

Title

Financing New Business Models to Expand Energy Access in Emerging Markets: A Case Study and Recommendations for Development Finance

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Abstract

Over 1.5 billion people worldwide lack access to electricity. Perhaps a billion more have unreliable connections, only receiving between 4 to 12 hours of power per day. The energy-poor often spend 20% or more of their incomes just to meet their essential needs for lighting. Globally, they spend over \$50b per year on very poor solutions, such as kerosene fuel for small lanterns, which are dangerous, dirty, and dim.

The good news is that effective decentralized energy solutions already exist. Small-scale solar home lighting systems, for example, can meet the essential energy requirements of a household or small business. Small solar PV systems can provide multi-room lighting, mobile-phone charging, and power for small DC appliances such as electric fans for cooling and mosquito control.

The problem is that because these clean energy technologies involve significant up-front costs, they are not immediately affordable to the energy-poor. Studies show that consumers are willing to pay for regular energy delivery, but few can afford the high up-front costs associated with the installation of electricity infrastructure.

In several markets around the world, new companies and new business models are emerging to tackle the development challenge of expanding access to clean, reliable electricity. These companies are pioneering for-profit business models that promise to advance the development objective of improving energy access.

A key barrier to the expansion of these innovative models is the lack of availability of appropriate working capital.

This paper presents a case study about the work of one such company that is selling solar-as-a-service to energy poor households and small businesses in rural India. Simpa Networks is developing a for-profit business model that aims to attract private capital in order to scale up into a commercially sustainable model. The paper identifies a critical opportunity for development finance and philanthropic capital to

help energy access companies in their early years to prove the viability of their models at a smaller scale, in order to ultimately mobilize mainstream commercial capital to achieve massive scale.

The Challenge

The Problem of Energy Access

Worldwide, approximately 1.6 billion people have no access to electricity and another 1 billion people have extremely unreliable access. Without ready access to electricity, the poor depend on kerosene lanterns and battery-powered flashlights for light. They are unable to break the cycle of poverty because they cannot take advantage of the myriad productive uses of energy. Access to energy is essential for a family's economic livelihood, health, safety, educational achievement, and quality of life.

It's Expensive to be Poor

Kerosene lanterns are dangerous, dirty, and dim. Worse, they are very expensive to operate. And yet, in most markets, kerosene lanterns are the most common lighting system. For a person with little or no savings, no access to formal credit, and low and uncertain income, the selection of kerosene lighting is eminently rational. Kerosene lighting has a low initial purchase price and offers a flexible pattern of expenditures over time. The consumer can choose how often and how brightly to burn the lantern, and many consumers often choose to forego light entirely for periods when income is unavailable. The kerosene light – with its high operating costs, its many dangers to health and home, its poor quality light and noxious fumes – has, thus far, been the best choice available.

The Opportunity

A \$100b Global Market

Individual consumers in many emerging markets are making less than \$10 a day, with the poorest spending up to 30% of their income on inefficient and expensive means of providing light and accessing electricity. Worldwide, low-income consumers collectively spend about \$38b per year on kerosene for light, and another \$10b paying others to charge batteries and mobile phones. Small and medium-sized businesses (SMEs) have even greater demands, as reliable access to electricity can improve incomes in many ways. For them, energy supply can drive new income, which can drive more demand for energy. Considering the upfront investments required, there is

likely a \$100b global opportunity for small-scale distributed energy solutions, with no clear market leader.

Modern energy systems that meet these lighting and basic electrification needs are on the market for \$200-\$400 retail. These systems typically include a solar panel, battery, charge controller, at least 3-4 lighting points, a mobile phone charging port and power for charging or powering small DC devices. These solar home systems (SHS) have proven to be very desirable to consumers, who immediately recognize the health, educational, and income-generating benefits. Yet households cannot afford the high up-front cost of a quality solar energy system. They thus remain locked into expensive fuel-based lighting and battery charging fees. Over the 10-year life of a quality \$200-\$400 SHS, households will instead spend \$1500-\$2000 on kerosene, candles, batteries, and phone charging. They are paying more than they need to, because they are liquid asset poor: unable to save up enough money to make a large single purchase.

In India, as in many developing country markets, energy-poor households and SMEs can actually afford a small solar home system – but only if they could pay for such a system over time, in small, flexible increments. That is, if the pricing model matched the pricing model they are already using for kerosene, candles, batteries, and phone charging.

Clean Distributed Energy: The Second Great Leapfrog Opportunity

In the energy sector, there is now an opportunity to leapfrog the traditional coal-fired grid and move to a model of clean, distributed energy generation and consumption. To realize a world in which everyone has access to clean, abundant, and modern energy, it will be critical to leverage, the now ubiquitous, mobile phone networks and replicate the successful pay-as-you-go pricing that accommodates the mass market.

