From Gap to Opportunity: Business Models for Scaling Up Energy Access

In partnership with Austria
Executive Summary

ABOVE: Access to modern energy solutions allows low-income consumers like this artisan to be more productive (Credit: IFC)
While there is broad recognition that lack of access to modern energy has major implications for development, the energy access gap is increasingly being seen as a market. Given the vital role it plays in socioeconomic development, providing improved access to energy has typically been the role of state-owned power utilities, rural energy agencies, international development and nongovernmental organizations, and other public entities. However, with growing recognition of the potential for “base of the pyramid” (BOP) customers to become fast-growing markets for goods and services on the one hand, and the emergence of novel models for serving them on the other, the energy access gap is increasingly being recognized as a commercial opportunity, too. The nature of that market, and the segments within it, is the focus of this report.

Sizing the energy access market opportunity

Each year, the poor spend $37 billion on poor-quality energy solutions to meet their lighting and cooking needs. This represents a substantial and largely untapped market for the private sector to deliver better alternatives. It is estimated that over one-fifth of humankind lacks modern energy services and that the cost of providing “universal access” to the electricity grid and decentralized electrification systems would be in the tens of billions of dollars annually (if the institutional and structural issues in the utility sector could be addressed to enable such a setup).

This report posits, however, that an estimated 90 percent of (poor) people already spend so much on kerosene lamps, candles, and disposable batteries to meet their lighting needs that they could afford to purchase better options, such as solar lamps. Even more people could afford efficient cookstoves because of the fuel cost savings they offer. Those who are skeptical about the prospect should consider the spectacular takeoff of mobile phone devices. In Africa, the number of subscribers using devices that cost as little as $20—which is at the low end of the cost of many modern energy access devices—has been increasing at a rate of 30 percent annually for the past 10 years. On a continent of 1 billion people, of which some 73 percent live on less than $2 a day, there are currently 620 million cell phone subscriptions, and the user base is expected to hit 735 million in 2012.

Exploring how companies are serving the market

The good news is that pioneering companies are already making money from selling superior energy access options to households spending as little as $2 on lighting and $1.50 on fuels for cooking each month. A number of these players—ranging from international social enterprises to local small and medium enterprises (SMEs), domestic conglomerates, and multinational corporations—have already established significant customer bases, or hold promise for scaling up given the right conditions. While this is still a nascent sector, many businesses are rapidly moving beyond being cottage industries and are successfully serving tens of thousands to hundreds of thousands of customers. Some companies are seeing profit margins of 10 percent to 30 percent, often with fairly small subsidies on capital costs (but not on operational costs) or no subsidies at all.

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We explore three ways in which companies are providing improved energy access:

- **Household-level devices and systems**—including solar lanterns, solar home systems, and improved biomass cookstoves—offer a basic first step up the energy ladder and are often the most cost-effective option for the dispersed rural poor, and for those who live in urban slums.

- **Community-level mini-utilities**—often powered by hydro or diesel generators but increasingly using biomass, solar, and wind energy—provide households and small manufacturing and commercial firms with electricity, often for much less than what they currently spend.

- **Grid-based electrification**—is proving to be a viable option for new customers in many previously unserved urban areas. “Informal consumers” are also being regularized into bill-paying clients.

This study of over 100 enterprises shows that with the right business models and enabling conditions, the private sector can play an important role in helping to close the energy access gap. Each of these market segments exhibits particular characteristics in terms of target consumers, technologies, delivery approaches, and economics. They also require specific business ecosystem conditions—that is, legal provisions and regulatory frameworks—for success. But this analysis of commercial ventures from around the globe shows that when innovative companies, frontier financiers, and enlightened policymakers come together, business can successfully deliver valuable energy services to the poor.
Household-level systems and devices

The household-level systems and devices industry has attracted the greatest private sector innovation. With barriers to entry fairly low, dozens of companies are active across Africa, Asia, and Latin America. Local and international start-ups are growing quickly and some multinational corporations are exploring entry routes into the market. Solar lanterns priced between $20 and $50 are often the most affordable way for poor customers to purchase improved lighting services. Rooftop solar home systems (SHS) that cost $300 to $500 can provide sufficient power for a household or small retail business and have a fairly long history among both entrepreneurs and development institutions. Companies are also selling efficient biomass cookstoves for as little as $5 to $25. These stoves offer improved fuel consumption of 30 to 50 percent, meaning dramatically reduced operating expenditures, reduced indoor air-pollution levels, and a reduced burden on the environment.

