energy Outlook.

Presents the perspective of those living in energy poverty

Seep Network (2007)

Using Microfinance to Expand Access to Energy Services.

This research was aimed to support financial solutions for enhancing the usage and demand for modern and appropriate energy services

Christopher N. Sutton (2007)

The Role of the Utilities Sector in Expanding Economic Opportunity.

Focuses specifically on the role of utilities firms in creating wealth in the developed and developing world

UNDP (2010)

UNDP and Energy Access for the Poor: Energizing the Millennium Development Goals.

Positions UNDP as a partner for the private sector in providing energy to developing countries

UNDP (2009)

Bringing Small-Scale Finance to the Poor for Modern Energy Services: What is the Role of Government?

Report on providing modern energy options that are affordable for the poor

UNDP (2009)

Bridging the Divide Between Poverty Reduction and Climate Change through Sustainable and Innovative Energy Technologies: Scaling Up Sustainable Energy Innovations that Can Address Climate Change Concerns and Poverty Reduction Needs.

Argues that providing financing for innovative ideas, low-cost, low-emission, and pro-poor technologies are effective measures to harness their potential

USAID/GVEP (2010)

Market Survey on Possible Co-operation Institutions for Energy Financing in Kenya, Uganda, and Tanzania.

Market study of possibilities for alliances to increase access to investment finance and increase demand for energy products

WBCSD (2007)

Investing in a Low-Carbon Energy Future in the Developing World.

Examines how businesses and government can work together to overcome challenges

WBCSD (2002)

Sustainability in the Electricity Utility Sector.

Summary of a project focusing on sustainable development and challenges in the industry

World Bank (2008)

The Welfare Impact of Rural Electrification: A Reassessment of the Costs and Benefits.

Provides cost-benefit analysis of rural electrification based on field study

World Resource Institute (2010)

Power to the People.

Investing in Clean Energy for the Base of the Pyramid in India

WWF (2009)

Sun, Wind, Water, and More: Renewable Energy in WWF Field Projects.

Case studies on renewable energy approaches, including some with private sector involvement

Yale University (2010)

Making the Connection: Partnerships in Development Finance and Sustainable Energy.

Survey focused on organisations and programmes engaged in financial services focused on development and renewable energy

WEBSITES WITH CURRENT INFORMATION

B2B Renewable Energies

Online platform for renewable energies with information about international target markets

www.renewablesb2b.com

Energypedia

energypedia is a wiki platform that provides articles about renewable energies in the context of development cooperation

www.energypedia.info

Energy for development and poverty reduction

A blog updated by energy and development expert Douglas Barnes

www.energyfordevelopment.com

Green Energy Reader

Regularly updated review of moves towards clean, efficient renewable energy and green building

www.greenenergyreader.com

Improved Biomass Cooking Stoves

Designs for and information on stoves in developing regions; searchable by type or country

www.bioenergylists.org

Increasing Energy Access Through Enterprise — USAID

Presents information and tools to help small and growing energy service enterprises; includes case studies, presentations and other tools

www.energyaccess.wikispaces.com

International Clean Energy Analysis — Open Energy Info

Access to clean energy analysis tools, databases, methods and other technical resources; wiki-based system allows expansion of inventory

<http://en.openei.org>

REN21

Information about policies on renewable energies in countries worldwide

www.ren21.net

Acronyms

ADB	Asian Development Bank
BMZ	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (German Federal Ministry for Economic Cooperation and Development)
BoP	Base of the Pyramid
CDM	Clean Development Mechanism
CER	Certified Emissions Reduction
CSR	Corporate Social Responsibility
DEG	Deutsche Investitions- und Entwicklungsgesellschaft (German Investment and Development Company)
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Organization for International Cooperation)
IADB	Inter-American Development Bank
IEA	International Energy Agency
IFC	International Finance Corporation
IFC	International Finance Corporation
MFI	Microfinance Institution
NGO	Non-governmental Organisation
OECD	Organisation of Economic Co-operation and Development
PPP	Purchasing Power Parity
R&D	Research and Development
RESCO	Rural Energy Service Company
tCO₂e	Tonnes of CO ₂ Equivalent
UNEP	United Nations Environmental Programme
UNDP	United Nations Development Programme UNFPA
	United Nations Population Fund
VER	Voluntary Emissions Reduction
WBCSD	World Business Council for Sustainable Development
WRI	World Resources Institute