Just a decade ago, there were only 5 million mobile phone connections in India. Then mobile operators introduced prepaid, pay-as-you-go pricing plans. Today there are over 900 million mobile phone connections in India. 95% of these are prepaid, pay-as-you-go. The DTH (direct-to-home, satellite dish TV) sector is another example of a sector that has achieved mass market adoption through pricing and distribution innovation. With 64 million subscribers, the Indian DTH sector is the largest in the world. The pricing model is the same, with a small, initial up-front payment for the equipment, then prepaid pay-as-you-go payments for the services.

A Market Failure

Access to energy is access to opportunity. Access to electricity is essential for a family's wellbeing, livelihood, health, safety, educational achievement, and quality of life. Yet worldwide billions still lack reliable access. Without ready access to electricity, the poor depend on kerosene lanterns and battery-powered flashlights for light. They cannot break the cycle of poverty because they are unable to take advantage of the myriad productive uses of energy.

The market has failed to provide appropriate financing solutions for clean energy access at the base of the economic pyramid (BoP). This market failure is largely due to the:

- 1) Small, irregular, and often seasonal nature of income of the BoP consumer;
- 2) High transaction costs of initiating and servicing very small but longer term loans for energy products;
- 3) Great difficulty for a consumer to evaluate the true quality of the solar solution;
- 4) Misaligned incentives of solar vendors, namely to sell, but not to service, solar energy systems.

For the past decade, the solar sector has unsuccessfully attempted to increase access to clean energy by promoting "solar loans" through formal financial institutions. For various reasons, neither borrowers nor lenders have fully embraced the model.

Consumers understand the acute risks of taking a loan to purchase a solar energy system. If the product fails to meet their expectations, or fails entirely to work, the customer may be forced to return to kerosene while also remaining under obligation to the bank to repay the loan. For the energy-poor consumer, this risk is far too much to bear.

From the lenders' perspective, the risks are similarly high. They understand that to lend money to a consumer for the purchase of such a product also exposes them to the risks of technical failure of the product and commercial failure of the solar vendor. Lenders, thus, attempt to mitigate product and consumer risks through slow and burdensome application processes. Transaction costs are high, many would-be borrowers are rejected, and even creditworthy consumers are dissuaded from the lengthy and intrusive application process.

Case Study: Simpa Networks

Simpa Networks circumvents these market failures with an innovative business model that fully aligns its interests with those of its customers: Simpa sells solar-as-a-service to energy-poor households and SMEs in rural India.

Simpa Networks is a venture-backed technology company with a bold mission: to make modern energy simple, affordable, and accessible for everyone. Simpa has introduced a product and business model that will make sustainable energy choices “radically affordable” to the 1.6 billion BoP consumers who currently lack access to electricity.

Simpa’s model is built upon its proprietary risk mitigation technology, which creates opportunities for market rate and social investors to invest in the expansion of energy access.

Simpa’s Solution

Simpa sells distributed energy solutions on a “Progressive Purchase” basis to underserved consumers in emerging markets. The company’s launch market is India, where it is focused initially on transforming the market for solar energy systems.

Simpa customers make a small initial down payment for a high-quality solar PV system and then prepay for the energy service, topping up their systems in small user-defined increments using a mobile phone. Each payment for energy also contributes to the final purchase price. Once fully paid, the system unlocks permanently and produces energy, free and clear. The innovative pricing model is called Progressive Purchase™, and Simpa is live with customers in the Indian states of Karnataka and Uttar Pradesh.

Simpa sells high-quality solar home energy systems packaged with finance and credible service commitments that eliminate these risks for the consumer. Customers understand that they are leasing the solar product and that therefore Simpa has every incentive to provide after-sales service. The company actively markets the fact that if the product doesn’t work, the consumer doesn’t have to pay.

Simpa’s mission is to make modern energy simple, affordable, and accessible for everyone. The company’s founding premise is that the primary barrier to adoption is lack of trust: lack of trust in solar products, and lack of trust in the solar vendors. Simpa aims to address this barrier through several elements of its business model:

- **Simplicity.** Simpa borrows heavily from the successful mobile phone sector, with a simple prepaid pay-as-you-go pricing model already familiar to the target customer base. A Simpa-enabled solar home system has a low up-front cost, a low total cost of ownership, and highly flexible payments that can adjust to the irregularities in a BoP consumer's income.
- **Affordability.** The energy-poor tend to have incomes that are low, irregular, and uncertain. By allowing the customer a certain degree of flexibility in both the size and timing of payments, the company aims to make clean energy "radically affordable"
- **Accessibility.** Simpa sells through trusted, local, village-level entrepreneurs. These VLEs are branded as Simpa Urja Mitra, or Energy Buddies. These independent sales agents are recruited, trained and supported by Simpa to ensure their success. Simpa benefits through association with these locally known, trusted, and respected entrepreneurs.

Traction

The company's launch market is India, where demand for energy is growing quickly and clean, distributed energy solutions have particular advantages. There are roughly 75 million households in India with no access to electricity, and many more with unreliable access. The market for decentralized energy is conservatively estimated at \$2b per year¹, but is likely much larger as consumers are already spending much more than that on poor alternatives like kerosene, candles, batteries and battery charging services. India's un-electrified households are spending an average of \$50-\$100 per year on unhealthy and, inefficient energy, demonstrating a willingness and ability to pay. Moreover, demand for energy grows with supply. Often that dynamic is fueled by the income-generating benefits of reliable electricity.

In 2012, Simpa entered India through a local partner. The company partnered with a large Indian solar vendor to introduce the Simpa pay-as-you-go pricing innovation to the market. Through that partnership, Simpa was able to focus on technology development and leave sales and after-sales service to its partner.

By mid 2013, management was satisfied that its solution was ready to be taken to the broader market. In September 2013, Simpa introduced its direct sales model, recruiting local, village-level entrepreneurs (VLEs) to be its sales agents. The company

¹ Power to the People: Investing in Clean Energy for the Base of the Pyramid. 2010. World Resources Institute and Institute for Financial Management Research.

also selected a new sales territory, in the northern state of Uttar Pradesh, home to nearly half of all of India's energy-poor. The new sales model is scaling up quickly, and as of January 2014 the company was signing up 500+ customers per month, with 30-50% month-over-month sales growth. The company has set a target of reaching 15,000 customers in 2014.

Capital Requirements

Simpa's business model requires two pools of capital to scale.

- 1) The first is for operating expenses used to run the business itself: R&D, sales and marketing, legal, overhead, and other expenses.
- 2) The second pool of capital required is the working capital to finance the solar equipment. Simpa offers its customers one or two-year contracts.

At scale, Simpa expects to be able to raise debt to address its working capital needs. There is significant precedent for this model in the USA and other markets where solar leasing models are scaling rapidly.

Simpa's capital requirements are typical of many companies working to expand access to energy. Developers of community scale solar microgrids, for example, also have to raise capital to fund the up-front costs of the solar equipment. And some African markets also play host to pay-as-you-go solar companies with similar business models and capital requirements.

In the early years, energy access companies typically met their operating expenses through a mix of small grants, investments from friends and family, angel investors, and a global mix of social impact investors. In May 2013, Simpa closed an equity round led by the Asian Development Bank. Other investors include the DOEN Foundation (Amsterdam), Schneider Electric (Paris), Invested Development (Boston), HILTI Foundation (Schaan), Sorenson Impact Foundation (Salt Lake City), Village Capital (Atlanta), board members and angel investors. The company has also received project support in the form of a grant from USAID-DIV.

The Catalytic Role of Development Finance

Philanthropic capital, including grants from foundations and development finance institutions, has a tremendously valuable role to play right now to promote the

development and maturation of sustainable business models for energy access. To succeed, this capital must be catalytic mission-driven, and patient and committed.

Philanthropic Capital must be Catalytic

There are many young social enterprises that are developing quite promising approaches to expanding access to energy. Whether they are microgrids, battery rentals, or pay-as-you-go solutions, in every case there is a need for financing the up-front costs – or working capital – of the solar equipment. This is an unavoidable fact because, on the one hand, the technologies involve a high, up-front cost, and, on the other, the energy-poor are unable to make these investments themselves. So, to expand energy access, finance has to enter the ecosystem.

The scale of the problem is so large that only solutions that attract commercial capital can hope to make a significant impact. Ultimately, to expand access to energy, the sector must mobilize mainstream commercial capital and offer appropriate risk-adjusted returns.

However, to do so, businesses must be able to demonstrate, with real data and historical experience, the underlying cash flows and economics. Mainstream commercial lenders look for 2-4 years of payment histories and healthy customer portfolios. Actors such as commercial banks, private equity groups, and traditional debt funders will invest, but only once businesses can show track records with enough customers, over enough time. Simpa management estimates that it needs to garner 10,000-20,000 customers over 2-3 years to demonstrate the value of its model to the satisfaction of mainstream banks and other lenders.

Philanthropic capital has an important role to play right now to catalyze the sector with working capital. Many companies have piloted and are beginning to scale very interesting approaches to expanding access to energy. Each is currently backed by a mix of impact investment capital, typically equity. These funds are limited, however, and these companies now need to replicate their proven models and to build track records, with enough customers over enough time.

Philanthropic sources of working capital can be used to help these companies build their track records, to fund the initial investments in clean energy technologies, and to provide energy services to enough customers over enough time to prove their models at modest scale. Doing so will enable those companies to transition to mainstream investors and begin to unlock private capital for massive scale.