The business models adopted by lighting and cooking device companies vary. Many of the smaller international solar lantern players, in particular, focus on design and marketing, and outsource their manufacturing. Cookstove companies are often indigenous SMEs that employ artisans to make no-frills devices tailored to local tastes and conditions. But a few international players are entering the stoves space, offering more sophisticated and generally more expensive products. They prioritize design appeal and product quality, and often work with public sector partners to help market stoves, and to spread the word about their benefits. SHS players are typically active across much of the value chain. Given that system sizes and add-ons are best designed to address local conditions and user requirements, many of them develop and assemble components, and provide comprehensive installation services and after-sales support.

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Affordability is an obvious success factor for devices, and firms try to build this into as many aspects of the business as possible. Homegrown cookstove SMEs often leverage open-source designs (typically shared by nongovernmental organizations [NGOs] and development partners) while concentrating internal efforts on low-cost manufacturing using locally available materials, including cheap scrap metal. In the lighting market, economies of scale have led to solar lantern and panel prices dropping sharply, thus increasing their relevance to low-income consumers. But research and development (R&D), too, has played a role in the emergence of very low-cost products. “Solar kits” have surfaced as an alternative to traditional SHS—which can be too expensive for commercialization at scale in many markets without either direct subsidies or the availability of large amounts of concessional finance that the SHS provider can on-lend to customers, thus helping to spread payments over time. Solar kits are portable systems that allow households to run multiple lights and charge small devices. Priced at $100 to $200, these kits are more affordable than SHS and require no installation or regular maintenance. Smartly designed solar kits are also proving to be aspirational, helping to increase market penetration. On the payment side, rental and pay-as-you-go billing approaches are helping to reduce the up-front costs for consumers.
For higher-priced items such as SHS, companies must typically offer consumer credit to make them affordable; this is often done in partnership with microfinance institutions that have access to concessional financing for on-lending to consumers. Despite the historical emphasis on the importance of microfinance for helping BOP customers access products, many companies are seeing that this may not be needed for smaller-ticket items, such as solar lanterns and cookstoves, especially since technology costs have fallen. A handful of firms are tapping carbon finance, notably in the cookstove space. However, they are finding that significant support is needed to get through the process of applying for credits.

Fundamentally strong distribution networks and supply chain financing are “make-or-break” for devices businesses. In order to effectively penetrate BOP markets that are often in hard-to-reach rural areas, some companies sell devices through partners that have largely overcome last-mile distribution challenges to sell or distribute their own offerings, notably NGOs and microfinance institutions. The results have been mixed since incentives are not always aligned. Most companies stick to traditional retail channels in urban areas while establishing their own sales force in rural communities; typically, these rural salespeople go door-to-door in their own and in neighboring villages, demonstrating how products work and building trust that the seller can be traced if the product needs repair. Still others incentivize dealers to stock their items by offering a disproportionately high percentage of profits, leaving them to manage marketing, working capital, and other downstream issues. However, financing the length of the distribution chain, from the import of containers to wholesalers, through to distributors and then on to often many levels of retailers, can be costly.

Financing distribution is typically a natural comparative advantage of larger companies. Multinational corporations, in particular, are leveraging strong balance sheets, taking advantage of their brand names to get into the game and then quickly developing strong supply chains—from warehousing infrastructure to distributor credit facilities—to capture market share. There are, however, early signs of smaller players exploring innovative ways to deal with working capital by selling to large, nonconventional dealers—in some cases, local conglomerates or multinational corporations—that serve as aggregators and are well placed to provide the necessary trade finance to retailers downstream. In one instance, a major oil and gas company interested in the access market is establishing distribution channels (that tap its petroleum filling stations in selected countries) for solar lanterns, with the jury still out as to whether it will develop a proprietary lighting product.

But device manufacturers also have to work hard to create consumer confidence in new technologies. As with any new equipment supplier, leading-edge device players are faced with cautious customers reluctant to risk their money on unfamiliar technology. Overcoming this can become a major marketing cost—exceeding conventional brand-building expenditure. Manufacturers have used a variety of highly effective low-cost tactics to overcome this barrier, such as word-of-mouth marketing, publicly funded radio campaigns, and roadshows. But, for many, awareness raising and market development is an important financial sink; companies report that this typically adds 6 percent to 10 percent to device costs.

Device companies thrive in an ecosystem where the playing field is level. That is, when there is sufficient technology awareness, product standards exist, and tax and duty regimes do not discriminate against them. When these factors are combined with training and support of entrepreneurs, finance for growth, and in some instances carbon credits to help bring down the cost (of cookstoves in particular), successful device firms emerge and grow rapidly.

**Community-level mini-utilities**

Small, decentralized mini-grid businesses—we call them “mini-utilities”—are found in poor areas across the developing world and can offer sufficient power for both household and productive use. These entities vary enormously in scale but are generally from 30 kilowatts (kW) to 500 kW and use a range of technologies, from simple diesel generators to hydropower, biomass, photovoltaic, or hybrid systems. Many mini-utilities deliver electricity at $0.20 to $0.50 per kilowatt hour (kWh), allowing most families to meet basic energy needs for less than $10 per month. This is a significant expenditure, but the economics are attractive in many places because households already spend as much on kerosene and charging services for small appliances. Importantly, mini-utilities often provide sufficient power for activities such as water pumping, milling, grinding, and other forms of processing, thus supporting local economic development.

Profitable mini-utilities have an adequate demand for power; a reliable, cheap fuel source; and good bill collection approaches. For mini-grids to size systems optimally and operate efficiently, they require sufficient baseload. This is often achieved by serving a mix of household and SME customers, with the latter providing a more predictable demand for electricity over time, and the ability to pay for it. While diesel is often a preferred fuel given its availability, many companies use renewable energy to keep costs down and more predictably stable. Where available,
biomass feedstock is a good option, but it also creates several challenges in controlling supply that mini-utilities must overcome. On the revenue management side, some companies are installing low-cost meters and switches that allow for easy disconnection in the case of nonpayment. Others charge fixed monthly fees for a limited service, such as sufficient power for a couple of lights and charging of appliances, generally collected a month in advance. Beyond formal billing systems, developing close ties to the community is important, and successful mini-utilities work hard to be an integral part of the community. Interestingly, formal business skills are not an initial requirement for mini-utility success, but they do become critical for scaling up beyond a single site or a handful of sites. This is especially true for mini-utilities using renewable technologies, which are more sophisticated or have higher maintenance requirements than diesel generators.

Mini-utilities thrive in an ecosystem where they have the right legal and regulatory framework and good financing options. Simply put, mini-utilities must be allowed to operate and to do so under a regime where tariffs allow an attractive return on investment. Perhaps surprisingly, this is not always the case—in some countries mini-utilities are not permitted and in others they are subject to onerous regulations or non-cost-reflective tariffs. Where the right environment exists, profitable businesses operating one or a handful of plants can be found. But there are circumstances where some degree of subsidy is provided to make mini-utilities profitable. This is generally the case where governments are seeking to encourage private developers to enter the market but where tariffs alone are not commercially sustaining, where low population density increases the cost of building distribution networks, or where consumers are simply too poor to support the required revenues. In most instances, public financing comes in the form of a capital subsidy, ranging from 30 percent in India to up to 80 percent in Mali. More broadly, these companies need sizable investment to scale, yet most struggle to raise sufficient debt and equity for this. We believe that the ongoing success of mini-utilities will be linked to their ability to access these funds.

Grid-based electrification

For almost all governments, universal grid-based electrification is the endgame, yet levels remain very low in many parts of the world. Grid-based electrification supports economic and social development imperatives by providing the quantity and quality of services required for large energy-intensive industrial activities. It also allows for economies of scale in generation and efficiency in establishing peaking and back-up plants, reducing overall system costs. But only 30 percent of the population in Sub-Saharan Africa and 60 percent in Southeast Asia are connected to a network. Even when access to the grid is available, customers in many developing countries are plagued by unreliable power. Where system inefficiencies and theft create significant losses, utilities are unable to cover their costs. The result is that companies struggle with solvency and are unable to provide high-quality service to existing customers, let alone deliver new connections. Hence, despite having “access,” it is not unusual for households and businesses to rely on expensive power from back-up generators to make up for poor utility service.

There is a market opportunity to connect previously unserved households profitably. Beyond the prospect of providing improved service to existing grid-connected customers, some companies—most notably in urban and peri-urban areas in Brazil, India, and Colombia—have through choice or circumstance become smarter at serving the poor. In some cases, they have achieved this by turning households and businesses that were purchasing excessively expensive and often intermittent services from informal suppliers in their communities into utility customers. In other
instances, they have taken money off the table by regularizing consumers who may not have formally been paying for the services they used. All have typically succeeded by installing prepayment meters, providing payment flexibility, offering consumer finance to encourage the use of legal connections and, more broadly, operating their businesses efficiently.