Endnotes

- 1 UNDP (2010) *UNDP and Energy Access for the Poor: Energizing the Millennium Development Goals.*
- 2 IEA/OECD (2010) *Energy Poverty — How to Make Modern Energy Access Universal?*
- 3 World Health Organisation (2010) *Clean Household Energy for All.*
- 4 IEA/OECD (2010) *Energy Poverty — How to Make Modern Energy Access Universal?*
- 5 UN Population Division (2009) *World Population Prospects: The 2008 Revision.*
- 6 WBCSD (2009) *Vision 2050 — The New Agenda for Business.*
- 7 IEA (2010) *World Energy Outlook 2010.*
- 8 IEA OECD (2010) *Energy Poverty — How to Make Modern Energy Access Universal?*
- 9 IFC/WRI (2007) *The Next 4 Billion.*
- 10 IFC/WRI (2007) *The Next 4 Billion.*
- 11 Survey by MicroEnergy International (unpublished).
- 12 Practical Action (2010) *Poor People's Energy Outlook 2010, p.4.*
- 13 www.eskom.co.za/live/content.php?Category_ID=961
- 14 REN21 (www.ren21.net)
- 15 WRI (2010) *Power to the People.*
- 16 These challenges correspond to those identified in the UNDP report *Creating Value for All — Strategies for Doing Business with the Poor.* The report shows how widespread market challenges are under conditions of poverty and identifies their roots in the absence of enabling market conditions.
- 17 World Bank (2010) *State and Trends of the Carbon Market 2010.*

Goals and method

The aim of the study behind this publication was to draw upon the wealth of practitioner experience and to distil their insights on building successful business models within the BoP. In compiling the fruits of this learning, we applied sound methods of modern qualitative research with the support of an academic panel of experts on energy in low-income markets.

First, we collected a list of 250 case studies on energy business models for low-income households. We then selected 35 cases from this list for in-depth analysis. The cases selected not only demonstrate successful examples of inclusive energy businesses, but contain a sufficient level of detail for analysis. Our selection was also determined by the need for a diverse set of cases in terms of region, technology and connection type in order to appeal to a range of inclusive energy practitioners. Figure 10 illustrates the classification of our selected case sample.

Our analysis of the selected cases was based on a shared protocol guided by the following main questions:

- **Business model elements:** How does business organise key processes at the customer interface, i.e., sales, payments, service and end of product use?
- **Development process:** What are the best practices in developing the business, from design through implementation and growth?
- **Context factors:** How does the political and economic environment influence the development of the business?

The case study survey was complemented by further research on the subject and its literature. Early findings for this desk-based research were solidified through interviews with 11 expert practitioners.

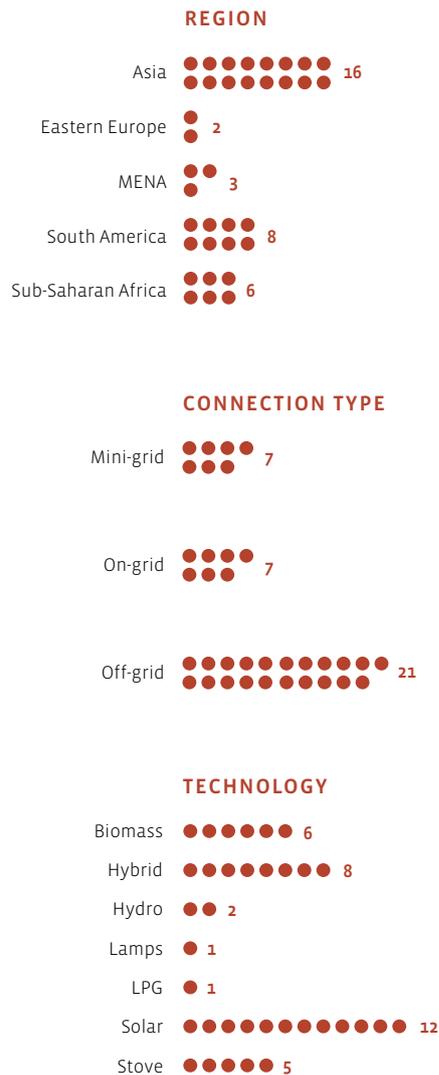
Case studies

The 35 case studies on the next page served as the empirical basis for building the energy business model generator.

