

A Coordinated Approach to Investing in Clean Energy Access

By Carson Whisler

Mentor: Dr. Keith Warner, OFM

Reader: Mark Correnti

Contents

Abstract	1
Introduction	3
Sustainable Development Goal 7 and Universal Access to Electricity	5
SDG 7: An Opportunity for Social Enterprises	7
Case Studies in Impact Investing's Problematic Framework	13
Philosophical and Practical Arguments Regarding PayGo	23
Barriers to Clean Energy Access within Impact Investing	28
The Need for Patient Capital	35
Conclusion	39
Cited Sources	40

Abstract

This research provides an assessment of the impact investing industry's current ability to contribute to universal access to electricity within the context of Sustainable Development Goal 7 (SDG 7). It analyzes recent data from sources within the clean energy and impact investing industries to determine which types of capital are currently provided within the energy access industry in relevant economies. This information is used to assess existing frameworks within impact investing and determine if investors can reasonably meet the needs of social entrepreneurs seeking to promote energy access. Further analysis of a combination of case studies, industry data, and reports from thought leaders shows that impact investing's current framework incentivizes entrepreneurs seeking investment to skew their missions by moving up-market. This undermines progress toward SDG 7, as the majority of people projected to remain without electricity come 2030 are Base of the Pyramid customers located in Sub-Saharan Africa. Impact investors can most meaningfully contribute to SDG 7 by changing their frameworks to a format that allows them to deploy capital in a manner that allows social entrepreneurs to maximize their impact. This means providing capital with lower expected returns, increasing their investment timelines, and providing more accessible early-stage capital.

Introduction

The fight to end energy poverty is at the heart of Sustainable Development Goal 7, “Ensure Access to Affordable, Reliable, Sustainable and Modern Energy for All.” Over one billion people live in the dark, lacking access to basic energy solutions that significantly improve the quality of lives (“Universal Energy Access” n.d.). Early projections indicate the international community will fall short on its goal to eradicate energy poverty by 2030. Social entrepreneurship can provide the innovative framework and business acumen to help achieve these goals, but only if investors truly employ an “impact-first” investment approach.

Private capital can contribute greatly in the fight to overcome obstacles to universal energy access. However, most impact investors have prioritized market rate financial returns over impact, resulting in a lack of alignment with SDG 7. In the pursuit of returns, investments are made into enterprises that focus on customer segments with characteristically higher incomes. This has skewed the missions of many energy access enterprises away from the base of the pyramid. The focus on achieving market rate returns has also adversely affected the size and number of enterprises receiving capital, thereby reducing the resources required to distribute clean energy in communities suffering from energy poverty. John Kohler, an expert at Miller Center for Social Entrepreneurship, called for a more coordinated approach to impact investing as early as 2011.

The ambiguity in defining impact investing sits at the heart of this current misalignment. Currently, impact funds encompass a variety of investors with many differing expectations. Should funds that prioritize financial returns and view driving impact as a secondary outcome be categorized with funds that aim to drive impact and recoup capital costs in the process? A mix of different types of funds can contribute to social enterprises’ ability to deliver their missions.

However, the current composition of the impact investing industry represents an imbalance. There are far too many funds aiming to achieve market rate returns and not enough that offer impact driven capital. Currently, there is a shortage of concessionary funds that require a below-market financial rate of return. The lack of different blends of capital available to social entrepreneurs damages the industry's ability to make meaningful contributions within international development. This is particularly apparent among investments in energy access.

Many impact investors bring a traditional investment background and mindset to the deployment of capital. This paper extends three fundamental arguments to help the impact investment community power social enterprises toward SDG 7. To make capital truly transformative impact-first investors need to adjust their investment disciplines in three ways. First, investors need to be more patient. This will have the necessary result in lengthening investment horizons. Second, investors have to take on more risk. This will allow for the financing of earlier stage enterprises. And third, it is imperative for impact investors adjust their financial return expectations, thereby protecting social enterprises and their business models from unwanted pivots towards higher revenues and away from more substantive impact. Social enterprises and impact-first investors can meaningfully contribute to SDG 7 if investment frameworks shift in patience, risk-profile and financial return expectations. Only then can enterprises, and investors alike, drive true progress in eradicating energy poverty.

Analyzing the states of SDG 7 and the impact investing industry makes it apparent that impact investors will not be able to cover the gap in funding for energy access with their current frameworks. This will cause SDG 7 to fall short come 2030, as lack of electricity will continue to be a problem for rural communities in Sub-Saharan Africa due to the shortage in funding available to meet the goal. While impact investing and social enterprise could partner to defeat

this shortcoming, it will be impossible with the current priorities within impact investing. Impact investors' current emphasis on financial returns within a ten-year window causes mission-driven entrepreneurs to serve more affluent customer segments in order to attract investment. This can be seen through various data within impact investing, anecdotal stories about social enterprises, and current trends within the growing PayGo industry. Experts agree that a patient capital approach can resolve this issue. This will require investors to decrease their expectations of financial returns, increase their investment timelines, and become more willing to invest in riskier, early-stage enterprises. Impact investors will only meaningfully contribute to developing energy access in Base of the Pyramid communities by using these principles to become better partners to mission-driven social enterprises.

Sustainable Development Goal 7 and Universal Access to Electricity

Energy poverty is generally defined as lacking access to modern energy solutions. There are generally two main measures of energy poverty: access to electricity and access to clean cooking fuels. This is measured in binary terms: people either have access to modern energy solutions or they don't. While there are a variety of other ways and tiered systems for measuring relative access to energy, this paper will utilize the traditional binary system due to its prevalence within existing literature. Energy poverty is linked with issues relating to health, gender, and poverty. Households that lack electricity and clean cooking fuel are exposed to air pollution, as they most commonly rely on kerosene or biomass to meet their energy needs. Beyond poisoning the air, these options are financially costly. People living in energy poverty spend more proportionally on low quality lighting solutions than those with access spend for higher quality lighting. These issues are also gendered. Women and children suffer most from the consequences

of energy poverty, as women rely on these harmful energy solutions to complete household responsibilities and children use them to study at night.

When the UN created the SDGs, it an estimated 2.9 billion people who lacked access to modern energy solutions (“Energy Access Projections”, n.d.). As of 2012, only about 85% of people had access to modern electricity (“Goal 7: Ensure Access to Affordable”, n.d.). Over 90% of these people reside in Sub-Saharan Africa and developing countries in Asia. Recent growth in access to electricity has been concentrated in urban areas since 2000 (“Where Does the World”, n.d.). Increases in Asian electrification rates made the biggest contribution to increasing global electrification rates. India drove the largest portion of progress within Asia (“Where Does the World”, n.d.). There has been substantial growth towards electrification targets, renewable energy targets, and energy efficiency targets (“Where Does the World”, n.d.). There is much work left to be done despite these positive signs. Growth rates for each of these subcategories still fall short of where they need to be sustained in order to achieve them by 2030 (“Where Does the World”, n.d.). The International Energy Agency’s World Outlook for 2016 estimates that there will an estimated 780 million people who remain without access to electricity come 2030 (“Energy Access Projections”, n.d.). This failure is pronounced in several regions.

Sub-Saharan Africa and Oceania lag behind other regions with regards to energy access. As of 2012, only 35% and 29% of people have access to electricity in Sub-Saharan Africa and Oceania respectively. These countries only experienced the world’s average growth rate for electrification between 2000 and 2012 despite the massive opportunity their markets represent (“Goal 7: Ensure Access to Affordable”, n.d.). Oceania’s island geography lends itself to a variety of distribution problems, which are a major reason for its slow growth. However, plenty

of land-locked areas are still experiencing dismal growth numbers in Africa and other geographies.

Distribution issues also exist in Africa even where there is access to a centralized grid. Low supply of electricity in grid-connected areas of Sub-Saharan Africa is a major problem. Upwards of 30 countries have dealt with issues such as load shedding since 2005 (“United Nations Economic Commission for Africa”, n.d.). As of 2015, there was only enough electrical capacity to power one light bulb per person in Africa for three hours a day (“United Nations Economic Commission for Africa”, n.d.). This is also a major issue in India, where the grid is more extensive. India has a large population living in energy poverty or dealing with issues relating to unreliable access to electricity. The subcontinent is making great progress in this regard. The same cannot be said for Sub-Saharan Africa. The IEA estimates that Sub-Saharan Africa will be home to 90% of the 540 million people it projects will remain without electricity come 2040 (“Energy Access Projections”, n.d.). More than 90% of these people will reside in rural communities (“Energy Access Projections”, n.d.).

SDG 7: An Opportunity for Social Enterprises

Social entrepreneurship can help eradicate these unjust equilibriums within energy markets. Social enterprises use business as a means for disrupting unsatisfactory social equilibriums. While most entrepreneurs are doing this in some sense, there are other distinguishing factors between entrepreneurs and social entrepreneurs. Roger L. Martin and Sally Osberg of the Skoll Foundation differentiate the two in an article for the Stanford Social Innovation Review, stating that “the social entrepreneur aims for value in the form of large-scale, transformational benefit that accrues either to a significant segment of society or to society at

large. Unlike the entrepreneurial value proposition that assumes a market that can pay for the innovation, and may even provide substantial upside for investors, the social entrepreneur's value proposition targets an underserved, neglected, or highly disadvantaged population that lacks the financial means or political clout to achieve the transformative benefit on its own" (Martin, R., Osberg, S., 2007). This definition of social entrepreneurship describes the kind of entrepreneurs who can contribute to achieving energy access for all and SDG 7 as a whole.

Social enterprises can contribute to the fight to end energy poverty through a variety of their inherent characteristics. They represent an opportunity for experimentation and local partnerships. Their diffuse presence provides a "divide and conquer" approach that can take place within a continent, country, or province. Different enterprises offer unique knowledge on different customer segments and understand how to utilize different business models and products to resolve the same problems across different regions. Successful models can be tested and replicated in other areas (Desjardins, S., Gomes, R., Pursnani, P., & West C., 2014). Social enterprises depend on private funds to invest in them in order to fulfill their mission. This makes social enterprises a strong fit to serve as partners to use private capital to fill funding gaps within the SDGs. For these reasons, it is urgent for development institutions to include social enterprises within their frameworks for tackling energy poverty.

Miller Center for Social Entrepreneurship's energy specialist, Andy Lieberman frames the fight to eradicate energy poverty in terms of social entrepreneurship. He asks, "how many energy access delivery enterprises will it take to make energy accessible to all the 500 million potential consumers — comprised of households and small businesses — who now lack it" ("Universal Energy Access: An Enterprise System Approach", 2015, P.4)? The number is estimated to be between 7,000 to 20,000 ("Universal Energy Access: An Enterprise System

Approach”, 2015, P. 4). This decentralized model of defeating energy poverty has a variety of advantages compared to traditional models for development that have been primarily driven by aid.

The Shell Foundation, one of largest private institutions leading the fight against energy poverty, promotes a similar model. Shell Foundation set out to deploy off-grid lighting solutions in the year 2000. This journey proved fruitless during the first three years, as Shell Foundation tried to incubate ideas and support organizations using a traditional grant system for NGOs. Switching to a longer-term, social enterprise based approach has allowed Shell Foundation to turn what was once a 75% failure rate into a 77% success rate (Desjardins, S., Gomes, R., