
Accelerating Access to Energy

Lessons learned from efforts to build inclusive energy markets in developing countries

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ACCELERATING ACCESS TO ENERGY: SIX LESSONS LEARNED

LESSON 1

Pioneers require significant early-stage support to test, adapt and validate new models

LESSON 2

Don't expect early adopters of modern energy solutions to be the poorest of the poor

LESSON 3

Tackling energy poverty will require urgent innovation across the whole energy value chain

LESSON 4

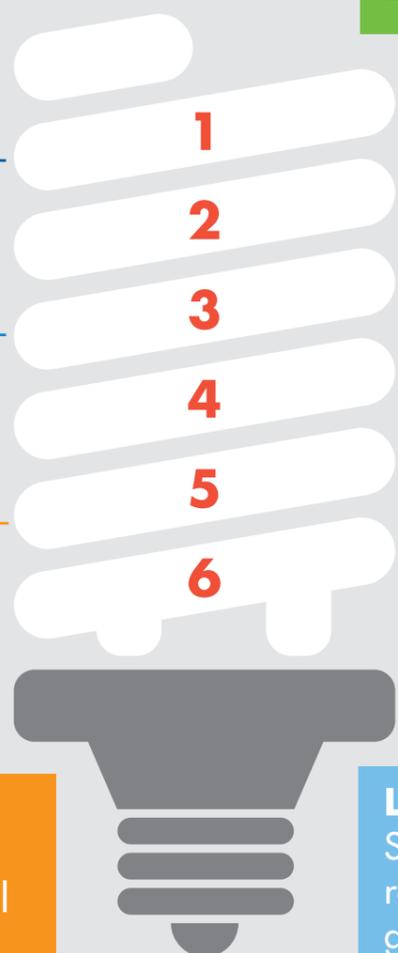
A new range of financial solutions will be required for inclusive markets to grow

LESSON 5

Early focus on talent development is crucial to the long-term viability of energy enterprises

LESSON 6

Systemic change will rely on the creation of global institutions and industry networks



Executive Summary

Nearly two billion people¹ – that's three in every 10 people – lack access to reliable and affordable modern energy, constraining their health, education and earning potential. Of this group, 60% live entirely without electricity for cooking, lighting and heating at home, for community services such as schools or health centres, or for improving the productivity of small business and farms.

This **energy deficit** forms a formidable barrier to inclusive growth and poverty reduction that shows limited signs of abating. Already, researchers using World Bank data² have estimated that Africa misses out on 2–4% a year in GDP growth due to power shortages. Without major changes to the way people access and use energy, almost one billion people will still be without electricity in 2030.

WHY READ THIS REPORT?

This report outlines our 14-year journey to create and scale new **decentralised energy solutions** that provide safe, reliable and affordable power to low-income consumers in under-served areas. During this time, Shell Foundation (SF) has worked with over 100 entrepreneurs and organisations – deploying nearly \$74 million – in an effort to develop new disruptive technologies and business solutions with the potential to deliver socio-economic, health and environmental benefits at scale.

In these pages, we analyse the common features of the most promising of these solutions, and the learning from failed efforts which informs our current strategy. We hope that these findings may be helpful to fellow donors, impact investors, development finance institutions, governments and corporates working hard to enhance energy access around the world today.

OUR JOURNEY

1. SF has always focused on catalysing new sustainable and scalable solutions to deliver modern energy to low-income consumers, though our strategy to achieve this has varied greatly over the years. Our initial approach was characterised by small, short-term grant-giving to a multitude of NGOs; a conventional form of philanthropy that we found poorly suited to our objectives. Between 2000 and 2003, over 75% of funding deployed as part of our 'Access to Energy' programme failed to help grantees demonstrate the potential for large-scale impact.
2. This experience forced us to adopt a new 'enterprise-based' theory of change that involved identifying the market failures that prevent modern energy solutions reaching the Base of the Pyramid³ and co-creating pioneer social enterprises to solve them. This helped us improve our efficiency and impact, though we discovered that pioneers require patient, flexible grant funding and extensive business skills support to refine new models and build the capacity for global expansion.
3. We found ourselves working proactively to analyse markets, build networks, test a few high-risk yet potentially transformative ideas and form long-term partnerships with aligned entrepreneurs.

¹ "SE4All Global Tracking Framework", World Bank, and "Universal Access to Modern Energy for the Poor", UNDP.

² Power outages and economic growth in Africa (2013), Thomas Barnebeck Andersen & Carl-Johan Dalgaard.

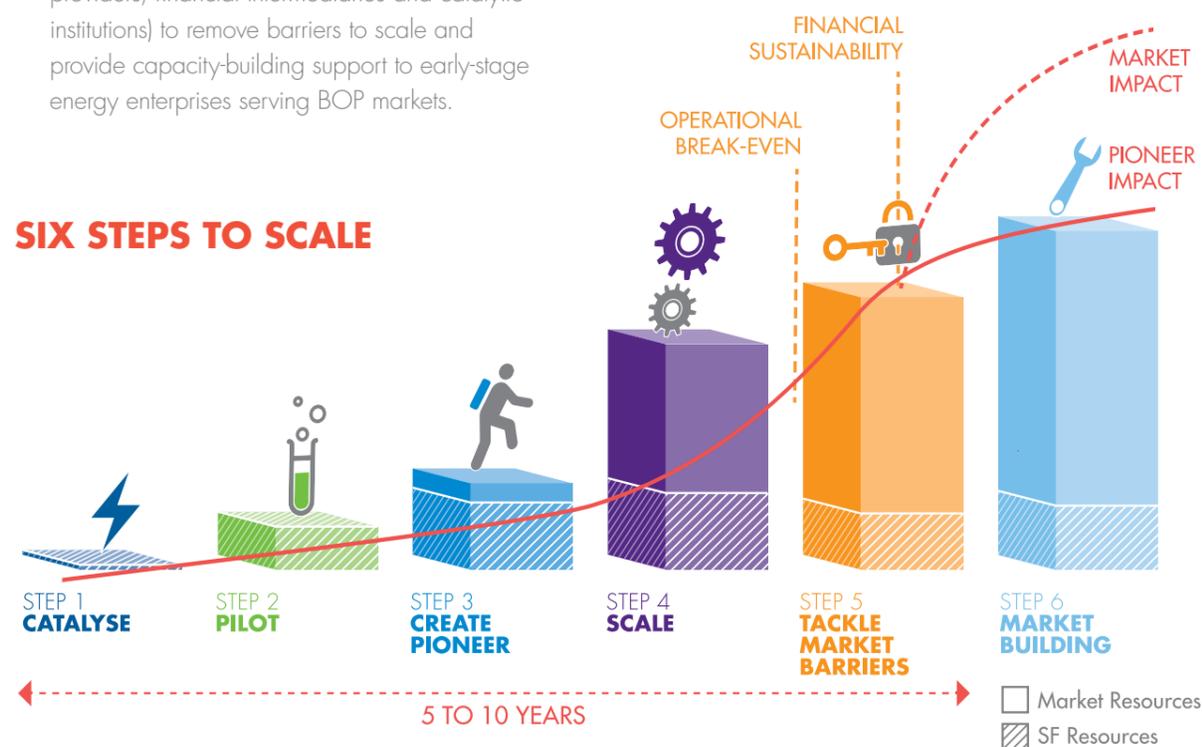
³ 'Base of the Pyramid', or BOP, was defined by CK Prahalad in 2002 as the four billion people earning less than \$4 a day.

The market knowledge and learning gained from failed pilots, often over several years, was critical to the evolution of promising technologies and business models. While we continually try to improve this process by mitigating common risks (shared in Chapter 2), we believe that failure is a necessary step towards disruptive innovation, and that finding the right team is ultimately more critical to success than selecting based on the proposed business model.

4. By 2009, several of these pioneers had demonstrated demand for a range of affordable energy products (e.g. solar lights and cleaner cookstoves) and services (e.g. electricity from agricultural waste). Yet each business remained fragile, with slow growth across Asia and Africa. We discovered that significant 'barriers to purchase' and gaps in enabling infrastructure, explored further in this report, are constraining the adoption and replication of these models.
5. Reflecting on this experience, we now realise that our approach was insufficient to catalyse the systemic change required for inclusive businesses to achieve sustainable growth. Over time our thinking has evolved into a new 'Six Step Model' that includes the creation of dedicated market-enablers (supply chain service providers, financial intermediaries and catalytic institutions) to remove barriers to scale and provide capacity-building support to early-stage energy enterprises serving BOP markets.

6. In recent years, promising new 'inclusive' markets have begun to emerge in Africa, Asia and Latin America, generating power from renewable sources, improving the efficiency of energy appliances, and transforming the way the poor access and pay for energy. However, the growth of these markets has invariably been slow and there remain very few viable 'social enterprises' operating at an international level. Learning from the struggles of our early-stage partners as they seek to grow, we have come to believe that the fragmented nature of the social investment sector has led to critical gaps that prevent the emergence, validation and growth of inclusive energy markets.
7. This poses a challenge to donors, social investors, governments and corporates alike. In this report, we examine six market barriers that we believe prevent the innovation and scale-up of energy enterprises that can meet the needs of low-income consumers around the world, and emerging opportunities for collaboration across the public and private sector to solve them. We share these lessons as they apply specifically to the energy sector – although we believe they have generic relevance for effective social investment across a range of development challenges.

SIX STEPS TO SCALE



SIX CHALLENGES TO THE GROWTH OF INCLUSIVE MARKETS

Lesson 1:

Pioneers require significant early-stage support to test, adapt and validate new models

Pioneers providing new products or services to BOP markets face disproportionate costs to serve a risk-averse consumer base, especially when they lack prior market data to draw on. These businesses are inherently fragile and considered too high-risk for investors until they can:

- understand the true needs, wants and decision-making processes of their target customer;
- prototype (and iteratively improve) their technology to produce a range of high-quality, durable and affordable products and services that appeal to customers;
- adapt their business models to overcome gaps in the value chain, such as the lack of existing routes-to-market in low-income areas;
- build the systems, talent and assets to demonstrate viability and attract growth capital.

Our experience working with a range of partners has shown it can take **6 to 10 years** and anywhere between **\$5 million** and **\$20 million** for a breakthrough innovator to build a sufficiently strong customer base to achieve a net positive cashflow. This explains the often-cited 'absence of viable pipeline' for impact investors and illustrates the need for more organisations, especially foundations, to deploy **unrestricted, risk-tolerant grant capital** to help early-stage social enterprises adapt to market needs.

In practice, this type of catalytic grant is rarely available. While our partners have been able to leverage \$92.5 million from a variety of social and commercial investors to date, on average it takes **3 to 4 years** before a pioneer can attract sufficient co-investment to cover their core costs.

Lesson 2:

Don't expect early adopters of modern energy solutions to be the poorest of the poor

Consumers are particularly sensitive to risk, cost and value – and this means initial demand for new products in these markets is almost always low. Simply put, if a product is unknown, offered by a company they haven't heard of, rarely stocked in local shops and comes without a warranty, don't expect BOP consumers to buy it.

Existing retail channels are typically unviable due to dispersed demand, low margins and high marketing costs required to 'push' products to reluctant consumers. Between 2007 and 2010, with our partners struggling to grow, we invested heavily in new ways to increase the uptake of their energy products and services through a variety of new retail, microfinance and NGO channels without significant success. We discovered four principle 'barriers to purchase' for BOP consumers:

Awareness, Accessibility, Affordability and Availability (the Four As).

Developing new supply chain solutions to these challenges can often take several years, requiring considerable investment, and only then will an energy enterprise gain significant traction in BOP markets. For example, it took **Envirofit**, a clean cookstove manufacturer, three years to transition from a B2C to a predominantly B2B business in order to achieve economies of scale and build the brand credibility needed to create, market and sell 'aspirational' products.

For this reason, early adopters of energy products and services tend to be from slightly higher income brackets and exposed to less risk. These first customers are needed to demonstrate aspirational value to lower-income consumers, especially for solutions where value is not easy to demonstrate. For instance, products that can be used to generate income immediately (such as solar lights) are extremely desirable, whereas financial savings from cookstoves are accrued only after many months of use.

Lesson 3:

Tackling energy poverty will require urgent innovation across the whole energy value chain

No matter how great their products or services, early-stage energy enterprises will struggle to serve low-income markets unless they can successfully tackle a wide range of demand- and supply-side constraints that prevent the creation of sustainable value chains. Chief among these are **three interrelated challenges**: demand activation, consumer finance and last mile distribution.

The resources required to tackle these barriers typically render these low-margin early-stage businesses unviable. In 2010, we began investigating a range of **integrated business solutions** to these market barriers. Three in particular show particular promise for scale and sustainability:

- **Integrated Business Models** relying on new technology and joint venture partnerships. **M-KOPA Solar**, for example, is a Kenyan social enterprise that combines embedded-mobile payment technology with solar power. The business forms joint ventures with national telecoms companies with well known and trusted brands, such as Safaricom, to provide consumer credit for solar home systems. Customers then pay this loan back over time via mobile money platforms such as M-PESA.
- **Integrated B2B partnerships with national corporates and distributors**, allowing social enterprises to benefit from the brand recognition, marketing power and sales channels of credible partners, or even join forces to develop new co-branded products to drive demand.
- **New Supply Chain Intermediaries** that create demand, financing options and routes-to-market for multiple manufacturers in a more cost-effective manner. These include Dharma Life, a social enterprise building a network of rural entrepreneurs, retailers and distributors to bring a range of social-impact products (such as cookstoves, solar lights, water purifiers and sewing machines) to market in rural India.

Lesson 4:

A new range of financial solutions will be required for inclusive markets to grow

Looking back across our portfolio and range of work, we realise that each and every one of our partners has been constrained by a lack of appropriate finance at every stage of their validation and scale-up. We see **three prime opportunities for financial innovation** to unlock appropriate capital from public and private sources to drive far greater collective impact:

- **New 'Incubation' Vehicles to Accelerate Transformative Innovation.** A range of new intermediaries are needed to provide appropriate capital (equity, patient grant, or convertible grant) plus technical expertise and business skills support to early-stage energy enterprises with different risk profiles. One example is **Factor(E)**, a venture development firm that offsets 'technology risk' by supporting early-stage energy innovators with a blend of risk capital and world-class engineering support from the Colorado State University.
- **Flexible Debt Finance for High Potential Energy Enterprises.** For enterprises that are already selling thousands of products every month, the single largest barrier to scale is the lack of affordable debt available to them. To address this challenge we have helped create three new models to provide working capital for distribution, capacity-building and the purchase of new productive assets.
- **New Models to Unlock Private and Public Capital.** These include: new tiered capital structures and grant-based instruments that allow investors with aligned social interests (but different expectations for risk and return) to participate in the same funding vehicle; the evolution of different types of partnerships between development agencies and foundations that better leverage private sector ability to innovate and the public sector's ability to validate new markets (a shift to private-public partnerships), and several emerging models to track, value and monetise social and environmental impact.

Lesson 5:

Early focus on talent development is crucial to the long-term viability of energy enterprises

The idea of a social enterprise investing heavily in human capital as a prerequisite for growth is not controversial or even new. Despite this, we still encounter examples of grant-makers that neither provide unrestricted funds of the level to enable the enterprises they support to attract and retain top talent at market-related rates, and impact investors that are reluctant to meet such costs as they believe it will delay financial returns.

Our experience emphasises time and time again that helping social enterprises with grant support allows them recruit top talent on market-related terms, which is critical not only to navigate the early phases of operation, but also as the basis for their scale-up and viable growth.

Without exception, the social enterprises that lead their respective markets treat finding, selecting and managing their human capital as their top priority. d.light, for instance, decided to recruit an independent CEO in 2011 alongside a raft of talent from the private sector. This investment paid off handsomely, with the business able to treble growth figures within the next three years.

Lesson 6:

Systemic change will rely on the creation of global institutions and industry networks

When SF was established back in 2000, we believed that a combination of private sector actors (philanthropists, social investors, big business and commercial funders) would be able to catalyse and scale market-based solutions to global challenges such as energy access. The intervening years have shown that while social enterprises are needed to tackle these problems at scale, they alone will be insufficient to solve entrenched problems of this size.

As pioneers in the inclusive energy sector have started to grow, we now see a need for neutral industry institutions and networks to work across public and private sectors to build the necessary market infrastructure for them to be effective. Public-private partnerships such as **Sustainable Energy For All (SE4ALL)**, the **Global Alliance for Clean Cookstoves** and the **Global Off-Grid Lighting Association** will be critical to set international standards, codify best practice, publish market data and leverage investment into growing markets.

Central to their ability to bring credibility to these nascent markets will be a disciplined focus on adapting to the challenges faced by pioneers on the ground to enable one or more of these first-movers to achieve scale and viability. This lowers the risk for new investors and entrepreneurs to enter the market. Only then will dialogue with policy-makers, and efforts to share learning, foster a more conducive enabling environment to accelerate the growth of the wider market.

WHAT NEXT?

Lack of access to energy is a major obstacle to inclusive economic development and a challenge that SF will continue to focus on for the foreseeable future. While this has long been a subject for international attention (as currently witnessed by SE4ALL), our view is that there still remain few examples of financially-viable energy solutions that focus explicitly on generating large-scale benefit to BOP consumers.

The learning outlined in this report has helped shape our current 'Access to Energy' strategy and our understanding of the role that we, as a private foundation, can play in catalysing an effective response to the energy challenge. In particular, we see three areas for increased focus over the next five years.

1. Work to accelerate the growth of the early-stage manufacturer, service provider and market-enabling pioneers in our portfolio of long-term partners.

Many of our social enterprise partners are now delivering promising results but they are all in early phases of growth and have a long way to go to fulfil their market potential. Until they can prove financial viability they will struggle to attract growth finance, yet organic growth limits their ability to enter new markets or diversify products/services attractive to BOP consumers.

We believe the success of such pioneers is essential to lower the risks for further entrepreneurs and investors to join these markets. We therefore see the need for continued support (including grant, social investment, business skills and market linkages) to our existing partners, in conjunction with leveraged private and public investment, to support their scale-up, deepen their impact on BOP markets and to avoid mission drift during their journey towards sustainability.

2. Work to improve the efficiency and effectiveness of our efforts to enhance energy access through more strategic collaboration with other actors in the social investment ecosystem.

We see several opportunities to partner with thought-leaders (across private and public sectors) to substantially improve our own performance. These include:

- i) **Greater 'syndication' with impact investors** to help early-stage energy enterprises navigate the 'valley of death' by reducing the risk and transaction cost of securing growth capital through new instruments, pooled funds and tiered capital structures.
- ii) **Improving our ability to measure impact.** Writing this report has highlighted gaps in our understanding of the long-term development outcomes that our partners deliver, e.g. the gender implications of impact and the differential value gained by different consumers. Further research will improve our ability to assess the public benefit of alternative interventions and to explore new revenue streams for 'marginal return' enterprises by monetising social impact.
- iii) **Developing robust performance evaluation methodologies to track the cost-efficiency of the impact we deliver over time.** We see value in working with independent market analysts to validate the impact we deliver, assess our operational efficiency over time, and to share this transparently with others in the sector. Our hope is that such action forces a greater accountability on our organisation to continually improve its performance each year and, we hope, contributes to a sector-wide drive for transparent reporting and benchmarking to improve effectiveness.

3. Identify game-changing solutions to specific market failures with the potential to deliver outsized social and environmental impact, such as:

- **Improving the enabling infrastructure for decentralised energy services companies,** for example through low-cost power meters that manage demand, reduce theft and integrate pay-as-you-go technology, or greater use of mobile phone technology to crowd-source data from local hauliers to create new distribution solutions.
- **Developing larger-scale energy solutions for SMEs,** such as new sources of off-grid electricity (e.g. biomass gasification, biogas, waste and solar) that could improve the viability of small businesses currently without significant choice, leading to improved productivity and employment in rural areas.
- **Improving the availability of affordable energy for the urban poor,** for instance through new hybrid systems to supplement grid electricity, improvements in battery storage and integrated energy and sanitation solutions for people living in urban slums (e.g. by creating a market for municipal waste that can be converted into power or fertiliser).

Introduction

Nearly two billion people around the world⁷ – that's three in every 10 people – lack access to reliable and affordable modern energy, constraining their health, education and earning potential. Of this group, 60% live entirely without electricity.

This energy deficit forms a formidable barrier to inclusive economic growth. People rely on energy for cooking, heating and lighting. Businesses and farms need energy to improve productivity and generate growth. Essential community services such as basic healthcare, sanitation and education all require power to be effective.

Researchers using World Bank data have estimated that Africa misses out on 2–4% a year in GDP growth due to power shortages.⁸

Energy is a critical enabler of almost every aspect of life – yet billions of people around the world lack this basic prerequisite for sustainable development.

CLIMBING THE MOUNTAIN: PROGRESS AND SETBACKS

The International Energy Agency estimates that more than 2.7 billion people will still be reliant on traditional fuels for their energy needs in 2030, with over one billion people without access to electricity (largely in rural Africa and Asia). Factoring in planned extensions to the national grid and technological advancements, they calculate that between \$700 billion and \$1 trillion in additional investment will be needed over the next 15 years to serve this market.

Shell Foundation has been working to enhance access to energy since 2000 – one of a growing number of foundations, governments, multilateral agencies, NGOs, investors and corporates rallying to tackle the energy challenge in different ways. Over this time, public perception of the issue has shifted radically, with initiatives such as the UN's Sustainable Energy For All programme (launched to achieve universal energy access by 2030) placing the issue firmly on the international agenda.

Each year
4.3 million
people die from household air pollution, more than HIV, tuberculosis and malaria combined.⁵

Low-income households in Africa can spend up to
40% of their income
on fuels for heating, lighting and cooking.

1.2 billion
people lack access to any type of reliable and affordable power. A further **800 million** live in areas where grid electricity is unreliable, unpredictable and inadequate to meet basic needs.

1 billion
people are served by health centres without electricity for lighting, refrigeration of medicines and cleansing equipment.⁶

Half of all primary school children in the developing world, **291 million** young people, go to schools without electricity.⁴

⁴ Practical Action, Energy Outlook 2014.

⁵ WHO Global Burden of Disease Study (Lim et al 2012).

⁶ Practical Action, Energy Outlook 2014.

⁷ "SE4All Global Tracking Framework", World Bank, and "Universal Access to Modern Energy for the Poor", UNDP.

⁸ Power outages and economic growth in Africa (2013), Thomas Barnebeck Andersen & Carl-Johan Dalgaard.

With the vast majority of development dollars and private investment directed toward national grid extensions and large-scale power plants, we have focused our efforts on supporting breakthrough innovation in small-scale decentralised energy options that are better suited to the needs of people living in areas where grid power is patchy and unreliable, or in off-grid rural communities.⁹

Over time we have seen the emergence of promising markets in Africa, Asia and Latin America to provide affordable energy from abundant renewable sources such as solar and waste (with stand-alone products or through mini-grids) and dramatic improvements in the energy efficiency of products such as cookstoves. These new solutions have the potential to deliver safe, affordable and reliable energy to those without access at a fraction of the time and cost of centralised grid extension models.

Yet despite a surge of public and private interest over the last decade, few up-and-coming businesses in these new sectors have achieved viability and international scale, nor have they been able to develop holistic solutions to the energy poverty challenge. Pioneers with solutions that could revolutionise the way the poor access energy are yet to tap their potential. Even 'high-growth' markets such as affordable solar lighting and clean cookstoves serve less than 5% of market demand today.

This slow rate of progress poses a challenge to social investors, entrepreneurs, development agencies, governments and corporates alike. How can we work differently to accelerate the growth of such markets as potential drivers for universal access to energy?

WHY WRITE THIS REPORT?

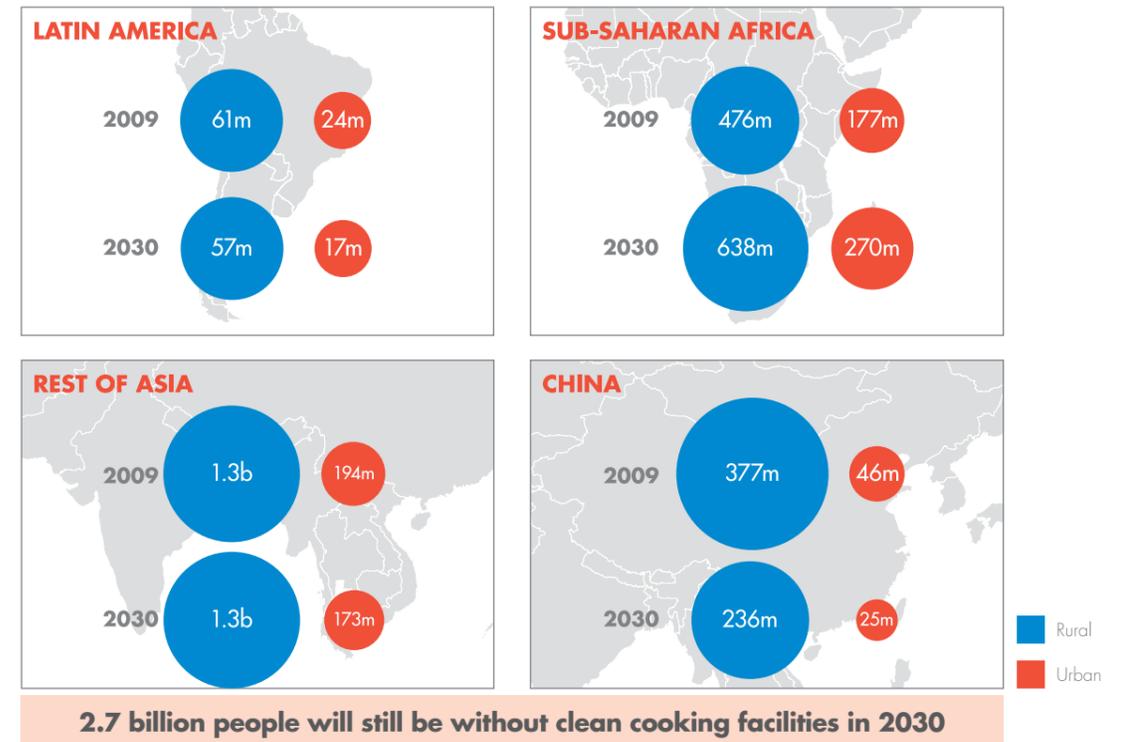
'Accelerating Access to Energy' outlines the key learning from our 15-year journey to enhance energy access for BOP consumers. In line with our business principles and previous reports, we share insight from success and failure to support others across the public and private sector, as well as opportunities we have discovered to improve our impact and efficiency. In particular, we examine common obstacles preventing the growth of inclusive energy markets – and some emerging ways to blend the unique assets and preferences of 'social investors' to overcome them.

Small-scale decentralised energy providers have the potential to serve rural and urban consumers in ways that are flexible, timely and can grow with their increasing demand for energy.¹⁰ With the right support, new technology such as 'Pay-As-You-Go Solar' could even become as ubiquitous as mobile phones in Africa within just a few years.¹¹ We hope this report sparks ideas that help make this scenario a reality – and offers information that supports today's entrepreneurs and innovators to make modern energy services and products an everyday feature of life in developing countries.

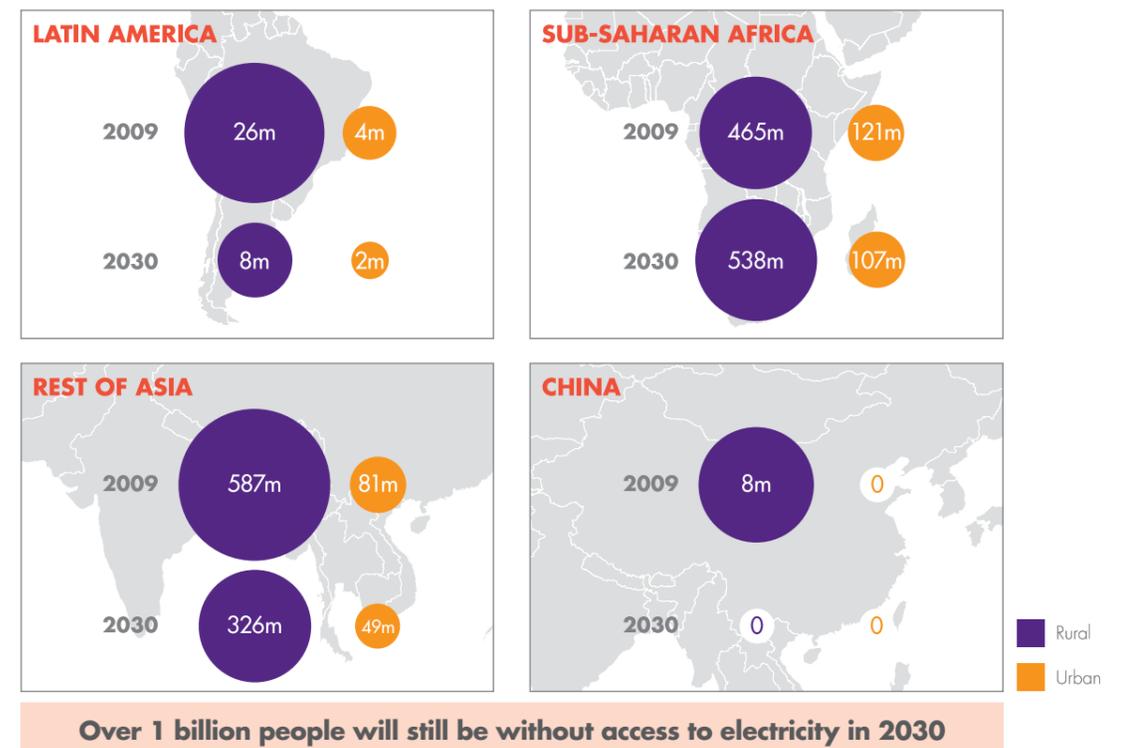
THE GEOGRAPHY OF ENERGY POVERTY 2009 AND 2030



The number of people without clean cooking facilities



The number of people without access to electricity



⁹ 85% of the 1.2 billion people without electricity today live in remote, sparsely populated areas where energy usage is relatively low.

High distribution, power plant and infrastructure costs mean an extension of the national grid to serve these communities is typically unviable.

¹⁰ 'Universal energy access' is defined as 250 kWh/year per household, barely enough electricity to power a few lights, fans and mobile phones.

¹¹ Mobile subscribers in Africa increased from 5% to 73% over the last 10 years, driven by investment of just under \$44 billion (reported in GSMA's Sub-Saharan Mobile Economy). Today's market for solar power shares many of the same characteristics, falling unit costs, value that's easy to demonstrate and strong economic incentives – leading some to believe the solar market could mirror this growth trajectory.

USES OF ENERGY BY LOW-INCOME COMMUNITIES



The Evolution of our Energy Strategy

02

Shell Foundation has worked with over 100 entrepreneurs and organisations over the last 14 years – deploying nearly \$74 million to increase the provision of energy to low-income consumers. While our work to create, prove and scale disruptive technologies and business models has remained consistent over this time, our performance with respect to impact and efficiency has shifted greatly in response to key changes to our strategy.

PROGRAMME OBJECTIVES

Our early work to better understand the market included consultations with experts across public and private sectors and field work with low-income consumers in several countries across Africa and Asia. This led to the formation of a dedicated programme in 2001 to catalyse sustainable ways to increase access to modern energy services, with the aim of tackling poverty at scale and reducing negative environmental externalities related to energy use.

From the outset we decided our activities would extend beyond household needs to include the provision of energy for community services (such as healthcare, schools and waste management) and productive use (for informal enterprise, small business and farming). This has meant focusing efforts on a range of decentralised energy services (powered by plentiful local resources such as solar or waste) and energy-efficient products that deliver a mix of health, financial and environmental benefits to consumers.

Low-income households in Africa can spend up to 40% of their income on fuels for heating, lighting and cooking.

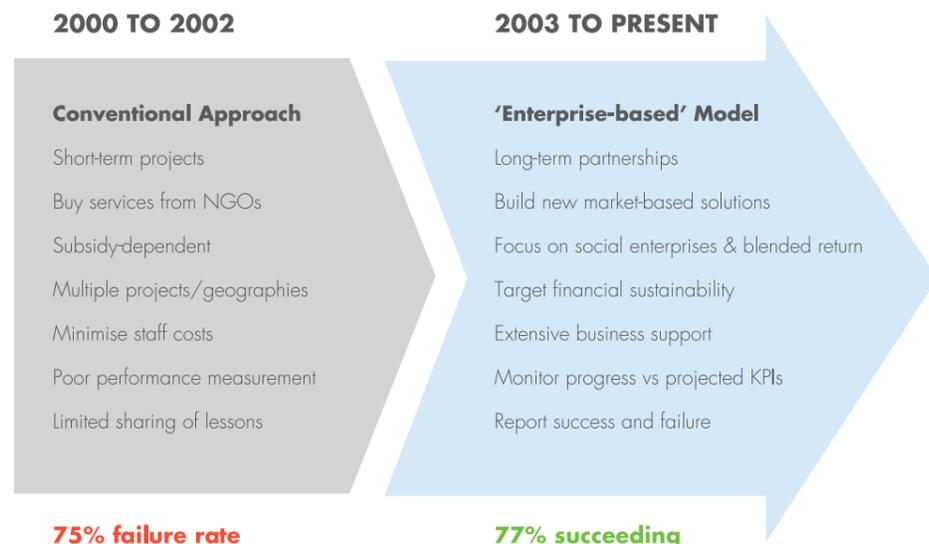
MOVING TO AN 'ENTERPRISE-BASED' APPROACH

In our early years, we selected grantees by consulting widely, publicising our areas of interest and then reviewing multiple proposals – a classic 'Request for Proposal' methodology based on offering short-term (i.e. less than three years) grants of less than \$300,000 to a multitude of not-for-profit organisations.

This 'spray and pray' approach was marred by a fundamental lack of success, with over 75% of grantees in our first three years failing to demonstrate any potential for large-scale impact¹² and financial independence. The quality of applications we received was poor and, of those we selected, most failed to even achieve their basic stated objectives due to poor execution, an inability to ascertain the true needs of the market and insufficient expertise to develop a business model that could progress beyond a long-term reliance on subsidy.

Through a process of trial and error, we discovered we could radically improve our philanthropic effectiveness by focusing resources (time, money and effort) on developing new approaches with a few carefully-selected entrepreneurial partners, and supporting them to build the organisational capacity needed to validate and scale new market-based models.

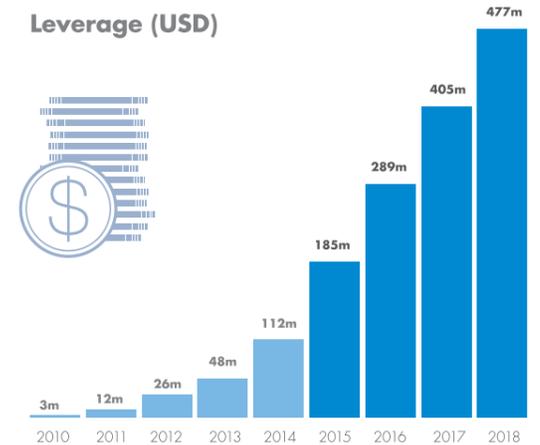
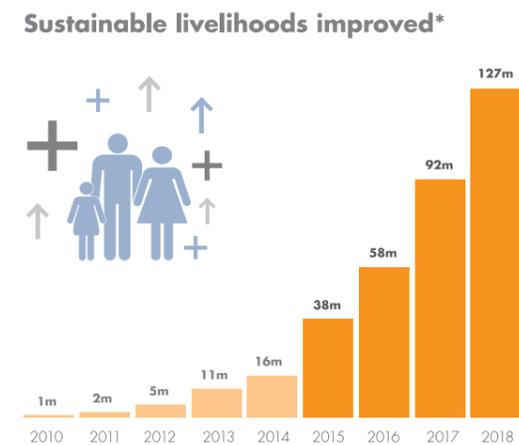
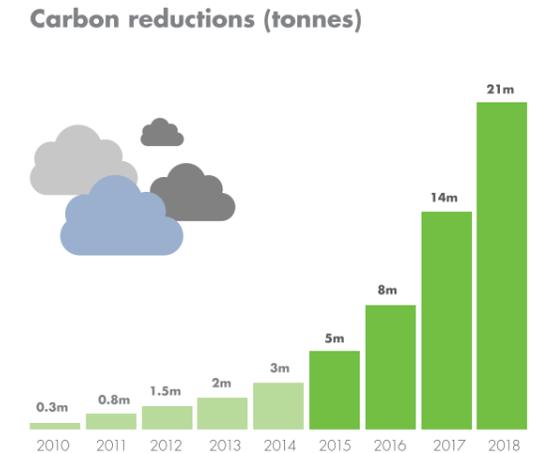
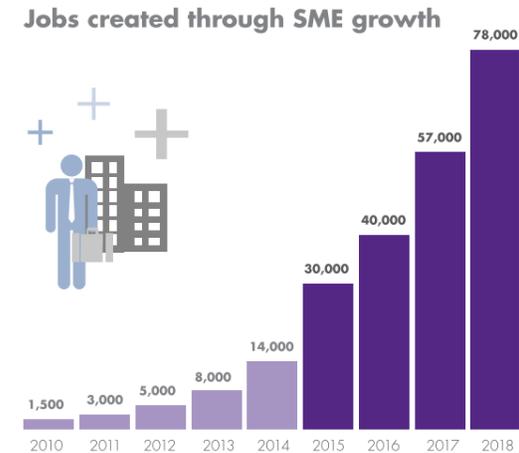
By recruiting staff with a blend of commercial and development expertise, and applying greater business discipline to our own processes for partner selection, performance management, cost-efficiency and risk assessment we have been able to improve our performance over time. We report this transition in full in our 2010 report *Enterprise Solutions to Scale*.



'ACCESS TO ENERGY' PROGRAMME: PERFORMANCE ANALYSIS

Since 2010, we have used four aggregate metrics to measure our overall developmental impact, with the intention to facilitate knowledge and learning rather than to use the KPIs as goals in themselves. Tracking and measuring changes in

our performance against pre-defined milestones and impact targets allows us to better tailor the type and level of our support to partners to deliver greater development outcomes.



* Target beneficiaries for SF programmes are 'Base of the Pyramid' consumers – a socio-economic group estimated as in excess of four billion people, first defined by C.K Prahalad to describe people who earn less than \$1,500 per year (roughly \$4 a day).

A New Theory of Change: From Pioneers to Building Markets

By 2009, we had narrowed our focus to a small portfolio of entrepreneurs developing solutions to make modern energy products (like cookstoves and solar lights) and services (such as off-grid electricity and engine retrofits) affordable and available to low-income communities.

Over the next two to three years pioneers such as Envirofit, d.light and Husk Power Systems began to demonstrate the potential of decentralised energy solutions and cutting-edge technology to deliver measurable financial and social benefit to customers in India and several countries in Africa.

Each business, however, remained fragile. Promising initial growth had slowed by 2011, and it became clear that **structural barriers** such as low consumer awareness, affordability constraints and limited routes to market (further explored in the next chapter) stood in the way of significant global expansion. Alongside a range of public and private sector collaborators, we wrestled with ways to overcome these challenges.

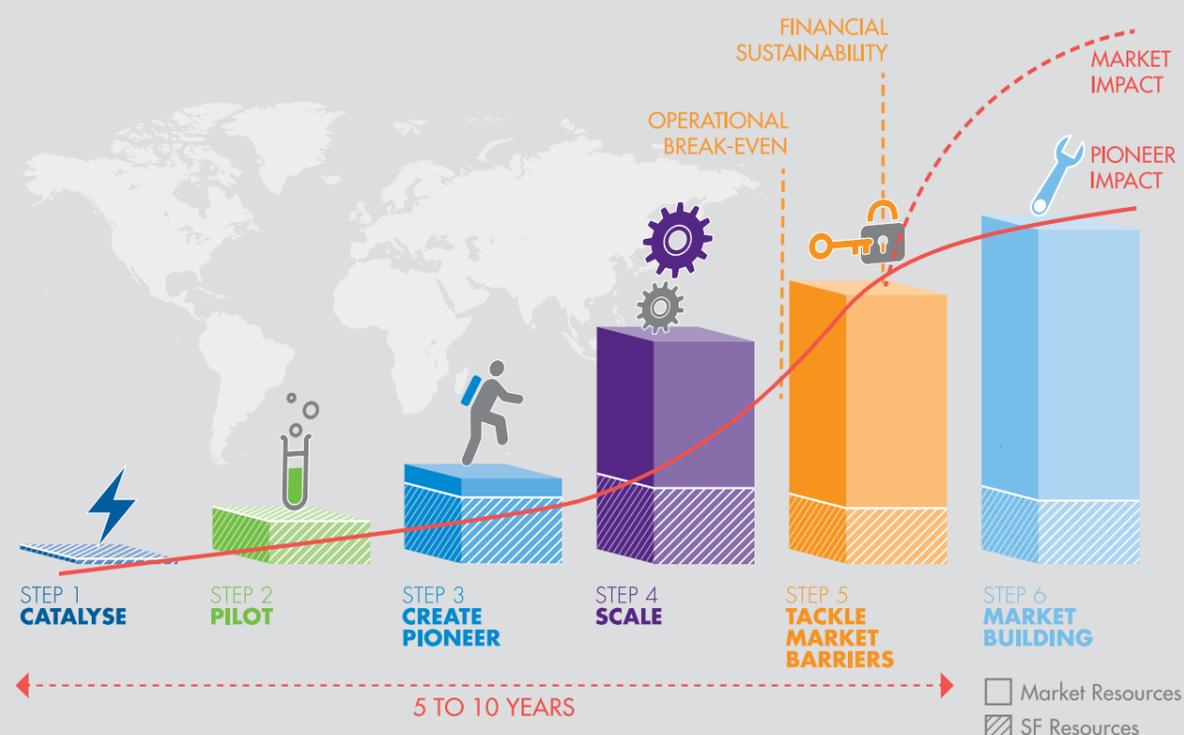
Over time, a series of direct interventions evolved into something more strategic. We started to prioritise the creation of dedicated 'market-enablers' – intermediary businesses, financiers and industry bodies – to provide the critical market infrastructure that a broader set of early-stage energy enterprises needed to thrive. With partners beginning to mature, we entered a new phase of organisational growth: looking beyond pioneer social enterprises to the creation of inclusive markets in order to amplify our impact. ▶

¹² Scale means different things to different people. For us, scale is about delivering cost-efficient solutions that impact large numbers of beneficiaries in multiple locations in ways that are ultimately financially viable and self-sustaining.

OUR SIX STEP THEORY OF CHANGE

Shell Foundation works in six areas to accelerate social innovation and build new inclusive markets. We play a catalytic role to demonstrate the viability and scalability of transformative new models – then create ‘market-enablers’ that channel support from investors, corporates, NGOs, governments and multilateral agencies to support widespread replication at a global level.

Where appropriate, we leverage the brand, networks and technical and functional expertise of our corporate founder Shell to further support our partners.



Assessing Scale and Sustainability

SF and our partners track a few key metrics specific to each enterprise, drawing upon independent monitoring and evaluation as much as possible to validate reported data. These include a wide variety of outcomes to understand the environmental, economic and social benefits that our partners deliver to different socio-economic groups. We also track progress to financial sustainability through monthly and quarterly financial reporting as well as performance ratios (such as subsidy per product sold).

Appendix A includes the journeys of three of our partners (Envirofit, d.light and M-KOPA Solar) to illustrate the way we track progress towards scale and financial independence.

STEP 1: CATALYSE

Identify underlying market failures leading to global development challenges. Combine business and development DNA to discover high-potential yet high-risk innovations with the potential to scale.

STEP 2: PILOT

Test a range of new solutions to demonstrate new technology, evaluate market demand, assess viability and identify game-changing partners with the greatest potential to deliver impact.

STEP 3: CREATE PIONEER

Form long-term partnerships with talented entrepreneurs and co-create new enterprises that target large-scale impact and financial independence. Provide early-stage grant funding, management support and business skills to help pioneers refine business models, develop their customer offering, track impact and financial sustainability and invest in world-class talent.

STEP 4: SCALE

Support partners to demonstrate the viability of their models and build operational capacity for global expansion. Provide patient and flexible finance, strategic guidance and day-to-day business support to help pioneers to expand their customer base, build assets, recruit talent, develop global systems, strengthen supply chains and adapt products for new regions.

STEP 5: TACKLE MARKET BARRIERS

Identify structural barriers that prevent sustainable growth and develop new partnerships to catalyse a strong and sustainable supply chain. Develop new tiered financial structures for partners to leverage different forms of private and public capital, helping pioneers transition from grant support to non-grant investment to fund future growth.

STEP 6: MARKET BUILDING

Create specialist ‘market-enablers’ to accelerate the growth of new inclusive markets.

These include:

- **supply chain intermediaries** tackling barriers to scale (such as last mile distribution)
- **innovative financial vehicles** that provide appropriate types of capital (such as working capital or growth finance to market entrants) to support scale and replication, using new instruments and structures to offset investor risk
- **non-profit ‘institutions’** that build the infrastructure needed for markets to thrive: codifying best practice, developing standards, leveraging investment or advocating for policy, legal or regulatory change.

PORTFOLIO OVERVIEW: INTRODUCING OUR CURRENT ACCESS TO ENERGY PARTNERS

Our current social enterprise and non-profit partners, all in varying stages of incubation and scale-up, all share the potential to impact over 10 million BOP beneficiaries and achieve financial viability in the long-term.

SF purposely seeks to take high levels of risk in developing new technologies and new business models – and we have been involved in the co-creation of each new pioneer with the exception of d.light (a partnership established two years after their inception). Once a model has been sufficiently validated we work to leverage second-stage funding for further growth and geographic expansion.



ENERGY MANUFACTURERS & SERVICE PROVIDERS

Envirofit

SF partner since 2007
www.envirofit.org



Envirofit is a global clean cookstove business that designs, produces and markets affordable biomass stoves which significantly reduce emissions, fuel costs and cooking time for low-income households and institutions.

Organisation Size: 68
Areas of Operation: Global
Livelihoods Improved: 7.1 million
Projected Financial Sustainability in 2016
Total Investment Secured: \$25.3 million (67% from SF)

d.light

SF partner since 2009
www.dlightdesign.com



d.light is a global leader in the design, manufacture and distribution of affordable solar power for low-income households and small businesses across emerging markets.

Organisation Size: 400+
Areas of Operation: Global
Livelihoods Improved: 41 million
Projected Financial Sustainability in 2017
Total Investment Secured: \$40 million (17% from SF)

Husk Power Systems

SF partner since 2008
www.huskpowersystems.com



Husk Power Systems is a pioneer in decentralised renewable power supply to off-grid communities. The company designs, installs and operates small-scale power plants that convert solar energy or agricultural waste into affordable electricity for people in rural India and East Africa.

Organisation Size: 200
Areas of Operation: India, Kenya
Livelihoods Improved: 75K
Projected Financial Sustainability in 2020
Total Investment Secured: \$11.1 million (23% from SF)

M-KOPA Solar

SF partner since 2010
www.m-kopa.com



M-KOPA Solar combines solar and mobile technology to provide affordable energy to off-grid villages in East Africa. The company provides smart credit to low-income consumers, enabling them to access a range of energy products which they pay for in instalments using mobile money platforms such as M-PESA.

Organisation Size: 300
Areas of Operation: Kenya, Uganda, Tanzania
Livelihoods Improved: 500K
Projected Financial Sustainability in 2017
Total Investment Secured: \$25 million (11% from SF)

FINANCIAL INSTITUTIONS & VEHICLES

IntelleGrow

SF partner since 2010
www.intellegrow.com



IntelleGrow is a new intermediary that provides venture debt finance and skills support to small and growing businesses serving low-income communities in India, with a major focus on access to energy.

Organisation Size: 11
Areas of Operation: India
Livelihoods Improved: 1.5 million
Projected Financial Sustainability in 2015
Total Investment Secured: \$20.8 million (13% from SF)

Sangam

SF partner since 2011
www.sangam.vc



Sangam Ventures is a new type of seed and early-stage venture fund, first piloted in 2011, that provides capital and tailored business support to early-stage energy enterprises who serve low-income communities in India. The venture has developed a range of new tools to support Indian entrepreneurs to refine business models, build capacity and attract growth capital – and will enter its growth phase in 2015.

Organisation Size: 3
Areas of Operation: India
Livelihoods Improved: 50K
Projected Financial Sustainability in 2017
Total Investment Secured: \$3.2 million (55% from SF)

Factor(E)

SF partner since 2013
www.factorventures.org



Factor(E) is a venture development firm, co-created by Shell Foundation and Colorado State University in 2013 to support early-stage entrepreneurs with a blend of risk capital and world-class engineering support to accelerate energy access in emerging markets.

responsAbility energy access fund

Planned for 2015 pending regulatory approval

responsAbility

This planned \$30 million fund (with investment from IFC, Lundin Foundation and other private investors) aims to support the growth of small and medium-sized businesses active in the energy access space through the provision of short- and medium-term debt financing.

BIX Fund

SF partner since 2013
www.bixfund.com

BIX Fund

Opening doors to essential household appliances
The Base of the Pyramid Exchange Fund (BIX), co-created with Cardano in 2013, will catalyse the use of impact certification mechanisms such as the voluntary carbon credit market to improve the availability and affordability of essential energy products for low-income households.

SUPPLY CHAIN INTERMEDIARIES

Dharma Life

SF partner since 2010
www.dharma.net.in



Dharma Life catalyses rural employment, creates rural supply chains and builds market demand for new types of 'social impact' products that deliver economic and social benefits to low-income consumers in remote areas.

Organisation Size: 70
Areas of Operation: India
Livelihoods Improved: 1 million
Projected Financial Sustainability in 2016
Total Investment Secured: \$4.4 million (81% from SF)

INDUSTRY ASSOCIATIONS & NETWORKS

Global Alliance for Clean Cookstoves

SF partner since 2010
www.cleancookstoves.org



A multi-stakeholder public-private partnership co-developed by the UN Foundation, Shell Foundation and the US State Department, established in 2010, that works to build a global market for efficient household cookstoves. The Alliance has now secured commitments exceeding \$200 million from a range of government, private and NGO stakeholders and aims to benefit 100 million households before 2020.

Global Off-Grid Lighting Association

SF partner since 2013
www.global-off-grid-lighting-association.org



A neutral, not-for-profit industry association, formed in 2013 on the back of IFC's Lighting Africa programme to accelerate market development of clean, high-quality off-grid lighting for businesses and individuals. Shell Foundation will support GOGLA to build organisational capacity and amplify its impact from 2014.

LEVERAGING INVESTMENT

Our current energy partners have leveraged \$92.5 million in funding to date.



LESSONS ON PILOTING

One of the reasons foundations are so well suited to catalyse inclusive energy markets (and social investment more broadly) is our ability to make available **risk-tolerant capital**. SF choose to deploy this in support of high-risk yet potentially transformative ideas, technologies and business innovations (at both an enterprise and market level) which other types of private and public funders simply won't touch.

This means getting comfortable with, perhaps even redefining, the 'F' word: failure. A large number of the partners we have supported over the years have, while making a genuine difference at a local level, failed to meet our expectations for scale and sustainability. **The word 'failure', however, belies the iterative learning we gain when things go wrong.** Time and again, our experiences have led to the insight we needed to find a successful partner.

While we work to mitigate these risks through improved partner selection and due diligence, Shell Foundation's view is that failure is a necessary step towards disruptive innovation. We believe failure is acceptable, provided you learn, you learn quickly and you share lessons widely.



COMMON REASONS FOR FAILURE

LEADING CAUSES OF FAILURE	RISK MITIGATION
<p>EXECUTION</p> <p>The single largest cause of failure occurs when management teams lack the necessary business skills and competences to accurately analyse market demand, assess risk, develop a viable value proposition and execute business plans efficiently.</p>	<p>Careful selection of partners with aligned vision, commercial track record, entrepreneurial flair and management competence.</p> <p>Agree relevant performance metrics (social and financial) and track progress against agreed milestones. This enables us to provide timely, flexible, tailored support to help promising partners overcome obstacles to successful delivery.</p> <p>Small and short duration pilots are needed to demonstrate core alignment and commercial acumen of the team. If the team isn't right our motto is: fail fast and exit early.</p>
<p>NON-ALIGNED VISION</p> <p>You only ever know someone once you start working together. Once a pilot is underway, fundamental differences in vision for scale, business principles and willingness to genuinely partner can become clear. Partners who trial a new product or service as a short-term project, or lack 'skin-in-the-game', rather than having a long-term strategic commitment, typically fail.</p>	<p>SF works to identify major market failures that prevent access to energy, and proactively seeks high-potential opportunities to bridge these gaps. This means we focus on solutions with the potential to deliver significant impact.</p> <p>Form deep working relationships at every level to understand the market, key challenges and opportunities for growth.</p>
<p>WRONG BUSINESS MODEL FOR MARKET</p> <p>Where limited market knowledge exists, particularly for disruptive product or service categories, market trials can often fail to demonstrate demand for an initial offering. Where the team has nevertheless demonstrated high competence, SF will often support further product or value chain innovation to see if improved learning about customers and market realities can be translated into a viable and attractive value proposition.</p>	<p>We focus first on customer validation and early market testing of prototypes, rather than profitability, to assess market needs and potential to scale.</p> <p>This enables us to take a more informed decision on the value of higher levels of support to improve new technology or refine solutions to business challenges, or whether an early exit is more appropriate.</p>
<p>PRODUCT OR SERVICE</p> <p>On occasion, development of a new technology that seemed possible within a set timeframe simply doesn't work. Either the technology itself cannot meet desired needs, or others, perhaps better suited, are able to bring competing products to market at a quicker pace, at lower cost or with improved functionality.</p>	
<p>INSUFFICIENT/SHORT-TERM PROJECT FINANCE</p> <p>Developing new energy technologies or business solutions for a price-sensitive and hard-to-reach customer base can take time and be capital-intensive. Higher levels of support and patience can be required to pilot riskier solutions with potential to deliver higher impact.</p>	

LEARNING FROM FAILURE

SECTOR	MARKET KNOWLEDGE	RESULT
Cookstoves 	<p>Between 2002 and 2007 SF conducted nine pilot projects across seven countries, at a cost of nearly \$20 million, to understand varying cooking technologies, business models and customer needs... none of which resulted in the creation of a product that met consumer desires for affordability, high performance and durability.</p>	<p>This market knowledge informed the selection of Envirofit in 2007 as well as the evolution of its business model.</p>
SME Finance 	<p>Early SF debt finance pilots in India from 2008 to 2009 failed due to lack of fund manager capacity, yet clearly demonstrated the potential for a cashflow-based approach to SME lending. Rather than abandoning the model, we regrouped and conducted a national search for the right partner.</p>	<p>SF identified IntelCap as a more suitable partner, leading to the co-creation of IntelGrow in 2011.</p>
Consumer Finance 	<p>Lack of financing options is a major barrier preventing potential consumers taking a chance on new energy products. In 2010, we conducted three pilots with large microfinance institutions in India to test possible solutions. These failed pilots gave us critical insight into the need for consumer finance options that were separated from microfinance models. They also informed the creation of new partnerships with MFIs more suited to scale.</p>	<p>Learning from these failures led to a collaboration with the founders of M-KOPA (in 2009) to create a disruptive solution to this challenge.</p>
Last Mile Distribution 	<p>SF conducted a series of pilots from 2008 to 2011 to test new models for rural distribution with microfinance institutions, NGOs, local governments, corporates and distribution companies. Ultimately, they proved too costly for an individual organisation to afford. We concluded that a multi-product independent intermediary would be a more cost-effective way to build new channels for social impact products in these markets.</p>	<p>This learning led us to a partnership that ultimately resulted in the co-creation of Dharma Life in 2010.</p>

Accelerating the Growth of Inclusive Energy Markets

03

Our work with a range of social enterprise partners – and the large number of social investors, governments and corporates that have supported their scale-up over the last 14 years, has challenged our understanding of the true obstacles they face – resulting in significant changes to our efforts to enhance energy access.

Several of our partners are now experiencing sustained and rapid growth, with welcome signs of competition in the markets they are forging. Yet solutions such as mini-grids, affordable solar lights and clean cookstoves have now been available in the market for more than 10 years and we are yet to see the emergence of more than a handful of globally scaling enterprises in each field. Now that demand for modern energy services has been proven, what is preventing uptake and replication in the market?

Time and again we come up against the same barriers to scale that prevent these solutions from fulfilling their true potential. We believe that a smarter use of philanthropy and a new range of partnerships can help catalyse critical changes to the energy funding ecosystem to tackle these barriers and drive far greater collective impact.

In the following pages, we review our journey so far to outline the emerging challenges and opportunities which we believe will have greatest influence on the growth rate of inclusive energy markets over coming years. We share them publicly in support of fellow organisations working hard to accelerate access to affordable and reliable power.

Lesson 1:

Pioneers require significant early-stage support to test, adapt and validate new models

Iterative improvements to existing energy technologies and distribution models are unlikely to meet the needs of two billion energy-poor consumers in the near future. Pioneering innovators are needed to disrupt the status quo – but while we know many entrepreneurs who fall into this category, all too few achieve truly global scale.

We have often underestimated, particularly in our early years, the mountainous task that first movers in inclusive energy markets face. A staggering level risk and uncertainty surrounds social enterprises and much of it is outside of their control. Seeking blended returns is hard in any market; in a BOP market it is exceptionally difficult. If pioneers cannot beat the odds to validate new markets, there will simply be no viable deals that allow social investors, development financiers and commercial funders to improve energy access across the world.

FIRST MOVER DISADVANTAGE IN INCLUSIVE ENERGY MARKETS

The energy entrepreneurs that are solving the world's biggest problems with market solutions are necessarily operating in the hardest geographies in the world, serving a highly risk-averse consumer base while attempting to test unknown business hypotheses.

These pioneers face disproportionate costs when prototyping and validating their solutions. Major investment in product development, business model innovation and marketing are required to serve low-income consumers while navigating a poor enabling environment – all without comprehensive market data. We have found it takes time to develop an attractive value proposition that meets consumer wants and needs and generates significant development value.

Our experience working with partners like d.light, Envirofit, M-KOPA and Husk Power Systems – all market leaders in their fields – is that it can take **six to 10 years** for a business with an unproven

model (serving BOP consumers) to refine its value proposition, demonstrate demand, start to scale and achieve net positive cashflows.

Businesses in this market must create their own ecosystem of manufacturers, distributors and retail channels from scratch. Few fit-for-purpose distribution channels exist, on top of which they must contend with a shortage of skilled labour, low customer awareness and a dearth of capital.

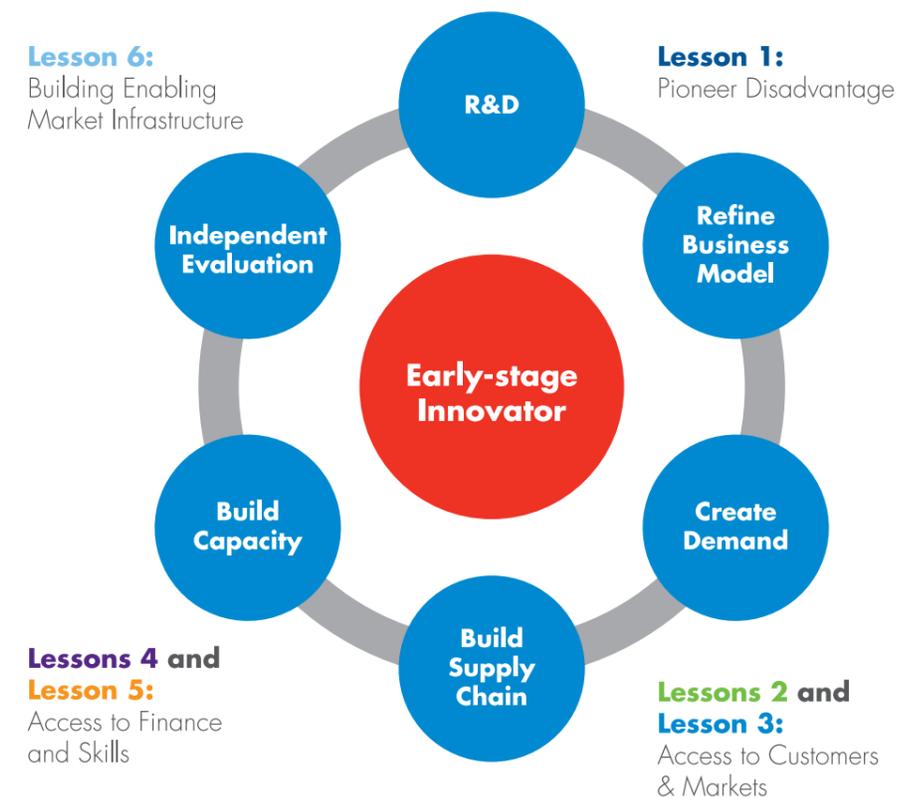
These 'market barriers' amplify risk, uncertainty and fragility for pioneers operating in emerging countries. Across all our programmes we find it can take anywhere between **\$5 million and \$20 million** for an enterprising innovator to build sufficient knowledge and capacity to tackle the core technical and commercial challenges at the heart of the market failure they seek to address, and to develop solutions that are proven to work at scale.

HIGHER COSTS FOR TECHNOLOGICAL INNOVATION

Across our work in Africa, Asia and Latin America we have seen clear evidence of demand for **reliable** energy by individuals and small businesses in low-income areas – if it can be delivered with sufficient **quality** at an **affordable** price. In practice, finding the right trade-off between these three variables can be prohibitively expensive for an entrepreneur. Attempting to serve price sensitive customers with very low ability to take risk means pioneers must

invest heavily and continuously in R&D to develop offerings that are both desirable and accessible; a high cost with an uncertain return. The low unit margins of these products reduces the commercial feasibility to assign significant levels of investment capital to R&D in the first place – leading to an important role for grant funding to offset these costs, even if these funds are used by individual enterprises at first.

Pioneers must build sustainable value chains from scratch, benefiting the next wave of market entrants. Several structural barriers prevent them from doing this:



Building the first viable 'improved' cookstove: The heavy R&D requirements at Envirofit



Envirofit was the first clean cookstove manufacturer to create a high-performing affordable product suitable for global distribution. Envirofit co-founders, Nathan Lorenz and Tim Bauer, recall the challenge of designing an initial prototype for the Indian market in 2008:

“ We knew there was a need for a better stove but we didn't know how the consumers would react, or how price-sensitive they would be. To be honest, we didn't really know if we had a business yet. It was difficult enough to design a quality metal combustion chamber that was built to last and would reduce emissions in the lab, and field testing blew everything open again – with the way different consumers use different types of wood or dung, or cook using different oils, affected performance. ”

Envirofit place significance important on customer feedback. They have invested nearly \$10 million on R&D and field testing, enabling them to develop a range of affordable and durable stoves that reduce fuel use and emissions and are tailored to the varying cooking styles and fuel choices of customers around the globe. This product line runs from low-cost wood and charcoal stoves for households up to 'institutional' stoves for kitchens in hospitals, schools and local businesses.



Nathan Lorenz



Tim Bauer



BUSINESS MODEL VALIDATION: FROM VERSION 2.0 TO 5.0

Looking at our partners businesses today, we find it striking how different they are from their initial business plans. It takes time to get to know the core customers you seek to serve, their usage habits, drivers for purchase and earning patterns, especially in the absence of information. It's not uncommon for start-ups to describe their target market in broad terms such as, 'low income

consumers living in un-electrified rural areas' in early plans. In a market like India, that description would cover more than half the population.

Building demand is hard in a market with low consumer awareness, yet that is only half of the challenge. As pioneers grow they learn more about the market; invariably encountering new challenges related to production, distribution, skills gaps or differing consumer constraints as they adapt to new geographies, which can threaten margins and compromise viability.

Envirofit spent three years developing direct sales channels to reach customers in India before they had sufficient track record to form more cost-efficient B2B partnerships with national distributors – a model that helped them scale far more rapidly when they entered African markets in 2010.

We have found that partnerships more akin to long-term joint ventures are needed to solve these challenges, with financial information and performance data shared openly between partners. This allows us to provide the depth of support needed to identify risks and persisting fragilities early, and to deploy flexible and tailored support to address these.

Pivoting to a better solar product: Lessons from M-KOPA's first pilot

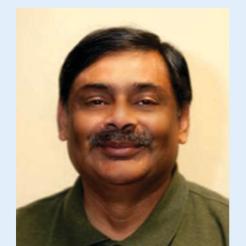


M-KOPA's first business plan in 2010 focused on embedding mobile payment technology in a portable solar lantern as the right product for scale. SF provided the first grant funding alongside Doen Foundation and d.o.b Foundation in support of a one-year pilot in which M-KOPA was able to build a minimum viable product and perform a deep dive on its initial customer feedback. Two critical lessons emerged from this pilot: the technology worked but the product was wrong. Customers actually aspired to a larger solar home system, and the economics of the pay-as-you-go technology made it unfeasible to use a low value product. M-KOPA reacted by pivoting on its initial model and developed a larger three-light solar home system with charging capabilities in partnership with d.light.

During the pilot, two ideal equity investors were identified and invited to join part of the company's advisory committee. After the lessons from the pilot were absorbed and a viable business model emerged with a validated technology and management team, one of these advisors – Gray Ghost Ventures – ended up being the anchor equity investor in the company.

“ The process of transparently working alongside Shell Foundation and other donors enabled us to far more accurately establish what we were investing in with M-KOPA. The grant funded pilots were critical to customer development and to understand what level of capital was really required. Attempting to invest at the outset would have resulted in a far smaller round of funding, with far less potential for impact. ”

Arun Gore, managing partner of Gray Ghost Ventures



The need for sustained support and flexibility: Husk Power Systems, journey towards scale



Husk Power Systems (HPS) is an early pioneer and poster child for the impact investment sector. In 2008 SF became the company's first institutional funder and provided philanthropic support to develop a prototype biomass-gasification plant to convert agricultural waste to affordable electricity. This successful pilot led to a long-term partnership to create a business that would generate affordable power at a village level and distribute this to homes and small enterprises through a mini-grid system. In just under two years, HPS attracted support from several impact investors and raced to establish more than 80 biomass plants in Bihar, a state in north-west India where nearly 85% of the population live without power. This phase of the company's growth was documented in more detail in Monitor's 2010 *From Blueprint to Scale* report.

As the business grew, the constraints to manage an ever-increasing portfolio of power plants in a geography with so little enabling infrastructure became apparent and began to slow down the company's growth. In particular, a lack of critical talent in Bihar, technological constraints such as smart metering and cash collection, and long-term debt finance requirements were preventing HPS reaching the next phase of growth, much to the frustration of investors.

SF has had to step in again recently with further grant funding and managerial support to help HPS restructure the business around a less capital-intensive franchising model for growth and bring on new senior managers. HPS continues its role as a pioneer in rural electrification but the significance of the barriers it faces requires significantly more resources to tackle than many in the sector had originally assumed. With less than \$10m invested, HPS is building a solution that 400+ million people lack in India alone. We can imagine how this level of funding would be perceived if it were applied to solving a similarly large problem in a developed market.

Having made important changes to their business and model over the last three years, the company is now in a position for accelerated growth and is rapidly pivoting towards solar mini-grids and developing technologies and partnerships that will facilitate its further expansion in India and Africa.

WHY FOCUS ON PIONEERS?

In their 2012 report, *From Blueprint to Scale*, Monitor Deloitte illustrate how a major gap in funding available to help pioneers validate new inclusive business models is constraining the availability of investable opportunities for the impact investment sector to deploy capital and deliver impact.

When new inclusive models emerge, they write, *'there is limited potential for outsized financial returns within a timeframe that is acceptable to investors in order to compensate for greater early-stage risk and small deal sizes. Where new categories or value chains are being created the initial spending on market preparation may not be recouped by the firm and its investors because much of the benefit flows to new entrants, or to customers or suppliers.'*

This accords with our own involvement in growing sub-sectors such as clean cookstoves, affordable solar lighting and pay-as-you-go solar, where the learning from a small number of market leaders has lowered the risk for many other enterprises and investors to entering the market. Proof of demand and viability from pioneers reduces the lead time for new entrants to provide comparative alternatives, accelerating product innovation and the introduction of choices for customers. This further incentivises investors and talent to participate in the market by demonstrating the scope of opportunity and the viability of multiple route-to-market strategies.

Building the Energy Ecosystem: Recommendations

BE DISRUPTIVE... BUT STAY THE COURSE

Pioneer Needs

Energy pioneers often underestimate the cost of technological and business model development as they work to demonstrate demand, validate new markets and attract growth capital. Every new market needs a show-runner; yet without sufficient support, pioneers will remain fragile and there will be limited opportunities for impact investors, development financiers and the private sector to enhance energy access for millions of people.

Developing new models takes time, money and considerable effort. Entrepreneurs require patient and flexible support for **both** product and supply chain innovation, and a mixture of sizeable funding and business skills support to build the organisational capacity to overcome barriers to scale.

Implications for Social Investors

Investing in an unproven pioneer is by nature a high-risk, high-reward activity, and first-mover disadvantage has major implications for all socially-motivated investors, from foundations to commercial banks.

■ Accessing equity requires extensive due diligence, clear evidence of growth and hence is poorly aligned to the needs of pioneers. If entrepreneurs don't yet have clarity on their product and business model, then investors will be far more hesitant. Entrepreneurs who seek **small amounts of equity** to meet these costs are effectively forced to scale too early with an under-developed offering and to spend time fundraising rather than validating their model. Shell Foundation continually receives requests for grant support from energy enterprises that have quickly burned through a small equity investment only to reach an equivalent conclusion.

■ **Catalytic grant funding** can help establish the actual 'investable' business model in advance of seeking equity financing. Yet our own

experience seeking co-funding for partners is that there is very limited 'high-risk grant' out there. Donor funding from foundations, NGOs and challenge funds tends to be small and thinly spread, limiting the chances of any organisation succeeding. **On average, it takes our early-stage partners 3-4 years before they are able to attract significant co-investment beyond our core support.**

■ Early collaboration between pioneers and investors, as in M-KOPA's case, can build confidence in the validity of the business and ease the transition to non-grant funding. With their business models now proven, both M-KOPA and d.light have successfully attracted commercial finance to fund expansion. Yet although both businesses are able to service these forms of finance, they retain a need for grant funding to accelerate their impact, for example for investment in further product development, to trial new delivery models or to expand into new geographies.

■ While we continue to believe that such enterprises can achieve global scale and attract significant commercial capital to fund their growth, the nature of BOP demand may mean that some level of continued (blended) grant funding is needed to offset the high investment in product development and supply chain innovation needed to accelerate growth.

The use of grant funding for market-based solutions is a complicated instrument with which to target impact at scale. At Shell Foundation, we have had to be disciplined about ensuring we are funding pioneers with a genuine first mover disadvantage to overcome – as opposed to choosing the wrong partner or technology entirely, or funding enterprises who are in a position to leverage harder forms of finance. We apply equal discipline to report and engage transparently on the experiences of our partners to build a better collective knowledge of new markets.

Lesson 2:

Don't expect early adopters of modern energy solutions to be the poorest of the poor

There is no question that demand, not just need, exists in low-income communities for affordable and reliable energy. In fact, our experience with dozens of social enterprise partners serving these markets over the years is that most poor customers are no different from any other in how they make purchasing decisions; their limited means simply makes them extremely good at assessing risk and value.

Constructing a product that effectively meets customer demand is an arduous process. As we saw in Lesson 1, our partners have required deep pockets to make design and technology improvements to their product offering over several years to achieve a better product-market fit. Goods and services of high quality, performance, reliability and durability do more than deliver greater development outcomes; they are critical to consumers wanting them in the first place.

Getting the product right is, however, only part of the story. Looking back at the growth paths of our partners, we note that even after developing a product that tests well in different markets, in many cases it has taken far longer to develop a substantial customer base than projected. Both d.light and Envirofit, for example, took between two and three years to gain significant traction in the market place.

This perplexed us. Surely energy that is cleaner, brighter, safer and saves you money is an obvious choice for consumers, businesses and suppliers alike? Between 2007 and 2010, we invested millions of dollars to accelerate the uptake of new products and services, both by augmenting the sales force and marketing capacity of partners, and by running a series of regional social marketing and financing campaigns in India and East Africa. We found that route-to-market

strategies that could survive independently without subsidy support were rare to develop.¹³

For example, our partnership with microfinance institution Grameen Koota in south-west India to provide their members with consumer finance for cookstoves was successful in generating sales but required too much ongoing subsidy to sustain the programme as part of Grameen Koota's core business. Only now, after several years and significant iteration of structure and supply chains, are we starting to see early potential for microfinance institutions to sell energy products without subsidy support.

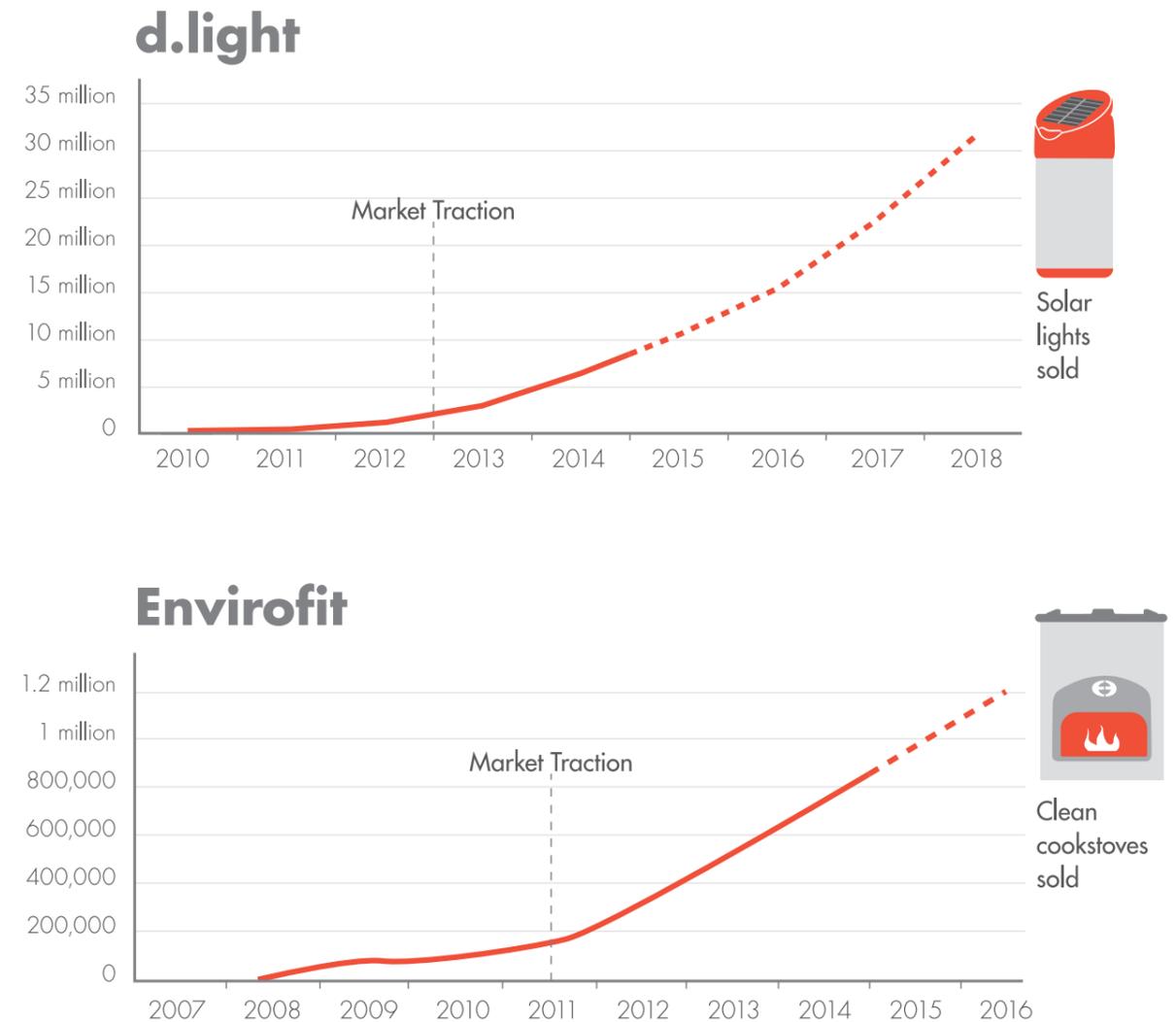
Over time, we have come to learn that although the nature of people's energy needs may vary by country, region, culture and demographic, BOP consumers share several common characteristics that makes them extraordinarily difficult to serve.

This combination of barriers to purchase and supply constraints has yet to be resolved and drives up the 'cost-to-serve' for social enterprises in inclusive energy markets. The exact ranking of each barrier will change from market to market and can be very different for different types of products or services.

For example, sales of solar lanterns will typically be higher than expensive consumer durables like clean cookstoves. Not only is the comparative cost higher for a standard product (\$10 compared with \$20–30) but, more importantly, the value of these products is far easier to demonstrate (as anyone who has observed a nighttime crowd gathering around a solar light in an off-grid village can testify). d.light's sales agents often throw their lanterns to the ground with considerable might to demonstrate durability.

Brighter, safer lights typically raise social status in a way that cookstoves have yet to match – and can be used to generate income. Making money by keeping a shop open is typically more desirable than saving it even though the fuel savings can be considerable (in Kenya where charcoal is the predominant cooking fuel, a household can save up to \$1 a week, and 2–3 hours' cooking time, by purchasing a clean stove).

D.LIGHT AND ENVIROFIT'S CUMULATIVE SALES DATA



¹³ We outline these efforts alongside cost-efficiency comparisons and sales conversion rates from our 2012 report, Social Marketing in India, in Appendix B.

COMMON FEATURES OF BOP ENERGY CONSUMERS ACROSS ASIA, AFRICA AND LATIN AMERICA

LOW PRODUCT KNOWLEDGE



- Old habits are hard to break. New products or services are not well known – and this represents a significant risk to consumers with little available income.
- The health issues around traditional energy sources like using open fires may be unclear or un-prized.
- Behaviour change (e.g. to increase usage of a cleaner energy product) requires prolonged interventions.

Key Learning

- Above-the-line marketing through TV and radio advertisements typically makes little difference to actual sales, certainly in the early phases of growth.
- Direct engagement by field staff at the village level is needed to educate the consumer on the value of the product. Supplementing this with below-the-line marketing, such as product demonstrations, door-to-door selling and wall paintings, leads to higher sales conversion rates.
- High marketing costs and resource-intensive sales processes are difficult to absorb into a sustainable business model.
- Safer, cleaner and brighter energy must be seen as **aspirational**. This is easier with some products (e.g. lights) which immediately raise social status than with others such as biomass cookstoves (which can label you as someone who cannot afford LPG).
- Focus on the right purchasing drivers. Economic benefit, i.e. cost savings or income-generating opportunities, will be valued far higher than health benefits. Work through the payback calculations with potential buyers.
- Target the decision-maker. Early campaigns appealing to women in India typically failed, as husbands were not convinced. We have found this to be reversed in East Africa, where women are in sole charge of household expenses.

BARRIER TO PURCHASE: AWARENESS

LIMITED DISPOSABLE INCOME



- Purchasing the wrong energy products and services can represent a significant liability.
- Regular cashflow is also a problem, with earning patterns often uncertain.
- People tend to pay for energy on a day-by-day basis according to their means, even though this is more expensive.
- Even though products like solar lights and clean cookstoves pay for themselves within months, after which consumers enjoy significant cost savings, meeting large upfront costs is difficult.

Key Learning

- Potential customers may not be as price-sensitive as they first appear and, especially in Africa, are willing to pay for kerosene, diesel or charcoal (which they value as reliable and available).
- Flexible payment plans, whether provided by a retailer, manufacturer or microfinance institution, can improve affordability – but making these types of credit model work efficiently is complicated. Low loan amounts and high transaction costs are often unattractive to MFIs.
- Demonstrating value is key: enterprises with a range of gateway products at different price points and functionality can provide a way for the consumer to try the brand out at a lower cost before upscaling.
- Modular products such as solar home systems by d.light and M-KOPA that can be purchased and upgraded over time are popular with customers who have irregular income.

BARRIER TO PURCHASE: AFFORDABILITY

LACK OF TRUST



- Low-income consumers are rightly sceptical about unknown brands promising them the world.
- They need hard proof that claims around cost savings, reliable performance, durability and customer care are true – and this takes time to build.

Key Learning

- Partnering with well-regarded and trusted brands can help early-stage enterprises build credibility and reduce risk perception (see next lesson).
- **Word-of-mouth** is critical to sales in low-income communities where people rely heavily on the practical experience of friends, neighbours and particularly village elders to make important decisions. Early customers will be higher earners, who are more likely to carry weight in the community.
- Extensive after-sales support is needed to allow enterprises to help customers to use the product correctly, and to respond to those with bad experiences by issuing replacements or developing improved products. Warranties and guarantees are similarly crucial to build brand loyalty.
- **Independent standards** or quality assurance will be increasingly important to build trust in new products as markets develop. Poor quality local copycats that waste customer money can destroy fledgling markets.
- Envirofit and Dharma Life have both found that female sales agents and entrepreneurs will be far better at selling certain products, like cookstoves or hygiene products, than their male counterparts. Customers find that women are better able to explain these products and are more likely to believe that they are safer and easier to use.

BARRIER TO PURCHASE: ACCOUNTABILITY, AWARENESS

LOW ACCESSIBILITY



- 85% of people without access to reliable and affordable modern energy live in dispersed, rural villages and peri-urban areas.
- These areas are characterised by poor existing infrastructure and a lack of viable distribution channels.

Key Learning

- Early-stage energy enterprises typically struggle to find viable and sustainable routes to market, especially in rural areas.
- Existing retailers and distributors are unwilling to fund the disproportionate marketing costs required to generate interest in new energy products, and require manufacturers to take significant credit risk simply to stock products.
- This means there is often a significant time lag between promotional activities and a customer coming into contact with a product, which kills the sale.
- Logistical constraints related to customers living in remote and dispersed locations also extend to **after-sales support**, which is crucial to ensure customers are satisfied, learn about their preferences and ensure products are used correctly.

BARRIER TO PURCHASE: AVAILABILITY

REACHING THE BOP: MOVING FROM 'PUSH' TO 'PULL' DEMAND

Energy enterprises need to address the whole gamut of consumer barriers to purchase to serve customers living on less than \$2 a day. Only economies of scale and time can allow energy pioneers to innovate new ways to address these risks and move past the tipping point where 'word-of-mouth' drives sales. By nature, early adopters, while still living in low-income areas, are the ones with fewest barriers: they live nearer market towns, earn slightly more income, run informal businesses and are better informed. We have found they are essential to creating aspirational demand for a product.

While we are currently working together to research and provide empirical evidence for the increase in BOP penetration and impact over time, our partners have already collected substantial market data and eye-witness reports from field sales agents that show that, over time, they have been able to reach households and businesses in poorer villages, meeting the needs of a much wider range of BOP consumers.

We explore emerging models and innovations within the energy sector to overcome these barriers and accelerate the growth path of early-stage energy providers in new BOP markets further in Lesson 3.

The need to develop a range of products

One size very much does not fit all when serving BOP markets. Our partners have discovered that heavy investment is needed to develop a range of products to suit different consumer needs, tastes and preferences in different regions.

Beyond this, an array of products with differing price points can allow customers greater flexibility to try and trust the brand at a lower cost, experience benefits such as financial savings first hand, and then invest this by upgrading to a more pervasive solution.

Beyond making solid business sense to upsell products with improved functionality (such as mobile payment technology, or greater battery life, or using different fuels) to customers, we have discovered there is a huge development benefit in creating a range of aspirational products that help customers to move up the energy ladder, and incentivise poorer customers to adopt the product in the first place.



Building the Energy Ecosystem: Recommendations

ADAPTING EXPECTATIONS TO THE MARKET REALITY

Pioneer Needs

Low-margin businesses need volumes to achieve sustainability – and creating demand takes time. Pioneers need to invest considerable effort to understand what low-income customers really want and their financial constraints, and then evolve new marketing, distribution and sales strategies to de-risk their product. Only then will disruptive innovations reach the poorest consumers.

There is a clear role for public and donor funding to take risk on new supply chain innovations to overcome these issues.

Social Investors

Our experience is that it's unrealistic to expect early-stage energy enterprises to be able to deliver the depth of awareness-raising and supply chain innovation that is required to serve this market alone. These challenges are not unique to the energy sector – and will similarly prevent the scale-up of many other enterprises building markets for social impact products and services, such as medicines or water purification.

Overcoming barriers to purchase takes long-term commitment. Social enterprises are often under pressure from donors and investors to deliver against short-term sales targets – instead of building their understanding of how potential customers want to use and pay for their products. Patience in the short-term will deliver far greater impact in the long-run.

There is a clear role for public and donor funding to take risk on new supply chain innovations to overcome these issues. Once this tipping point has been reached, economies of scale and snowballing appetite transitions the product from 'push' to 'pull'. We have seen this most recently with rapidly growing mobile phone and mobile money markets in East Africa.

Lesson 3:

Tackling energy poverty will require urgent innovation across the whole energy value chain

Early-stage energy enterprises, no matter how great their products, will struggle to serve low-income markets unless they can tackle a wide range of demand- and supply-side constraints. Building appetite among risk-averse consumers for your product, particularly in rural locations, and establishing sales and distribution channels to serve them, ratchets up costs and risks that can cripple the viability of early-stage businesses as they seek to scale.

By 2010, all of our product partners were wrestling with these issues, predominantly in India and East Africa. Envirofit, for example, had focused exclusively on building its own direct sales channels supported by district retail networks (typically hardware or general convenience stores) to reach customers that were expensive to serve. Experiments with local advertising campaigns, promotions, discounts and product offers (such as bundling with mobile phones) and new partnerships with NGOs, microfinance institutions, self-help groups and local authorities resulted in short-lived sales spikes, but were resource-intensive, complex and relied heavily on finding the right local partners.

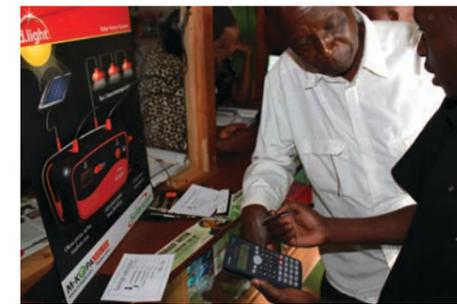
We find this is often the case with enterprises serving the energy-poor, where constant

experimentation is required to understand and solve the key barriers within the value chain, most importantly the interrelated challenges of **demand creation, consumer affordability** and **last mile distribution**. This can be very resource-intensive, and in some cases take a number of years to get right – often resulting in missed sales projections and investor frustration.

We have learned that for any energy enterprise with low margins to reach sufficient volumes to become financially independent, they will need to adapt their business model to find a viable and integrated solution to these three barriers.

SUSTAINABLE VALUE CHAINS: THREE MAJOR BARRIERS TO SCALE

Shell Foundation has been working to address these gaps in the 'inclusive energy value chain' since 2010. Early efforts to build the in-house capacity of partners by 'bolting on' solutions (such as social marketing campaigns and local microfinance partnerships) to critical barriers were ultimately too expensive and complex for scale. However, this work has led to three emerging delivery models that we believe show strong early potential for scale and sustainability.



Courtesy of M-KOPA © G. Goodwin



Courtesy of Dhama Life



THREE MODELS FOR VALUE CHAIN INNOVATION: LEARNING FROM 2010 TO 2014

INNOVATION

MARKET BARRIER: DEMAND CREATION

MARKET BARRIER: CONSUMER AFFORDABILITY

MARKET BARRIER: LAST MILE DISTRIBUTION

KEY CHALLENGES

RESULTS

Integrated Business Models

M-KOPA SOLAR

2010 to present

M-KOPA combine solar and mobile technology to provide affordable, clean and bright energy to off-grid villages in East Africa. Their founders built on their experience in setting up the mobile money platform M-PESA, to incorporate the use of mobile money directly into energy products. This allows them to provide smart credit to enable low-income consumers to access energy products and pay for them in instalments using mobile money platforms.

M-KOPA partners with national telecom operators, using these relationships to enable cash collection through mobile money platforms. Where these relationships are very strong, such as with Safaricom in Kenya, they can also bring brand and marketing benefits, adding to M-KOPA's credibility in the market place. M-KOPA's state-of-the-art customer service platform allows them to offer real-time support to users and up-sell new products or loans once initial loans are repaid.

M-KOPA have leveraged Safaricom's existing mobile money platform, M-PESA, and use sophisticated technology to allow customers to lease solar systems and pay back in instalments through their phones. Close monitoring of customer payment patterns and ability to shut down their systems has allowed M-KOPA to innovate a new model for consumer credit, with default rates running at less than 5%.

M-KOPA operates its own network of direct sales agents using a network of service depots to support inventory delivery. Having tried several sales channel models, M-KOPA's best results have been achieved with direct recruitment, training and incentivising of individual sales agents. Where strong relationships exist with the telecom operators, M-KOPA has also benefited from using some of these telecom sales outlets.

Working capital to fund product manufacture.
Building an effective sales force.

Since launching their first solar product in Nairobi in November 2012, M-KOPA has sold over 110,000 units in Kenya. Validating the right business model for scale-up has allowed them to leverage \$20 million in grant, commercial debt and equity to expand operations and break into new markets in Uganda and Tanzania.

National B2B Partnerships

ENVIROFIT d.light

2011 to present

Envirofit and d.light now create cost-effective partnerships with corporates and distributors with national reach (rather than seeking to own the entire value chain). d.light partnerships include a relationship with Total, the French energy group, across Cameroon, Indonesia, Bangladesh, Burkina Faso, Malawi, Niger, Senegal, South Africa, Uganda, Zimbabwe, Kenya and the Republic of the Congo to stock solar lanterns across thousands of retail outlets. Envirofit similarly partners with a range of national corporates in India and Africa, including Unilever and Comcraft (Africa's largest kitchenware producer) in Kenya and Nigeria.

Shifting to a B2B model has allowed Envirofit and d.light to benefit from the marketing and sales channels of their corporate and distribution partners. Co-branding national, regional and local campaigns has led to increased recognition in the market and helps to offset the risk to the consumer of spending valuable income on a product from an untrusted source.

These types of B2B partnership significantly reduce marketing, sales and distribution costs for social enterprises, which they can either pass directly on to the consumer or invest in product innovation to lower costs over time. Envirofit partners in India, such as Amul (a dairy producer) and Ultratech (a cement manufacturer) often run employee payment plans and discounting schemes for workers around their plants.

Partnerships with national corporates and distributors give social enterprises access to thousands of previously unavailable retail outlets, from Total retail stations to the convenience stores stocking Unilever or Comcraft products (as well as marketing space on the shop floor).

Partnerships with national corporates and bargaining power with national distributors typically require track record. Finding partners with aligned interests at a national level can be challenging.

Within two years of Envirofit switching to a B2B distribution model they had reduced costs by over 75%, staff by 90% and doubled sales in India. d.light's partnership with Total alone has resulted in the sale of over one million solar lights, with the partnership continuing to scale to additional countries in Africa and Asia. Both Envirofit and d.light have experienced a snowball effect through these collaborations, allowing them to build bigger and bigger partnerships at a national and international level.

Supply Chain 'Intermediary' Models

dharmalife

2009 to present

Specialist intermediary businesses can support multiple manufacturers of social impact products by providing cost-effective solutions to access customers, consumer finance and distribution channels at the last mile. Dharma Life offers an integrated solution to:

- recruit, train and support a network of young entrepreneurs in rural villages in India;
- work with manufacturers, distributors and local retailers to create a sustainable value chain;
- activate demand for social impact products by conducting marketing campaigns to demonstrate economic and social value.

Dharma's network of village entrepreneurs build trust with local communities and educate consumers on both the economic and social value of energy products. In addition to supporting social enterprises to reach rural markets, Dharma also helps major corporates such as Unilever, Johnson & Johnson, Microsoft and Coca-Cola to market specialised products that benefit the lives of the rural poor, such as water purifiers, sanitary towels or nutritious drinks. Dharma builds on this brand association by running regional awareness-raising campaigns, with a range of marketing activities including local market demonstrations.

Dharma's rapidly expanding rural sales network, their ability to foster market demand, and the range of products that they are able to offer (including cookstoves, solar lights, and also life-enhancing products such as sewing machines, mobile phones and bicycles), means they are fast becoming the partner of choice for many microfinance institutions that would like to expand their membership base. Dharma is also now further integrating consumer finance into its model by exploring the impact of mobile money across India.

Dharma has developed an innovative and cost-efficient 'hub and spoke' model. This sees their network of village entrepreneurs and sales agents generate demand, and then source products from Dharma's local and regional distribution partners.

Low margins and high operating costs make most multi-product distribution models unviable. Dharma uses mobile platforms and automated logistics and demand management systems to cut operational costs and negotiates margins with manufacturers which it can pass down to distributors, retailers and entrepreneurs to make the value chain sustainable. It also supplements income by conducting market research for development agencies and corporates.

Dharma's business has grown from a small pilot in Maharashtra in 2010 to supporting over 2500 young entrepreneurs across Maharashtra, Uttar Pradesh, Bihar, Karnataka, Gujarat, Delhi and Rajasthan – serving over two million customers. The model has gone through several iterations and is now ready to scale across regions with very different customer demographics and vast cultural differences. Dharma aims to grow its network to include 100,000 rural entrepreneurs by 2020 – serving 50 million customers.

Developing an integrated solution



“ We built M-KOPA to explore the potential of mobile money and machine-to-machine payment technology to make cleaner, brighter and safer energy more affordable for the BOP market. Everything about the model was new, from the technology itself, to a financial model that challenged traditional routes for consumer finance, for example through MFIs, and brought customer credit onto our books – a significant risk for a start-up.

We had to develop back-end platforms to cope with the complexity of assessing the credit risk of a largely unbanked customer base, managing a loan book, and real-time support for customers who stall for periods of time. Grant funding gave us the breathing space to build our track record and, with fewer than 5% of our customers defaulting, we've now been able to securitise our financing book and raise commercial debt to grow the business. ”



Nick Hughes, Co-founder, M-KOPA Solar



Courtesy of M-KOPA © G. Goodwin

Building the Energy Ecosystem: Recommendations

STRONG FOCUS ON 'ACCESS'

Pioneers

Early-stage energy enterprises who seek to serve BOP consumers directly must develop integrated solutions to three key barriers to market creation – demand activation, last mile distribution and consumer financing.

Enterprises serving this market are low-margin businesses, with unrecognised brand profiles, who deal with the world's most price-sensitive customers. The costs and risks associated with testing new solutions under these conditions are immense. Going alone is a daunting challenge, and the formation of long-term, deep-running partnerships with established brands can provide critical credibility and infrastructure to tackle many of these barriers.

Much later, once economies of scale set in and there is growing recognition in the market place, partners like d.light and Envirofit have been able to enhance margins by structuring their own sales and retailer networks and negotiating more favourable national contracts with microfinanciers.

Social Investors

Grant-makers and impact investors must look beyond the appeal of entrepreneurs who are designing or manufacturing new products or technologies to tackle the market barriers that prevent these new energy solutions from succeeding. An upsurge in value chain innovation is required to fuel the growth of decentralised energy markets; and there is an outsized need for patient and flexible grant support and early-stage impact investment to take new solutions to scale.

There is also an urgent need for **debt finance** to support fast-growing distributors and retailers to manage cashflow and balance sheet constraints associated with stocking energy products – a topic we cover more fully later in this report.

Corporates

Over the last 14 years we have partnered with many leading global multinationals who are interested in targeting rural consumers as part of their long-term growth strategies, but struggle to find a viable route to serve this market, or lack the patience or bandwidth to explore solutions that will deliver low returns in their early years.

We have seen two types of promising corporate intervention to enhance energy access:

- 1) enabling social enterprises to leverage existing infrastructure, brand credibility or provide direct funding to improve access to last-mile consumers; and
- 2) co-developing new products or services specifically targeted at BOP markets.

For example, Shell Foundation and Envirofit recently teamed up with Unilever to produce a jointly-branded clean cookstove for the Kenyan market, that would sell under their food category brand Royco. This integrated value proposition allowed customers to link a new product with an existing household brand they knew and trusted. Early pilots were promising and the value they got from the stove (reduced fuel use, emissions and cooking time) further enhanced their loyalty to Unilever.

Lesson 4:

A new range of financial solutions will be required for inclusive markets to grow

Today it is widely accepted in the social investment sector that a blend of catalytic subsidy and tailored finance is needed to build a strong, global energy value chain to serve the energy poor. Yet our experience of seeking co-investment to help scale early-stage energy enterprises is that **there is a distinct lack of the patient and flexible funding needed to build inclusive markets.**

The role of 'smart finance' becomes particularly relevant when we are talking about pioneers – high-risk businesses that lack the significant growth capital they need to innovate and scale, and deliver only marginal returns (at least in the short-term). Significant funding gaps in the sector also prevent the next generation of enterprises in these markets from replicating successful models.

Looking back across our portfolio we realise that each and every one of our partners have been constrained by a chronic lack of appropriate finance at every stage of their validation and scale-up. As a result, the creation of structures, intermediaries and models to unlock different forms of capital is a growing focus for SF. In particular we see **three prime opportunities for financial innovation** with particularly strong potential to drive impact.

1. New incubation vehicles to accelerate transformative innovation

As we have seen from Lessons 1, 2 and 3, a complex blend of capital, technological expertise and business support is needed to kick start a global ecosystem of energy entrepreneurs.

We believe there is a role for multiple 'intermediary' vehicles backed by a blend of funders, that provide different types of capital to early-stage innovators tailored to the **different risk categories** that they typically face (see Chapter 2 for common reasons for failure).

With this in mind, in recent years SF has experimented with three new models to accelerate innovation, opening up the use of different financial instruments to unlock the right blend of support needed for validation and growth of new 'inclusive' energy markets.

A complex blend of capital, technological expertise and business support is needed to kick start a global ecosystem of energy entrepreneurs.

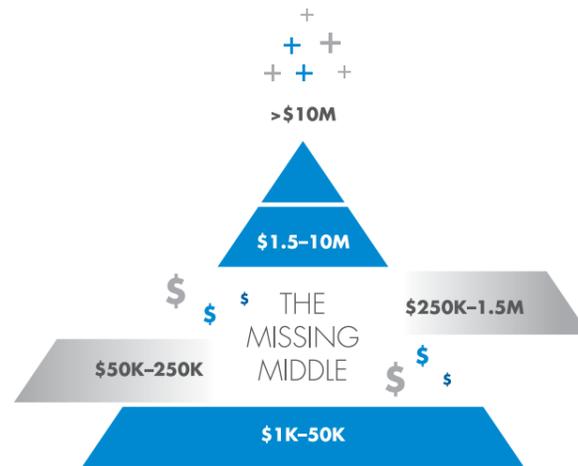


	TECHNOLOGY RISK	MARKET RISK	EXECUTION RISK
INCUBATION INTERMEDIARY	Factor(E) Ventures (Investing in new pro-poor energy technologies)	Shell Foundation Incubator (Building new markets for energy access)	Sangam Ventures (Validating new approaches to pro-poor energy delivery)
Legal Structure	Not for profit – with aim to be financially viable (US 501.C3)	Not for profit (UK Charity)	For profit – Fund
Established	2013	2000	Launching 2015
Stage of Company	Pre-seed to early-stage, pre-revenue, pre-R&D	Pre-seed to early-stage, pre-revenue, post-R&D	Early-stage, pre- to post-revenue-R&D
Primary Instrument	Convertible debt	Grant	Equity
Size of Investment	Up to \$500k	Up to \$300k	Up to \$2.5m
Type of Hands-on Support	Engineering, techno-economic analysis, technology lab, prototyping, mentoring, early piloting.	Hands-on operational, strategic and governance support across the business.	Business development assistance: product development, capacity building, financial management and governance.
Time Horizon	18–24 months	12–18 months	Fund term
Outcomes	Factor(E) has reviewed over 50 opportunities and has made several initial investments, including a hydraulic system to manage fuel efficiency in fleet vehicles, technology to convert human waste to industrial fuel, and a modular system to supply solar power for commercial use in remote areas.	All current SF A2E partners have progressed through the SF incubator (equivalent to Stage 2 in our six step process).	Sangam will officially launch in 2015, but has already made three initial investments at the pilot stage. These include a new thermal battery for rural refrigeration, a biogas plant powered by organic waste and a new business to provide vocational training in the renewable energy sector.
TARGET IMPACT	Factor(E)'s ambition is to reach the point where every investee in their portfolio has the potential to reach >100 million consumers.	Deliver a pipeline of possible long-term partners with breakthrough innovations that can each deliver significant impact to 10 million lives or more.	Sangam aims to invest \$50 million across 25 companies by 2020 – improving 100 million livelihoods in India.

2. Flexible debt finance to support high-potential energy enterprises

For enterprises that are already selling thousands of products every month, the single largest barrier to scale is the lack of affordable debt available to them. These enterprises struggle to access finance from banks (due to their lack of sufficient track record and availability of collateral) and, beyond dipping into limited and expensive equity reserves, have few other options to fund short-term working capital needs and medium-term capacity building.

Debt in Africa and Asia for unproven enterprises can cost as much as 20–30% in interest, presuming collateral is available.¹⁴ A suite of debt products that cater to the needs of these enterprises over their lifecycle rather than a standard debt product is required, including working capital, short-term and medium-term growth capital and uncollateralised lending.



Using philanthropic capital to tackle the need for affordable working capital



In 2011 Shell Foundation partnered with the OPEC Fund for International Development (OFID) to pilot a revolving working capital facility totalling \$2m. The facility enabled d.light and Envirofit to import products into Africa and to extend credit terms and skills support to carefully selected distributors.

This pilot exceeded expectations by catalysing the sale of over 450,000 solar lights (against a 225,000 target) and 130,000 clean cookstoves (against a 50,000 target) in less than 36 months – pointing to a potential sector-wide solution to solve the working capital bottleneck in the off-grid energy value chain. The experience has informed our work with asset manager, responsAbility, to create a dedicated fund for fast-growing energy access companies and distribution channels that would be suitable for scale.

“ In partnering with Shell Foundation, we were able to build on their experience and use our grant contribution over a period of two years to validate a need that could be relevant for the entire access to energy product market globally. We are now supporting the scale-up of the facility and continue to work with SF on creating a global access to energy market. ”



Faris Hassan, Director of Corporate Planning and Economic Services OFID

¹⁴ IntelCap Report on decentralised energy solutions in Africa and India.

THREE EMERGING SOLUTIONS TO THE DEBT GAP

DEBT FINANCE PROVIDER	responsAbility energy access fund ¹⁵ (Working Capital)	IntelleGrow (Short term Debt for Capacity Building)	GroFin (Start-up & Growth Finance)
Established	Expected to launch 2015	2011	2004
Challenge	Fast-growing inclusive energy markets such as solar lights ¹⁶ will struggle to scale due to the credit burden on manufacturers to facilitate the entire supply chain. Cash-to-cash cycles can take up to 52 weeks.	Most early-stage energy SMEs lack sufficient track record or collateral to secure debt from banks. This often results in enterprises seeking equity much too early, compromising on business validation.	Start-up and growing entrepreneurs in Africa typically struggle to access the finance and skills they need to grow their businesses successfully. This creates a finance gap in most markets known as the 'missing middle' – a major constraint on inclusive economic growth.
Type of Funding	Loans for growing energy enterprises.	Venture debt (early-stage, viability-based loans linked to cashflow).	Viability-based loan, linked to cashflow. Risk-adjusted returns.
Size of Investment	Up to \$3 million	\$50K to \$1.25 million	>\$50K to \$1.5 million
Fund Size	Target first close of \$30 million with investment from IFC, Lundin Foundation and other social investors.	\$10 million from a range of social investors including Omidyar Network and Michael and Susan Dell Foundation.	\$400 million under management from a range of social and commercial investors.
Non-financial Support	Technical assistance services for borrowers.	Nimble structure with decision to lend made within six weeks (rather than months).	Extensive business support pre-, during and post-investment and links to international supply chains and functional expertise.
Investment time horizon	Six to 24 months revolving fund	12 to 36 months	Three to six years
Outcomes	Readying for launch pending regulatory approval.	Still in its early stages, the business has disbursed 93 loans across high social impact sectors – energy, financial inclusion, education, healthcare – with a 100% repayment rate to date.	500+ businesses supported (26% in energy and transport). Total job creation of over 180,000 jobs, over a third of which held by women.
TARGET IMPACT	Expected to impact 50 million livelihoods and significantly reduce CO ₂ emissions.	\$230 million deployed by 2020 improving 10 million livelihoods.	\$650 million deployed, creating over 75,000 jobs and benefiting more than 1.2 million people.

¹⁵ Pending regulatory approval by the Commission de Surveillance du Secteur Financier in Luxembourg.

¹⁶ The market in Africa for solar portable lights alone has grown by 90% annually for the last 4 years.

3. New models to unlock private and public capital

Early-stage social enterprises in the energy sector are typically capital-intensive, high-risk and marginal return businesses. If judged only by their project financial returns they would (and do!) struggle to raise the required funding for the risk they carry. Investors often have differing expectations about the returns that are possible, looking for double-digit return where low-to-mid single figures are usually more accurate, and typically do not put a financial value on the impact of the resources that they are generating.

Different types of social investors, from grant-makers through to commercial funds, will have wildly different preferences on risk/return expectations and time horizons.

The challenge, in our view, is to create a set of new vehicles, tools and instruments that better harness the unique assets of these differing organisations, rather than try to change their preferences entirely. Three examples of innovations in this arena include:

i) Tiered capital and blended structures to unlock private capital

There are several existing examples of grant being used as concessional finance to allow an enterprise or vehicle to allow impact investors, DFIs and perhaps commercial funders to receive lower risk and higher returns, with philanthropic capital acting as a first loss cushion for investors.

We have similarly been experimenting with a variety of tiered capital structures to allow investors with aligned social interests, but different risk and return appetites, to participate in the same funding

vehicle (such as GroFin, the responsibility energy access fund and BIX Fund). Risk capital in these funds are tiered according to a pre-agreed order of liability or, in an interesting development, by offering proportionately higher returns to those who make a long-term commitment to carry high-risk (including grant-makers). We expect to be involved in further evolution of such models in the years to come.

ii) A shift to private-public partnerships

The way that private and public sectors combine to catalyse new inclusive markets is changing. Where in the past governments and public agencies have sought to incentivise innovation and market activity in areas they feel have high potential, in recent years there has been increasing recognition that the private sector (and here we include private foundations, entrepreneurs and 'intrapreneurs') may be better placed to identify breakthrough innovations that could transform markets.

The need for risk-tolerant capital and also the right capability and skills to deploy this, has allowed for the emergence of new private-public partnerships where foundations carry the risk of innovation and government agencies then support validation and market development in support of the most promising models; leveraging the relative strengths of both types of organisations.

The challenge, in our view, is to create a set of new vehicles, tools and instruments that better harness the unique assets of these differing organisations, rather than try to change their preferences entirely.

A strategic partnership with the UK Department for International Development (DFID)



Building new energy solutions to drive mass adoption of modern energy services

A significant barrier to the adoption of modern energy products in developing markets is affordability. Products such as solar home lighting systems and smart batteries are widely needed by under-served households and SMEs, but to date they have been available mainly on a cash-and-carry basis only, leaving them beyond the financial reach of most people. SF's partnership with M-KOPA set out to explore the market for embedded mobile technology in the energy sector; a development that would enable consumers to lease modern energy assets on a pay-as-you-go basis, without relying on partnerships with microfinance institutions.

In 2012, DFID awarded an initial grant to SF to support M-KOPA to extend the application of pay-as-you-go energy to other products and services and design lower cost technology that could drive adoption by different customer segments. This lower cost technology would also pave the way for other enterprises to adopt, generating widespread public benefit. Leveraging DFID funding to validate cost reduction in its core technology directly led to further private sector investment in M-KOPA from Gray Ghost Ventures, Gates Foundation and the Commercial Bank of Africa.

By channelling its funds through SF, DFID increased its impact in two ways. First, we did not charge any management fees, increasing the efficiency of capital deployed. Second, we matched DFID funding through a grant contribution from SF and co-investment from M-KOPA. This partnership proved highly successful and was shortlisted for a UK National Civil Service Award in the 'Innovative Delivery' category in 2012.

Based on this success, DFID scaled-up its partnership with SF in 2013 and increased its scope beyond embedded mobile technology to develop new energy applications and business models that could drive mass adoption of modern energy services. With a £4.3 million contribution from DFID and matched funding from SF, we are now working with M-KOPA, d.light and others to achieve this public benefit outcome.

“ Our partnership with Shell Foundation is on track to significantly enhance access to modern energy services and, at a strategic level, it has validated the potential for DFID to successfully leverage a private foundation to generate public benefit more efficiently than we could do independently. ”

Leanne Jones, Innovation Advisor DFID, and chief architect of our partnership



Partnering with USAID to accelerate entrepreneurship in the energy sector



In September 2014 the US Global Development Lab of the US Agency for International Development (USAID) partnered with SF to develop and scale-up new approaches to accelerate entrepreneurship in the energy sector. With USAID support of \$2.2 million against a contribution of \$12.85 million, SF is scaling-up three complementary business acceleration models: Factor(E), Sangam and SF's in-house Incubator. These models have a mandate to support entrepreneurs seeking to provide access to modern energy services for low-income communities in developing countries, with a focus on Africa and Asia.

Leveraging USAID funding to provide support to three incubation models managed or actively supported by SF will help further develop and validate these three approaches to enable them to reach scale and financial sustainability. Publishing reports related to these approaches will encourage their replication by others. These outcomes will drive the broader social impact objective of providing access to modern energy services for a significant number of low-income households and businesses in developing countries.

“ Testing new approaches to early-stage incubation is risky. By partnering with Shell Foundation under the PACE Initiative, we intend to test three distinct incubation models for the energy sector and generate social impact at scale. In parallel, we will study the efficiency and effectiveness of each model to benchmark against other incubation approaches in order to support and build entrepreneurial ecosystems around the world. ”



Rob Schneider, Senior Partnerships Advisor, USAID and PACE lead

iii) Pre-financing for impact monetisation

Social enterprises exist to deliver impact and this is an asset that is rarely priced and sold. We believe the monetisation of impact can not only help to improve measurement tools, but also enhance the overall returns of the businesses by creating a revenue stream that can be used to improve returns to private investors. For an early-stage energy enterprise to make this work, some element of pre-finance is needed. Entering the carbon market, for example, requires a lengthy registration process that includes the need to establish baselines in different geographies, track sales and support audits and can often take over two years.

In 2010 SF established a \$5 million facility to support Envirofit to overcome barriers to carbon monetisation, with loans repayable from revenue linked to carbon. The model, the first of its kind, enabled Envirofit to register and track the sale of over 200,000 stoves

across 10 countries that will save over two million tonnes of carbon over their lifetime. Following this pilot, in 2013 we joined forces with Cardano Development (a Netherlands-based fund manager with a track record for establishing new financial instruments for emerging markets) to create BIX Fund to serve the wider market. The new intermediary was established with the same \$5m seed funding and will now raise a further \$25 million from leading social investors to spur the purchase of impact beyond carbon credits (for example, households connected to electricity) in emerging markets.

Promising variants of impact monetisation include **results-based financing** and **development impact bonds**, where the aim is to use finance from socially-motivated donors (e.g. governments and foundations) who would pay only when their goals are delivered – enabling social enterprises to generate more attractive returns for impact and commercial investors.

Building the Energy Ecosystem: Recommendations

THE NEED FOR SMART SUBSIDY

Pioneer Enterprises

Energy entrepreneurs that serve the poor find it difficult to raise long-term committed capital, particularly at the early stages of their company's growth. Only when there is significant evidence of market growth and risk is sufficiently offset will investors with deep pockets start to emerge.

Lack of operational capacity in these enterprises often means that fundraising is led by small teams, typically without the relevant skills for successful negotiations with investors, compromising the value of the deals that they seal.

Grant funding can play an important role to off-set risk and increase returns for impact investors and the private sector.

Social Investors

Despite recent calls within the social investment sector making a case for philanthropists to catalyse innovation, de-risk technology and validate business models that serve BOP energy markets, there remain only a handful of organisations that provide high-risk, flexible, long-term capital alongside the ongoing, hands-on support that early-stage energy enterprises urgently need. The question is: how do we widen this circle?

Grant funding can play an important role to offset risk and increase returns for impact investors and the private sector, both by anchoring tiered vehicles and through the emergence of grant-based instruments such as loan guarantees.

First loss capital and convertible grant can help energy enterprises prove their viability to investors, unlocking much-needed growth capital to scale inclusive energy markets.

Improved metrics to benchmark the cost-efficiency of a growing range of blended funds will allow social investors to allocate capital towards the structure that best suits their preferences for instrument, time horizon, risk/return and impact delivered.

Lesson 5:

Early focus on talent development is crucial to the long-term viability of energy enterprises

The idea of a social enterprise investing heavily in human capital as a prerequisite for growth is not controversial or even new. In fact, it seems so obvious that few would question it. It is surprising, though, how often we see social enterprises struggle because they do not have the unrestricted resources needed to overcome staffing challenges.

Early-stage social enterprises in particular often cannot afford the kind of world-class talent they need to validate their business models and technologies. We are increasingly finding that partial and time-bound subsidy support specifically to enable enterprises to hire appropriate senior talent has been a highly effective use of philanthropic capital to help enterprises charter the critical early phases of their growth.

Looking back across our work with pioneering entrepreneurs tackling major development challenges over the last 14 years, we believe **five sub-lessons** have emerged related to the importance of building a strong talent pipeline right from the outset.

1. From a reactive activity to the core focus of the CEO

Too often, we see resource-constrained enterprises forced to react to gaps in their organisation structures as they arise, with no proactive plan to recruit for those gaps before they become bottlenecks to growth. Without exception, the social enterprises that have become leaders in their respective subsectors treat finding, selecting and managing their human capital as their top priority. The CEOs of these organisations spend more time on HR than on any other activity, in some cases by a wide margin.

2. You get what you pay for

Despite widespread recognition of the importance of building a world-class team, as it turns out few are prepared to pay for it. In many quarters, it is still assumed that because an enterprise has a social objective at its core, its compensation levels can and should be below market. This curtails the ability to hire world-class talent, who may not be quite as motivated by the social objectives of the company as the founders. In some regions (especially Africa where there is often a shortage of trained professionals, and where local sales directors or CTOs, for example, can easily command six-figure US dollar salaries) investors and even some entrepreneurs will balk at the idea of paying market-related salaries and typically opt for people with lesser track records and experience. Time and again, we have seen these decisions backfire and result in lost time and wasted money. The enterprise will realise its mistake only after many months of struggle.

Without exception, the social enterprises that have become leaders in their respective subsectors treat finding, selecting and managing their human capital as their top priority.

3. Don't sacrifice long-term sustainability chasing short-term profit

It is often the case that when an enterprise has spent significant resources moving through the validation phase (the phase during which an enterprise proves that its technology and business model can work, at least at a localised scale), it is still loss-making at a company level. With financial viability in sight, it is not always an intuitive or easy decision to make compensation commitments that will lead to a dip further into losses. We have seen, and continue to see, the importance of investing in world-class management teams as the core building block required to go to scale. Shell Foundation partners are at different stages of this process, but share the same philosophy on this subject.

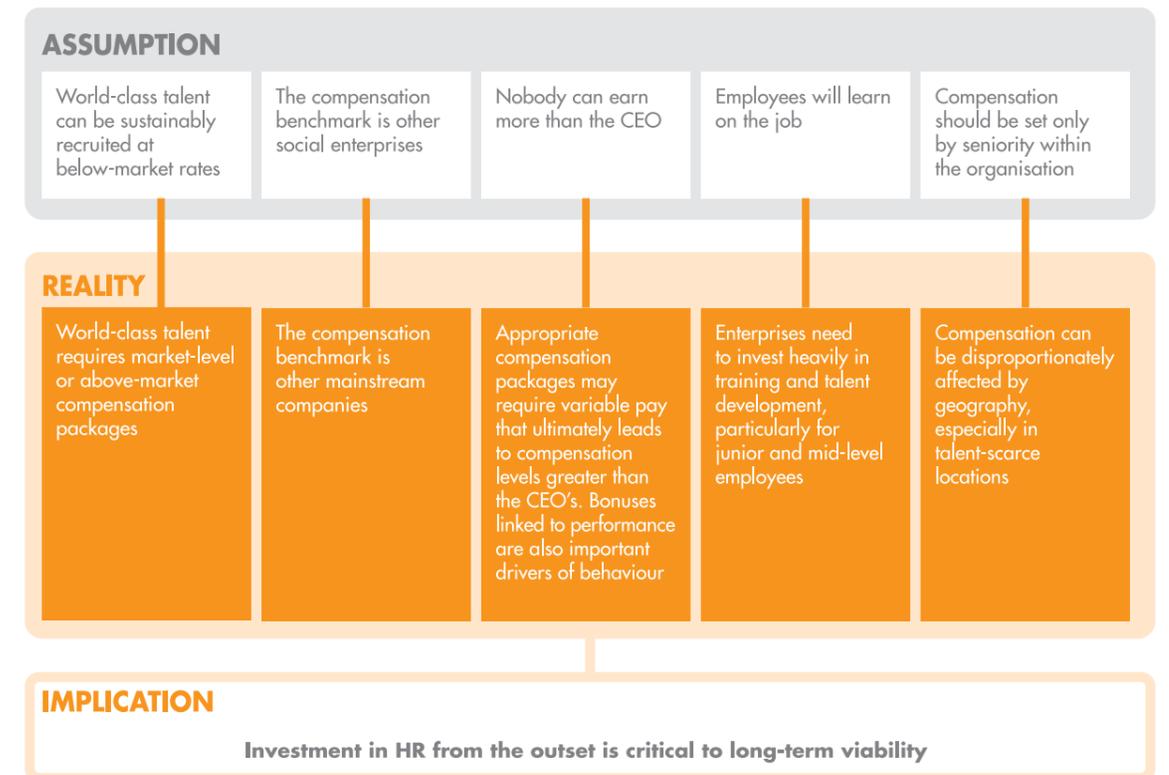
Hiring as a priority at IntelleGrow

“ I currently spend 40% of my time attracting new talent to the company and managing existing talent, which still isn't sufficient for me. After closing a few key hires this year, I will be able to increase that allocation to 60%. We are always hiring, even when we don't have formal vacancies. If I find a high potential candidate, we will simply find a role for them in the organisation. ”

Sanjib Jha, CEO, IntelleGrow



HR COMPENSATION ASSUMPTIONS AND REALITIES



Investing in Human Capital at d.light



In 2011, at the time of their first major fundraise, d.light's potential investors felt that the founders of the firm needed additional experience to build a global business – and made it a condition of their funding to bring in a new CEO, Donn Tice, to run the business. Donn brought 30 years of experience in consumer products, clean technology and global distribution working in a variety of roles with P&G – but at the time, it felt like a very expensive decision to make.

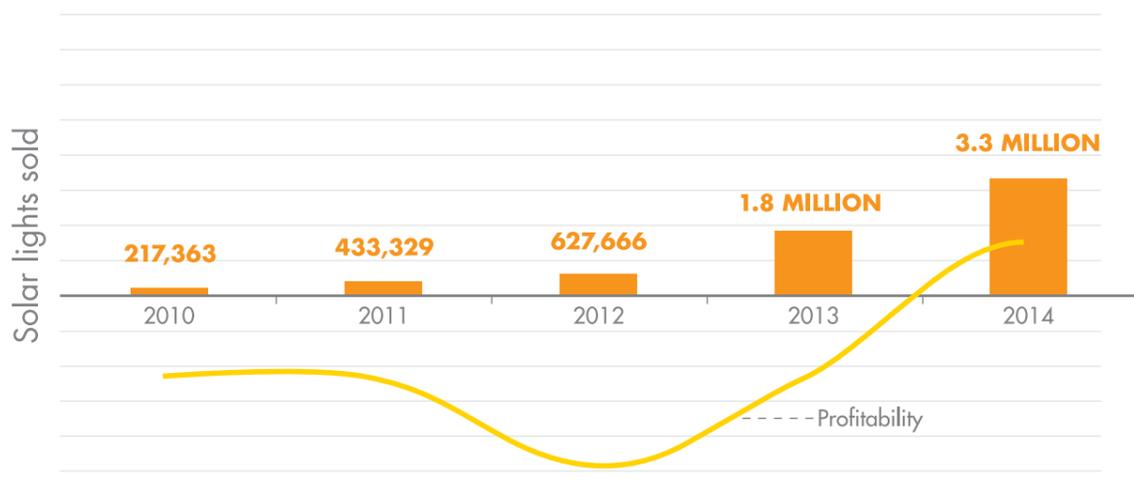
Hiring Donn and a number of senior managers with commercial expertise actually meant the business incurred heavy losses during his first year at the helm. However, the board remained confident that this short-term blip would deliver a more robust growth trajectory in the long run. As illustrated in the graph below, this heavy investment in manpower to find the right people for the right positions enabled d.light to triple the size of their business over the next three years.

“ d.light is creating a new, large-scale private sector market that enables access to modern energy for some of the world's most difficult-to-reach customers. This has required a massive investment in executive leadership, middle management, and staff – far ahead of desired results or foreseeable problems. Despite these challenges, our mission and 'company culture' have attracted tremendously talented, experienced people at all levels, which has enabled us to more than double our sales figures over the last three years. Even then, we expect to make a significant ongoing investment in our people – our most important asset. ”



Donn Tice, Chairman & CEO, d.light

D.LIGHT ANNUAL SALES AND FINANCIAL PERFORMANCE OVER TIME*



*scales are distinct from each other and illustrative only to highlight trends in spend vs. output

4. Upstream talent: skills building and leadership development

One challenge facing energy enterprises in particular is that the skills required at the junior level are simply unavailable at the volumes required to reach scale. Huge numbers of interested candidates can often be found, but few have the skills needed to hit the ground running. This is particularly true with enterprises operating in rural areas or those requiring technical skills. For example, Husk Power Systems, an enterprise that generates low-cost electricity from waste agricultural residue, has had to invest heavily in its own in-house training programme to build the skills required for its junior staff before they are deployed in the field. This heavy investment has helped the company screen and successfully hire over 200 employees, but it has been insufficient to solve this challenge completely. Indeed, sourcing, screening and training appropriate human capital is the company's single largest barrier to growth today. To solve the issue systematically in a state like Bihar would require setting up independent training organisations, an idea the company considered in 2012, but abandoned after concluding the resource requirements this would entail.

The demand for this type of training is so significant that the former head of training at Husk Power, Rama Siva, left the company to establish an energy skills development company called Anthropower that builds customised curricula for energy enterprises. Within 12 months of its launch it has provided training to over 1000 individuals, with the goal of directly catalysing over 15,000 jobs in the next three years.

For Dharma Life, the lack of skilled salespeople and employment opportunities in rural India formed part of the genesis of the company. Similarly to Husk Power, Dharma has had to invest heavily in developing its own in-house training programmes for its junior sales staff because no third-party organisation was fit-for-purpose. "Investing in basic sales training is highly resource-intensive, but there's no way around it," says Dharma Life founder Gaurav Mehta. Dharma Life has trained over 2500 sales agents and is on track to double this number by 2015. Its training model matters because the social impact criteria of its products fit into the value proposition of being a member of the Dharma team. The company's top entrepreneurs tend to find motivation from the product mix they are selling, because they see the benefit they are providing to the local communities. If Dharma is successful in scaling-up throughout India and Africa as planned, it will have proven the value of social impact extends into junior-level recruitment as well.

Huge numbers of interested candidates can often be found, but few have the skills needed to hit the ground running.



Hiring high-potential, mid-level talent presents its own challenges as well.

Despite social enterprises become increasingly appealing career options for young professionals, it continues to be difficult to match talent with opportunity, particularly with a global talent pool. High-potential, early-career professionals currently have few opportunities to gain practical experience in the social enterprise sector. Equally, social enterprises are constrained by the difficulty in sourcing appropriately skilled individuals willing to work in emerging markets.

In January 2014 Shell Foundation helped to establish Impact Business Leaders, a leadership development organisation that combines intensive practitioner-led training with one-year work placements with leading social enterprises and impact investors. Training centres at the University of Utah, the University of Virginia, Oxford University and Ashesi University in Ghana have already been established, with a plan to place over 200 young professionals into social enterprise roles over the next three years. This model provides the hiring organisation with a pre-vetted pool of high-potential candidates, and provides the candidates with a foot in the door, typically with the prospect of a full-time role after the initial placement.

5. Traditional third-party recruiters: a dying breed

Unless a hiring organisation is prepared to manually post and manage open positions on job boards and networks (a daunting, time-intensive and often fruitless task), they often rely on traditional third-party recruitment consultants. The trouble is, these consultants tend to be very expensive (with retainer fees and high 'success' fees) and highly unreliable. The networks they utilise to source junior- to mid-level candidates increasingly tend to be publicly available, reducing their value for hiring organisations.

Given the embryonic nature of the sector, third-party recruiters also tend not to know how to effectively pitch the idea of a social enterprise to potential candidates. Candidates often show up for interviews not knowing whether they are applying to join a charity or a business.

This is not to say that there will be decreased need for third-party recruiters. In fact, given the increasing supply of candidates entering the global job market, and the demand to fill an ever-increasing number of open positions, third-party recruiters may be more vital in building markets than ever. Rather, we expect the role and business models of these recruiters to change dramatically, from a role principally sourcing candidates to a role focused on screening them in ways that validate their skill sets using approaches unavailable or unknown to most organisations.

Talent matching at Impact Business Leaders

“ There is an overwhelming interest from leading social enterprises and corporates to pay for high-potential talent, especially local talent, though they often just don't have the networks and resources to source it. Equally, young professionals have limited ways to break into the sector. ”

David Kyle, Co-founder and Director, Impact Business Leaders



Building the Energy Ecosystem: Recommendations

BUILDING A TALENT PIPELINE

Pioneer Needs

Business growth figures speak for themselves. We have consistently found that pioneers who make considerable investments into attracting and retaining world-class talent can achieve scale and sustainability far more quickly than others. Paradoxically, failure to invest in people with the skills, track record and experience to perform efficiently in uncertain environments ultimately harms an enterprise's ability to raise funds, placing early-stage investment at higher risk.

We have consistently found that pioneers who make considerable investments into attracting and retaining world-class talent can achieve scale and sustainability far more quickly than others.

Social Investors, Intermediaries and Corporates

The human capital sector clearly needs increased visibility and attention by entrepreneurs and funders alike. Analysing of our work in access to energy over the last decade, we were struck by how many of the lessons related to human capital challenges, and we are actively exploring new potential disruptive innovations in this area. Those funding social enterprises would do well to take account of them if they want to see their investments succeed.

Social investors do not typically cover the core costs for early-stage enterprises; yet our experience has shown that early investment in human capital is critical to long-term sustainability. Moving from validation to scale typically requires a heavy investment in talent. This is a difficult proposition for entrepreneurs and investors alike. Often, investors are unwilling to approve market-rate compensation packages or accept investment that may delay short-term profitability but will invariably lead to accelerated growth and greater blended returns over the long haul.

We see an increasing need for new intermediaries that can tackle these human capital challenges in scaleable ways – dedicated organisations using new technology platforms to deliver more effective solutions to talent acquisition (sourcing and screening) and development, and to work with the private sector to match needs for short-term business support and mentoring with corporate responsibility programmes.

Few of the many challenges that inclusive energy enterprises face are as critical to determining successful growth as the marked shortage of human capital in the sector. Given the potential for wider catalytic impact on multiple sectors and geographies, the philanthropic community is especially well placed to support innovation in this area.

Lesson 6:

Systemic change will rely on the creation of global institutions and industry networks

SF began by supporting customer-facing enterprises that supplied access to modern energy services in new ways. We then took aim at structural finance gaps that prevented the wider market from growing, and co-created multiple financial intermediaries to help address those gaps. With a market building objective and with multiple enterprises operating independently in the lighting and cookstoves sectors, we then began to support industry bodies needed for managed sector growth.

Energy enterprises creating new solutions for developed markets already face significant adoption hurdles, despite benefiting from high per capita incomes, enforceable legal contracts, relatively high volumes of skilled workers, and established physical infrastructure and communications infrastructure. Pioneering energy enterprises creating solutions for developing markets face even greater adoption hurdles but none of these advantages. Monitor-Deloitte pointed to several of these enabling environment deficiencies in their *From Blueprint to Scale* and *Beyond the Pioneer* reports.

Professionally managed, neutral, industry bodies and networks are vital to overcoming these deficiencies and accelerating the sustainable development of sectors as a whole. These non-profit 'institutions' and public-private partnering are required to build the infrastructure needed for nascent markets to thrive.

PIONEERING WITHOUT REPRESENTATION: A NEED FOR GLOBAL INSTITUTIONS



THE CASE FOR THE GLOBAL ALLIANCE FOR CLEAN COOKSTOVES



What actually constitutes an 'improved' cookstove from a consumer's perspective? Today, there is a wide spectrum on offer in many markets, from local chulhas to sophisticated fan-powered gasifier stoves that run on dried biomass pellets. The price range across the spectrum is equally wide, from \$5 to more than \$500. While all of these stoves aim to improve the efficiency of cooking, resulting in lower fuel costs and reductions in emissions, until recently there has been little alignment of what an improved stove actually was, and limited data and low public knowledge about the issue.

Any formalisation of the sector would rely on minimum quality standards that would help build the reputation of the sector in the short-term, and help ensure the end consumer received access to quality products in the medium- to long-term. Further, there was clearly a need to raise awareness of the sector to both governments and consumers themselves, provide market information to transfer knowledge between practitioners, and facilitate fundraising for manufacturers and distributors. In recognition of the need to create a thriving global market for cleaner, more efficient household cooking solutions, SF, the UN Foundation and the US State Department combined in 2010 to co-found a public-private

partnership – the Global Alliance for Clean Cookstoves (the Alliance) – that aims to support the adoption of clean cookstoves and fuels in 100 million households by 2020.

The Alliance has had several clear wins, notably the establishment of initial quality standards and the marked increase in awareness of the issue amongst key stakeholders (over 100 members globally), mobilising a large level of financial commitments (\$200m+). We continue to see the opportunity for the Alliance to accelerate efforts to deploy investment capital into scaleable cookstoves enterprises and distributors, and to publish market and technology information that would measurably support the incubation of new cooking and supply chain solutions.

Having laid the groundwork for impact, the Alliance will now move into a new phase of practical implementation and capacity-building support to help manufacturers build credibility with consumers on the ground. A big goal is to catalyse the universal adoption of clean cookstove standards – which may involve tough exclusionary decisions and enforcement that could disrupt its highly diverse membership base.



THE GLOBAL OFF-GRID LIGHTING ASSOCIATION

Since 2009, the IFC's Lighting Africa programme has successfully provided reliable data on the solar lighting market, set industry quality standards, created demand and awareness amongst consumers, and convened industry members.

Russell Sturm, one of the founders of Lighting Africa within the IFC, points to the need for an effective industry body. "Even the leading manufacturers and distributors were small by global standards. We needed to give the industry a voice and legitimacy, with the tools needed to establish genuine credibility with investors and consumers alike. The level of consistency of need amongst the leading manufacturers surprised us, which gave us additional encouragement that an independent industry body was needed. The sector has made remarkable advances over the last six years, but we're really just getting started."

The success of Lighting Africa spawned Lighting Global, though IFC recognised the need for an independent industry body to ultimately take over these activities in a way that would facilitate their sustainability and reduce dependence on a single

GOGLA

funder. With this aim, the Global Off-grid Lighting Association (GOGLA) was created in 2012, with bootstrapped resources and a small but growing membership base. Shell Foundation provided grant support in 2014 in an effort to build core capacity of GOGLA, including a dedicated management team.

Rather than focus on building a huge membership base, GOGLA will concentrate on adding value to its existing members through 'working groups' led by leading practitioners and designed to build member consensus on such issues as quality standards, end-of-life recycling solutions, access to finance and market data, and several others. It will then work through strategic partnerships with other players in the sector on advocacy, recommendations to policy-makers and support improved distribution capacities. The organisation benefits from IFC's approach to start by addressing the practical needs of practitioners at a regional level, and to align their strategy and output from the bottom up, around the needs of these groups as they seek to leverage broad-based support at a global level.

“GOGLA will aim to stay nimble and drive clear and achievable outcomes to its members. We recognise the enormous challenges still needed to be overcome by the sector, but with the help of a small number of aligned funders – and by strategically leveraging our links to other key players – we will move the needle in meaningful ways.”

Koen Peters, Managing Director, GOGLA



“Prior to the Lighting Africa reports, we had to make very big assumptions about the characteristics of the solar lighting market. It was harder to engage productively with potential investors, who all wanted validation that the market we were describing actually existed. Today, the doubts on the market potential have evaporated, and the focus has now shifted to where it should be – on innovation capacity and distribution models.”

Anish Thakkar, Founder, Greenlight Planet



Building the Energy Ecosystem: Recommendations

IMPROVING THE SUPPORTING ECOSYSTEM FOR INCLUSIVE ENERGY ENTREPRENEURS

When SF was established back in 2000, we believed that a combination of private sector actors (philanthropists, social investors, big business and commercial funders) would be able to catalyse and scale market-based solutions to global challenges such as energy access. The intervening years have shown that, while pioneer social enterprises are needed to tackle these problems at scale, they alone will be insufficient to solving entrenched problems of this size. We will need many thousands of inclusive businesses adopting similar models to make any type of dent on challenges that affect half the world's population.

Strong demand clearly exists for the right types of products and services and there is a growing number of foundations, impact investors, government agencies and corporates interested in supporting promising energy enterprises to meet the needs of the energy-poor. Public-private partnerships and neutral industry associations such as the Alliance, GOGLA or SE4ALL will be critical to help coordinate the actions of the energy ecosystem and create the conditions to deliver far greater development impact.

Public-private partnerships and neutral industry associations such as the Alliance, GOGLA or SE4ALL will be critical to help coordinate the actions of the energy ecosystem and create the conditions to deliver far greater development impact.

Central to their ability to bring credibility to these nascent markets will be a disciplined focus on adapting to the challenges faced by pioneers on the ground to enable one or more of these first-movers to achieve scale and viability. This lowers the risk for new investors and entrepreneurs to enter the market. Only then will dialogue with policy-makers, and efforts to share learning, foster a more conducive enabling environment to accelerate the growth of the wider market.



Looking Ahead to the Next Five Years

04

Lack of access to energy is a major obstacle to inclusive economic development and a challenge that SF will continue to focus on for the foreseeable future. While this has long been a subject of international attention (as currently witnessed by SE4ALL), our view is that there still remain few examples of financially-viable energy solutions that focus explicitly on generating large-scale benefit to BOP consumers.

The learning outlined in this report has helped shape our current 'Access to Energy' strategy and our understanding of the role that we, as a private foundation, can play in catalysing an effective response to the energy challenge. In particular, we see three areas for increased focus over the next five years.

1. Accelerating the growth of our early-stage partners

Many of the social enterprise partners we have mentioned in this report are delivering promising results, but they are all in early phases of growth and have a long way to go, given the size of the market they aim to serve. They and others face formidable barriers to scale, be they manufacturers or service providers with new consumer offerings or market-enablers who can support the widespread adoption of new technologies and inclusive business models.

We believe that ensuring the success of these pioneers is essential to the growth of inclusive energy markets that can meet BOP demand at scale. Until they can prove financial viability they will struggle to attract growth finance, yet

organic growth limits their ability to enter new markets or diversify products/services attractive to BOP consumers. We therefore see the need for continued support (including grant as well as non-grant finance, business skills and market linkages) to our existing partners, in conjunction with leveraged investment, to support their scale-up, deepen their impact on BOP markets and to avoid mission drift during their journey towards sustainability.

We also see opportunities to help certain social enterprises broaden their range of products and services beyond household energy solutions to the provision of reliable power to improve the productivity of local businesses and agricultural systems in ways that enhance the livelihoods of the poor. We therefore expect to play a greater role in combining modern energy solutions with other essential services that rely on energy to function, for example cold chain products, education content, agricultural applications including irrigation, as well as healthcare and low-cost housing.

2. Working to improve our efficiency and effectiveness through more strategic collaboration with other actors in the social investment ecosystem

We see three opportunities to substantially improve our own performance and ability to enhance energy access over the next five years:

■ Greater 'syndication' with impact investors

We believe that more proactive linkages between venture philanthropists such as ourselves and a range of impact investors can help early-stage energy enterprises navigate the 'valley of death' by reducing the risk and transaction cost of securing growth capital. For energy enterprises, this could mean securing public funding to validate early-stage technologies and business models, or to test expansion into new and higher risk markets. For investors, this could mean creating more efficient ways of identifying pipeline opportunities, or the potential to de-risk investment through tiered capital structures.

■ Improving our ability to measure impact

Writing this report has, in many ways, highlighted our own need to understand more deeply the long-term development outputs and outcomes that our social enterprise partners deliver; and we consider further research essential to help us better assess the relative public benefit of future charitable interventions. For example, we feel we can do more to analyse the gender dimension of impacts

to the BOP consumers served by our partners, as well as better understand the differential value gained by different groups of consumers.

Given that many of our partners are still marginal return enterprises, we see potential to measure and validate social benefits as a precursor to monetising social impact and thereby creating an additional income stream for these social enterprises. We are currently investigating various ways to measure, price and sell impact to various organisations interested in **results-based financing**.

■ Developing robust performance evaluation methodologies to track the cost-efficiency of the impact we deliver over time

We see value in working with independent market analysts to validate the impact we deliver, and to understand if we are improving the cost-efficiency of our efforts to scale social enterprises and deepen their development impact over time. We will continue to share this analysis publicly with a dual purpose: first, to force greater accountability on our organisation to continually improve our performance each year and second, to contribute to a sector-wide drive for transparent reporting and benchmarking to improve the allocation of capital towards enterprises that deliver impact most effectively.

3. Identifying game-changing solutions to specific market failures with the potential to deliver outsized social and environmental impact

Every day, social entrepreneurs around the world are combining technology and business solutions in new ways to improve access to energy for BOP consumers. While these ideas are gaining traction in some areas, for example energy for off-grid households, in others we see a need for a step-change in innovation and impact. Three specific challenges stand out, and we will seek to catalyse new disruptive solutions in these areas:

■ Improving the enabling infrastructure for decentralised energy services companies

We expect advancing technology to transform the provision of decentralised energy over time. Examples include low-cost power meters for mini-grids that help manage demand, reduce theft and integrate pay-as-you-go technology, the collection of BOP consumer data (through mobile phones and mobile money platforms) to accelerate R&D and refine models for consumer credit, and mobile-enabled information platforms that can crowd-source data from local hauliers to enable small volumes of product to be shipped to small villages for the first time.

■ Catalysing larger-scale solutions specifically designed to spur economic growth in rural areas

Most SME businesses and industrial plants outside of cities in Africa and Asia still rely on diesel generators at a huge financial and environmental cost. Technological innovation is needed to generate affordable off-grid electricity from renewables (such as biomass gasification, biogas, solar and waste) and the creation of viable mini-grids systems to distribute this power. If this could be achieved, local businesses would enjoy greater productivity, driving employment and economic growth in low-income areas and halting the flight of talent to cities.

■ Improving the availability of affordable energy for the urban poor

By 2050, 6.3 billion people will be living in cities around the world. Already, rapidly escalating energy consumption in cities (caused by rural migration and a growing middle class) is putting tremendous pressure on existing utilities such as affordable electricity, housing, water distribution and sanitation. The World Bank estimates that over 70% of people living in sub-Saharan African cities live in slum conditions,¹⁷ where basic services are typically unavailable.

Disruptive solutions are required to increase the availability of energy to the urban poor, for instance through efficiency gains from better management of demand and supply, hybrid systems to supplement conventional power with renewable energy and improved battery storage. We also see strong potential for the energy sector to drive better sanitation conditions in urban areas by creating a market for municipal waste that can be converted into power, fertiliser or recycled goods.



Courtesy of MKOPA © G. Goodwin

¹⁷ World Bank, Energy Sector Management Assistance Programme (ESMAP), 2011.

Appendix A – Tracking Progress to Scale & Sustainability

From the outset we support our partners in defining a few key metrics specific to their own enterprise. Wherever possible, we draw upon independent monitoring and evaluation to validate reported data.

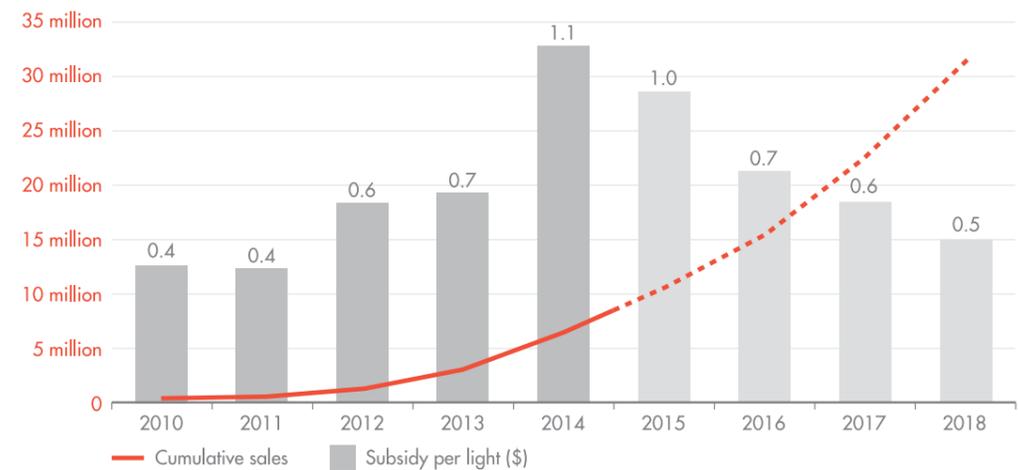
Our partners track and measure a wide variety of development outcomes including:

- low-income customers served, e.g. through product sales or bus ridership
- environmental benefit, e.g. reductions in emissions or water usage
- economic benefit, e.g. jobs created, earnings increase, money saved
- social benefit, e.g. improved health or time saving

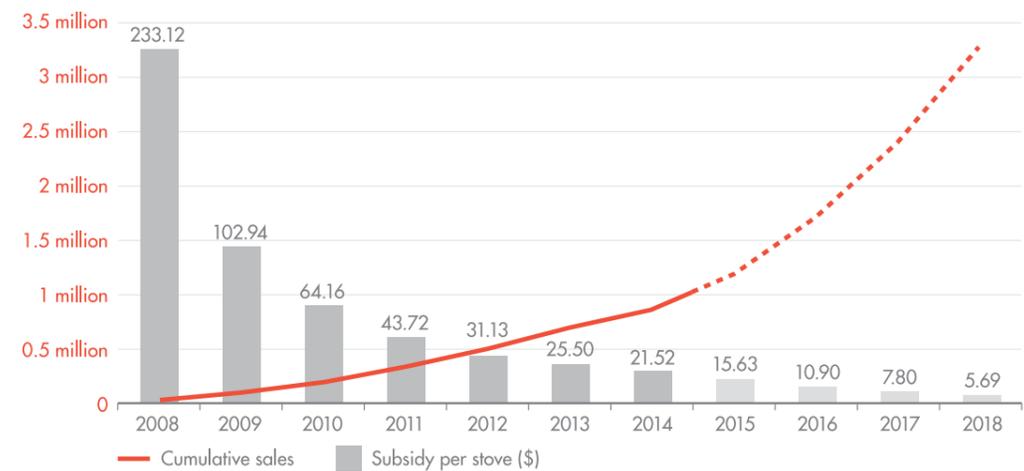
They also track progress to financial sustainability through monthly and quarterly financial reporting as well as performance ratios (such as subsidy per product sold).

Regularly tracking performance against projected targets helps us to better understand the overall business, respond quickly to unexpected challenges and improve the effectiveness and efficiency of our support over time. We share examples in the following graphs to illustrate the pathway to scale and sustainability for three SF 'Access to Energy' partners.

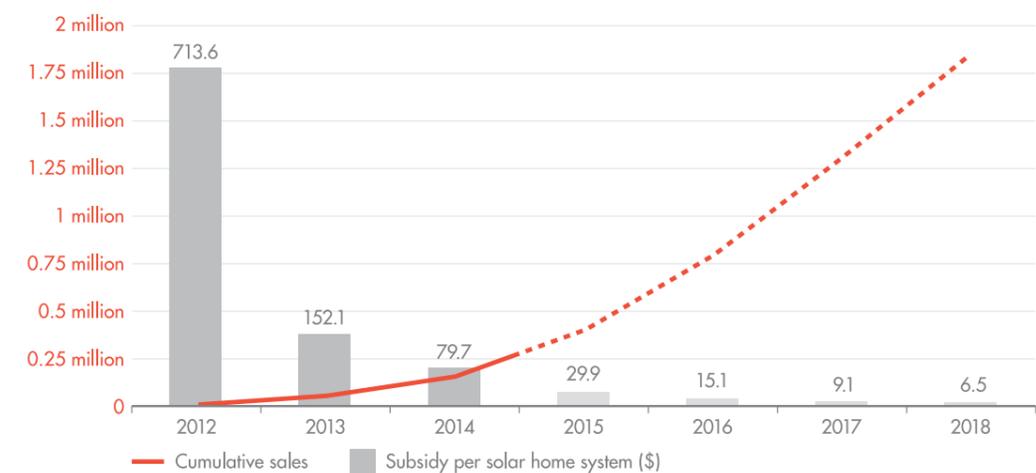
d.light



Envirofit



M-KOPA



Appendix B – Social Marketing in India

In 2009 Shell Foundation launched a social marketing campaign in Shimoga, a district in Karnataka state, south India, to raise awareness of the benefits (lower fuel costs, time saved, improved health etc) of cleaner cookstoves compared to using inefficient stoves or open fires for cooking.

Of the 61 million people living in Karnataka state at the start of the campaign, 70% were affected by the health impacts of using traditional cooking methods but the problem was not widely recognised. The campaign aimed to raise awareness of the benefits of cleaner cookstoves to the 1.6 million population of Shimoga and to sell 58,000 stoves at an additional cost of \$5.75 per stove sold – a cost-level that could eventually be absorbed by improved cookstove manufacturers (and reduced with economies of scale) to make the campaigns financially viable and scaleable.

The table below outlines the relative cost-efficiency and sales conversion rates from different channels trialled. We offer this merely as an example of the approach chosen to test the viability of different options. Partnerships with microfinance organisations proved the most promising of these channels, but nevertheless required five iterative phases to demonstrate potential.

We report the full details of our analysis in *Social Marketing in India*, available at www.shellfoundation.org/socialmarketinginindia

Approach	Dates	Reach	Sales	Cost (\$)	Cost/ Reach (\$)	Cost/ Sale (\$)	Conversion Rate
Partnerships with Microfinance Institutions							
Phase 1	Apr 10-May 10	27,846	348	44,000	1.58	126	1%
Phase 2	July 10-Sep 10	15,719	260	44,000	2.80	169	2%
Phase 3	Oct 10-Jan 11	29,685	568	44,000	1.48	77	2%
Phase 4	Mar 11-Jun 11	22,000	2,678	44,000	2.00	16	12%
Phase 5	Oct 11-Jan 12	12,000	3,199	13,125	1.10	4	26%
Low Intensity Social Marketing							
Static	Oct 09-Jul 11	n/a	n/a	19,301	n/a	n/a	n/a
Door-to-door	Oct 09-Feb 10	82,417	331	30,321	0.37	92	>1%
Vans	Oct 09-Mar 10	90,429	2,512	53,242	0.59	21	3%
Market activities	Nov 09-Jan 10	35,303	1,058	22,185	0.62	21	3%
Medium Intensity (as for low intensity + higher number of door-to-door sales focusing on self-help groups)							
Door-to-door	Apr 10-Jul 11	1,480	337	44,429	30	132	23%
High Intensity (covers all activities with additional communication through local government health workers)							
Health workers	Apr 10-Jun 10	157,850	290	12,848	0.08	44	<1%

ABOUT SHELL FOUNDATION

Shell Foundation is an independent charity, established in 2000 by the Shell Group. We work to create and scale new solutions to global development challenges by applying business thinking to major social and environmental issues linked to energy and mobility.

Learning from both success and failure we have gradually developed a new 'enterprise-based' model to catalyse lasting social and environmental impact on a global scale. This sees us deploy a blend of financial and non-financial resources to accelerate transformative innovation and harness private markets to deliver public benefit at scale.

Our Approach

Shell Foundation works with a small number of entrepreneurial partners to identify the underlying market failures behind intractable problems and co-create new social enterprises to solve them. We provide patient grant funding, extensive business support and access to networks to help pioneers to validate new models, achieve financial independence and expand across geographies.

We then create specialist intermediaries to facilitate growth and replication at an industry level. By working in this way we now have several strategic partners – addressing issues as diverse as energy access, sustainable mobility and job creation through the SME sector – that are now delivering large-scale impact in multiple countries across Africa, Asia and Latin America.

www.shellfoundation.org