Mission-driven

Not only can philanthropic capital be deployed in ways that are catalytic, but it can also be deployed in ways that achieve direct social impact today with magnified impact tomorrow. Mission-driven development finance institutions and philanthropic foundations should seek to maximize the development outcomes that matter to them.

When used to finance only the hard costs of delivering energy solutions to identifiable end-users, grant funders can be assured that their funds are having the intended direct social impact.

Since energy access enterprises are committed to building sustainable models, customers pay over time for their energy services. This means that customer payments can be recycled and redeployed to finance more equipment for even more customers. This represents an attractive opportunity for funders and energy access companies to partner to maximize impact over time.

Patient and Committed

The sector now requires large, but contingent, commitments of working capital to fund expansion.

Impact investors have previously stepped up to invest in very early stage companies, to pilot new approaches, and to take risks on entirely new business models. While some of these experiments have failed, a few are showing great promise.

The successful enterprises have created impact machines: business models that deploy working capital to create social impact while returning the invested capital to create even more social impact. This is the hallmark of a sustainable enterprise.

These models are today being proven on a small scale, with a few hundred or a few thousand end-users. Philanthropic funds are uniquely placed to provide patient and committed working capital to help scale these approaches.

Conclusions and Recommendations

Access to energy is recognized as being critical to the achievement of many important development objectives. Yet to provide universal energy access through the

traditional approach of large-scale, coal-burning, centralized generation is at best unviable, and at worse a false promise.

There is today an historic opportunity to provide access to clean, distributed electricity to hundreds of millions of energy-poor customers in emerging markets. The opportunity exists now because of three types of recent innovations: technological, financial, and entrepreneurial. First, technological and manufacturing innovations have resulted in improved efficiencies and rapidly declining costs for solar panels, batteries, and LED lighting. Second, innovative entrepreneurial companies are pioneering promising new business models that deliver energy-as-a-service to energy-poor households and SMEs in rural areas of Asia, Africa, and Latin America. Third, a new breed of impact investors – both angel and institutional – are identifying, funding, and supporting early-stage social enterprises with seed capital. These factors have converged to create a set of successful and promising new business models that have achieved proof-of-concept, are demonstrating market acceptance, and are beginning to scale beyond their initial pilots.

Working capital is now required to help the sector transition from pilots and early success to mass scale. There is an opportunity for philanthropic funders such as development finance institutions to have direct social impact, to have that impact magnified as funds are recycled, and to ultimately catalyze commercial capital to truly scale the delivery of sustainable business models to end energy poverty.

Recommendations: Development Finance to Accelerate Energy Access

- Partner: Development finance institutions and philanthropic foundations may feel that they lack the capacity to evaluate the commercial viability of individual companies and their business models. In these cases, funders should partner with institutional impact investors to identify promising social enterprises that have real scale potential. In partnership with sophisticated investors, funders will look for companies that have completed successful pilots and demonstrated consumer demand for their products and services. The partnerships will also help identify companies that have the many other ingredients for commercial success such as capable and experienced management teams, favorable regulatory environments, reliable supply chains, and well-developed sales and distribution channels to reach their target customers.
- Be Creative: Development finance institutions and philanthropic foundations should consider models of finance that are specifically targeted to catalyze

commercial capital to scale new solutions. These financial instruments may vary depending on the nature of the business model and company, but could include pay-for-performance, loan guarantees, first loss guarantees, low-cost and longer-term debt or sub-debt instruments. By working closely with impact-oriented investors and portfolio companies, funders will have an opportunity to structure their support in ways that achieve their development objectives while responding to the specific needs of specific business models.

- **Pay-for-Performance:** In particular, development finance Institutions and philanthropic foundations should consider offering funds in a pay-for-performance model. Funds could be pledged, but released only as evidence is produced that end-users have been provided with the promised services. Development finance Institutions and philanthropic foundations should enter such relationships with clear performance metrics and agreed criteria for release of tranches of funds. A structure such as this could be highly effective at catalyzing commercial capital while also ensuring that funds generate the desired social impact. For energy access companies, having these conditional commitments of working capital in place would allow them to mobilize complementary equity and debt capital, invest in the growth of their businesses, expand operations, and build out into new areas.
- **Recycle:** Development finance Institutions and philanthropic foundations should require that their funds be recycled to multiply the impact. As consumers pay for energy service, or pay down their loans, the recovered funds should be set aside to be used again to finance new solutions for the next set of customers. This provides the right incentives to the energy access companies to deploy the funds wisely and to preserve the capital base. If structured well, this can ensure that funds are used to scale solutions for the energy-poor, and not be taken out as profits for equity investors in the energy companies.