Since all case studies except two can be located on the Internet, the publisher and place of location have been omitted in the following references. To find a desired document, simply enter its title in a standard search engine.

FIGURE 10

Overview of case studies by category



Approach

COMPANY	COUNTRY	SOURCE	CONNECTION	TECHNOLOGY
AES	Venezuela	WBCSD (2008) Connecting Low-Income Consumers: AES in Venezuela	On-grid	Hybrid
Barefoot College	India	EnergyAccess (2008) Barefoot College — Case Study (energyaccess.wikispaces.com)	Off-grid	Solar
BIOTECH	India	The Ashden Awards (2007) Case study summary: BIOTECH, India	Off-grid	Biomass
BP Solar	Philippines	WBCSD (2002) BP Solar: Municipal Solar Infrastructure Project — Philippines	Off-grid	Solar
BSH Protos	Indonesia, Philippines, India	Hystra (2009) Access to Energy for the Base of the Pyramid	Off-grid	Stove
D.light Design	India	The Ashden Awards (2010) Case study summary D.light Design, India and global	Off-grid	Lamps
e7	Madagascar	Hydro4Africa (2006) Madagascar: PPP hydro project between e7 and GTZ	Mini-grid	Hydro
ECAMI	Nicaragua	The Ashden Awards (2009) Case study summary Empresa de Comunicaciones, SA (ECAMI), Nicaragua	Off-grid	Hybrid
Edenor SA	Argentina	Miguel Angel Gardetti (2008) Edenor SA: energy and development for the base of the pyramid; In: Prabhu Kandachar and Minna Halme (Eds.), Sustainability Challenges and Solutions at the Base of the Pyramid. London: Greenleaf.	On-grid	Hybrid
EDF Mali	Mali	Mamadou Gaye (2008) Rural Electrification in Mali: Improving Energy Accessibility to the Rural Poor	Mini-grid, Off-grid	Solar, Deisel
EnviTec	India	GIZ (2007) Mit deutscher Hightech nach Indien. EnviTec Biogas und GTZ verbessern Stromversorgung mit umweltfreundlichem Biogas	Mini-grid	Biomass
ESKOM	South Africa	WBCSD (2003) Escom: electrification program for South Africa	On-grid	Hybrid
EVN AG	Bulgaria	EVN (2010) Projekt Stolipinovo (www.evn.at)	On-grid	Hybrid
Fundacion Pro Vivienda Social	Argentina	Hystra (2009) Access to Energy for the Base of the Pyramid	On-grid	LPG
Grameen Shakti	Bangladesh	The Ashden Awards (2008) Grameen Shakti, Bangladesh, Rapidly growing solar installer provides clean cooking as well	Off-grid	Solar, Biomass, Stove
Husk Power	India	Acumen Fund (2009) Husk Power Systems, Rural Electrification from Rice Husks	Off-grid	Biomass
IDEAAS	Brazil	UNC Kenan-Flagler Business School (2004) Distributed Solar Energy in Brazil: Fabio Rosa's Approach to Social Entrepreneurship	Off-grid	Solar
La Esperanza	Honduras	E+Co (2006) La Esperanza (www.eandco.net)	Mini-grid	Hydro
LYDEC	Morocco	Tarek Hatem (2008) LYDEC: Providing Electricity, Water & Sanitation to Casablanca's Shanty Towns	On-grid	Hybrid

COMPANY	COUNTRY	SOURCE	CONNECTION	TECHNOLOGY
Maison Energy	Morocco	Wafa Elgarah (2010) Maison Energy: Micro Enterprise for Rural Energy Access	Off-grid	Solar
MARD & SNV	Vietnam	The Ashden Awards (2010) Case study summary: Ministry of Agriculture and Rural Development (MARD), Vietnam and Netherlands Development Organisation (SNV)	On-grid	Biomass
PEC Luban	Poland	Boleslaw Rok (2008) PEC Luban: Using Straw as an Engine for Sustainable Local Economic Growth	Mini-grid	Biomass
Philips Design	India	Philips Helping 400 million people give up smoking	Off-grid	Stove
Beijing Shengchang Bioenergy S&T Co	China	Charlie Dou (2010) Beijing Shengchang Bioenergy S&T Co.: A Leading Bio-Energy Benefits Both Business Itself and Local Farmers	Off-grid	Stove
SEEDS	Sri Lanka	Magdalena Gampp (2008) Financing Small-Scale Solar Energy in Developing Countries. Rural Electrification through Microfinance and Solar Home System Dissemination, Bachelor Thesis. University of St. Gallen.	Off-grid	Hybrid
SELCO	India	Sourav Mukherji (2010) SELCO: Bringing Sunlight to Rural India	Off-grid	Solar
SKG Sangha	India	The Ashden Awards (2010) Case study summary: SKG Sangha, India	Off-grid	Biomass
Solar Aid	Zambia	The Big Give (2010) Micro solar businesses in Zambia (www.thebiggive.org.uk)	Off-grid	Solar
Solar23	Senegal	Solar 23 (www.solar23.com)	Mini-grid	Solar
Soluz Honduras	Honduras	Energy Access (2008) Soluz — Case Study (energyaccess.wikispaces.com)	Off-grid	Solar
Aprovecho Research Center and Shengzhou Stove Manufacturer (now Stovetech)	China	The Ashden Awards (2009) Making affordable, efficient stoves for the masses: Aprovecho Research Center and Shengzhou Stove Manufacturer, USA/China	Off-grid	Stove
Sunlabob Renewable Energies	Laos	Andy Schröter et al. (2007) PV-Hybrid-Dorfstromversorgung in Laos — Profitabel für Versorgungsunternehmen mit bezahlbaren Preisen für die ländliche Bevölkerung?	Mini-grid, Off-grid	Solar
Tecnosol	Nicaragua	The Ashden Awards (2010) Case study summary: Tecnosol, Nicaragua	Off-grid	Solar
Temasol	Morocco	Brahim Allali (2010) TEMASOL: Providing Energy Access to Remote Rural Households in Morocco	Off-grid	Solar
Toyola	Ghana	Robert Darko Osei (2010) Toyola Charcoal Stove: Improving the Environment and Health of the Poor in Ghana	Off-grid	Stove

About Endeava

Endeava's mission is to inspire and enable enterprise solutions to development challenges.

As an independent institute, we work closely with partners from all sectors, including development agencies, foundations, universities, and companies both large and small. Together with our partners, we build, share and apply knowledge about how to develop and implement inclusive business models.

Endeava was founded in September 2010 as a successor to the "Emergia Institute", which targeted inclusive business development. Building on this experience, Endeava draws upon a carefully cultivated global network of experts when carrying out projects with partners from the public, private and non-profit sectors. The results of these efforts have been incorporated into our diverse set of activities, which include the BoP Learning Lab in Germany and publications such as "Inclusive Business Guide", "Creating Value for All — Strategies for Doing Business with the Poor" (published by the UNDP), "Towards Triple Impact — Toolbox for Analyzing Sustainable Ventures in Developing Countries" (published by the UNEP) and "Learning to Insure the Poor — Microinsurance Report" (published by Allianz SE).

For more on what we do, visit us at www.endeava.org.

About the "Energize the BoP" training

Endeava offers training for practitioners interested in developing energy business models for low-income markets. The training is tailored to meet the specific needs of technology and energy providers as well as consultants. As an interactive 2-day workshop, the training integrates the in-depth research presented in this publication with practical guidance on how to design and develop inclusive business models. It also provides a unique opportunity to network with other companies, experts and donors. This training can also be provided to individual companies on demand.

For more information about the workshop and scheduling, visit us at www.energize-the-bop.net.

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Fishermen on the Kenyan shore of Lake Victoria use energy-saving lamps, which can be recharged at small solar “filling stations”, to attract fish. Prior to the introduction of these lamps, the fisherman relied upon harmful kerosene lamps to lure their catch. The “Energy for All” project initiated by OSRAM and the Global Nature Fund offers them a affordable and healthy alternative.

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The energy business model generator is designed to support entrepreneurs and companies in developing sustainable businesses that provide of clean, reliable and affordable energy services to low-income markets. It makes the business case for venturing into the low-income market, outlines solutions for interacting with low-income households, and advises on how to manage critical resources along the development process — from design to implementation to growth. The generator includes, an extensive support directory of useful contacts and information sources of use to entrepreneurs in the field.

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