Grid extension can benefit from policies that explicitly support private participation. This means removing limits on service areas where it makes sense, relaxing restrictions on serving informal settlements, allowing flexibility in tariff regulation, and financing the connection of the end customer.

But high costs and limited consumption by low-income consumers mean that purely commercial models for grid-electrification are still rare; public funding has played an important role in the success of most truly large-scale extension programs. The capital investment required to generate power and extend lines means that grid extension is costly. Meanwhile many unconnected customers have low incomes and therefore have limited consumption, resulting in slim returns. In addition, a large portion of unelectrified urban households live in slums, with the implication that they are unlikely to have legal tenure and may thus not qualify for—or are prohibited by municipalities from formally accessing—electricity services. Where providing widespread grid-based access for the energy poor has been successful, as in China, South Africa, and Vietnam, this has largely been a result of explicit policies mandating it and has been backed by significant financial commitments from the public purse. Commonly, governments choose to award concession contracts for new or privately owned distribution companies to serve currently unserved areas. This can also be combined with smart subsidies to extend access even further than would be viable on a purely commercial basis. Private companies often bring access to capital and new management approaches, which allow them to increase connections more quickly than public utilities, while improving the bottom line.

**Acting on the findings: what can be done to scale-up energy access success stories?**

There is a real market opportunity for closing the energy gap; however, scale-up and replication challenges will need to be addressed. This report asserts that energy access is not just a development gap, but also a real market opportunity for the private sector. Around the world, entrepreneurs are already seizing the opportunity to profitably supply appropriate, affordable goods and services to the poor. But despite the progress made in technology innovation and delivery approaches over the past decade or so, there remains much to be done before this becomes a more “mainstream” area on par with mobile telephony, for example. In particular, very fundamental scale-up and replication challenges will have to be addressed if the sector is to achieve its potential. There are a number of areas on which operating companies, policymakers, and impact investors (social venture capitalists and donors) can focus to further catalyze commercial activities in energy access.

**Refining business models: challenges for operating companies to address**

Companies should continue to design for radical affordability in every area of operations. Businesses serving the BOP invariably require volume to make up for typically low margins. Affordability is critical for this and can continue to be achieved through innovation on product and service design, business model innovation, and provision of consumer finance, either directly or indirectly.

Perhaps the most important factor for all device companies is to secure robust distribution channels. Partnering strategically with companies that have already established strong distribution channels is one way of getting products to market more quickly. For example, tie-ups with mobile telephony network operators could be a good start, because the products are complementary (charged cell phones benefit the mobile operator’s average revenue per customer) and they require similar supply chains for getting goods to customers and financing them along the way. Equally, if a company has been able to develop strong networks of its own, it could leverage this asset to cross-sell other products. These might be other energy devices (such as cookstove manufacturers that also sell solar lanterns) or other products that would be desirable to end users such as radios, irrigation pumps, and water purifiers. Device players, that is, companies in the device market, should also concentrate on ensuring sufficient working capital to support retailers in stocking products; in many cases, this will require partnering with firms able to provide such financing.

For mini-utilities, the operating basics are focused on innovative approaches to developing multisite systems. Once they have mastered the reliable supply of low-cost fuel and secured sufficient demand, most companies struggle to find a replicable business model that allows them to leverage the economies of scale that are critical for growth. While there are no easy remedies, one option to explore could be the “anchor client” model. Here, a mini-utility would partner with mobile network operators...
(to manage the power needs of off-grid base stations) or other businesses, such as commercial farms or extractive industries, and in parallel, sell electricity to close-by communities. Another approach could be to supply rural government institutions such as agricultural extension facilities, clinics, schools, and possibly railway installations with power on a contract basis and then to build community mini-grid operations around such demand centers. Or they could provide power on an off-take agreement to existing mini-grids, for instance, remote systems operated by the central utility. This would allow the central utility to focus on increasing connections rather than adding off-grid capacity, and likely reduce overall costs of operations if it were based on renewable energy rather than diesel generation. Contracts with any of these entities would need appropriate advance payments or guarantees, and long-term agreements to serve multiple areas.

If growth were to take off, mini-utilities would need to develop the right span of control over dispersed systems to manage the operating complexity and resulting overheads that typically come with running several dispersed systems. One idea that could help businesses scale efficiently is an “umbrella company” that plays, among other roles, a contract negotiation and governance function, assists in raising financing, provides resource assessments and strategic planning advice, and procures equipment centrally.

For grid-based utilities, the basics fundamentally mean being fit for purpose, which is achieved by enhancing system efficiency. This begins with investing in reducing both technical and nontechnical losses. While the skills and access to capital that have led to large-scale grid extension in some countries will take time to replicate in others, many more straightforward tactics can be employed universally. These center on preventing theft, managing payment risk, and introducing flexible payment options. Utilities in Brazil, Colombia, India, and Uganda provide evidence that such measures can lead to enhanced utility commercial viability and, in turn, (often aided by smart subsidies), increased connections for the poor.

To succeed over the long term, companies need to play to their strengths and build a compelling business case—and a strong development story—and should consider professionalizing their management teams in order to secure financing and grow their businesses. Smaller companies, especially those that are locally run, have several advantages. They are often nimble and have low costs, good knowledge of the market’s product preferences and ability to pay, and have customer reach through innovative networks. Larger firms typically have deep pockets; broader management expertise; and some value chain advantages including procurement, convening power, and the ability to scale across geographies. But this alone is not enough to be a successful player in the long term. Given that many start-ups (especially the device manufacturers) begin life as social enterprises, the social benefits of their endeavors are usually well communicated. Potential investors are looking for both a strong business case and a great story about potential development impact; rarely is the latter sufficient for consistently attracting capital, even from impact investors. Hence, a well thought out commercial business plan is fundamental to securing financing, and, fairly soon after they get going, smaller firms should also think about how best to professionalize their management teams to ensure that they take the business forward and help it grow.

Larger companies making tentative forays into the market should ensure that such ventures are given the required resources and internal visibility. While they may begin below the top-management radar screen, these ventures should quickly be showcased within the company—as a CEO-sponsored effort, for example. They would do well to use this platform to leverage core competencies, from distribution to procurement, across the business. And, here too, capital and strong management skills are needed for them to grow. So, an initiative may be incubated in the corporate social responsibility department, or another “soft start” area of the business, but cannot be allowed to remain there. Once sufficient time has been given to nurturing an innovative model, it must be treated commercially and resourced accordingly.

Rethinking policy: Roles for governments and their development partners

For policymakers—that is, governments and the development partners with which they work—leveraging business as far as possible to increase energy access should be a priority; this strategy would allow public funds to be directed toward reaching the “last mile.” As the examples in this report show, conducive policy can help to attract the private sector to all three energy access markets. This means that household-level systems and mini-utilities should be recognized in policies as good options, and be fostered accordingly. It also means that the private sector should be seen as part of the solution; development imperatives and profits need not be incompatible. If policymakers encourage business to address a sizable portion of the access gap, they can concentrate their own limited public funds on those segments of the population that can only be served through public means. Meanwhile, in order to ensure economic efficiency, those public funds that the private sector accesses would be limited to closing the “viability gap”—that is, the shortfall between revenues that customers are able to contribute and those needed for enterprises to be financially workable.
While energy access can, in many instances, be a complex political issue, policymakers would do well to resist giveaway programs and unrealistic promises where markets exist. First, smart subsidies can be an invaluable tool for providing services to the poor. But, carelessly thought through “giveaways” can distort the market and limit the success of otherwise commercially viable offerings. Customers who are willing and able to pay the full price for a product or service will of course hesitate to do so if they know that others received a giveaway and that they may be next to enjoy this benefit. Second, if they favor certain types of products, giveaway programs risk stunting innovation and encouraging companies to manufacture according to specifications that are not always optimal for the market. Finally, free products also deter businesses from investing by creating risk that they will have to compete with giveaways.

Policymakers should consider removing discriminatory import tariffs across energy access products. This report illustrates the ways in which many governments impose penalties on modern energy access products that are higher than the duties and taxes on conventional energy products. Often the effects are discriminatory and perverse, creating a bias in energy provision toward a better-off grid-connected population and away from poorer households, and toward conventional rather than renewable generation sources. Countries that have instituted successful renewable energy access programs have typically relied on removing such tariffs.

For mini-utilities, there are a number of supportive policies that can be implemented, including rethinking service areas, instituting appropriate “light-handed” regulation, and creating a solid revenue framework for firms. Rethinking service areas involves being clear on where potentially competing grid extension projects will head, and relaxing exclusivity on who can operate in other areas. Instituting appropriate “light-handed” regulation means streamlining requirements for SMEs operating mini-grids, instead of applying rules in this subsector that were originally designed for large utilities. Creating a solid revenue framework for companies means establishing market pricing for mini-utility tariffs, subsidizing connection costs where needed to close the viability gap and, if appropriate to the business model, helping to manage payment risks for service contracts with large offtakers, including incumbent utilities that buy excess power.

For grid-based access, public-private partnerships such as concessions hold the potential to extend reach when they are carefully structured with incentives to connect end users. For grid access to be successful, service areas need to be prioritized, subsidies structured to cover viability gaps, and delivery mechanisms put in place to ensure that concessionaires are each implementing their part of the bargain as promised, or alternatively, allowing for regulatory counterparts to adjust contracts where this is below par.

Refocusing financing: Opportunities for impact and commercial investors

Investors can play a strategic role in helping to catalyze commercial approaches to improved energy access. Commercial lenders, social venture capitalists, local development banks, philanthropists and international development agencies would do well to keep investment mandates broad and beyond a single technology. This will attract a wider selection of promising companies to invest in and build a stronger portfolio. Investors should also establish deal marketplaces and local presence to discover hidden gems. Without these, it will be difficult to identify those lower-profile companies that hold great promise—many of which may initially be community-level efforts.

First, financing from both impact and commercial investors is needed at various stages of the business life cycle. In the energy access industry, there are roles for impact investors (particularly at the earlier stages) and commercial investors (especially for growth capital), but these should be directed at the needs of the investable companies. While innovators often start as social ventures, they have the potential to become sizable double bottom line companies.

But to do so, they need help from impact investors to become bankable. Support could take the form of start-up grants, concessional financing at attractive terms, or loan guarantees to allow firms to borrow from commercial banks, for example. Alternatively, support could be used to guarantee revenue streams, for instance from large but perhaps less creditworthy offtakers, such as entities that serve as anchor clients for mini-utilities. Given the difficulty in identifying and assessing individual companies, it would make sense to channel programmatic monies via wholesaling mechanisms: this means that impact investors should work with intermediaries that are set up specifically to support a portfolio of energy access businesses rather than attempt to cherry-pick “winning companies” themselves. Commercial investors should then address deal size, especially the “missing middle,” typically between $50,000 to $100,000 and $3 million to $5 million, while providing both debt and equity at the start-up phase and throughout the company life cycle. In this market, there is also a particular need for trade finance and carbon prefinance (to support the carbon credit registration process, and front-load payments for emissions reductions) for many companies.
Second, both investment and enterprise development support are fundamental to company success. Hence, at the individual company level, funds for business model refinement and management capacity building should be coupled with financial investments. The goal should be to help executive teams implement organizational structures and operating approaches and to develop robust growth strategies that allow the business to really scale. This is a model common in venture capital firms, which provide early-stage firms with active guidance designed to ensure that the investee delivers a suitable return. At the subsectoral level, donors can also help to support the design and testing of business models for companies operating at the frontier in energy access where there are difficult opportunities with high potential. This is the case, for instance, in the mini-utilities subsector, where profitable businesses have difficulty growing beyond a few isolated systems. Impact investors could potentially help to demonstrate proof of concept of scalable models by partially funding an umbrella firm setup or franchising plan.

Third, donors can help reduce first-mover costs by addressing public good issues, namely providing market intelligence and information on the availability of resources and helping to build consumer trust and awareness. As with all emerging sectors, there are high first-mover costs in the nascent energy access space. Certain critical inputs to the development of a business venture may be prohibitively expensive to secure. Many such inputs can also be seen as public goods. These include collecting information on the availability of resources (such as biomass or hydropower potential) needed by mini-utilities, and gathering market intelligence on local customer spending patterns and preferences to help device players refine offerings. The same is true for building consumer awareness of and trust in new technologies, and putting into place appropriate standards to ensure that high-quality products enter the market as a whole.

Finally, it is important to have effective institutional capacity to deliver on energy access targets. Governments should consider establishing “delivery” units specifically tasked with managing the rollout of targeted energy access efforts including, as applicable, market-orientated programs to stimulate device uptake, mini-utility development, and grid extension programs. Effective local standards agencies for device manufacturers and regulatory bodies to manage mini-utility power purchase agreements or large electrification concessions are also needed. These areas can all benefit from donor funds.
EXECUTIVE SUMMARY

ABOVE: MODERN ENERGY ENABLES SIMPLE TASKS SUCH AS COLLECTING WATER AFTER DARK (CREDIT: IFC)
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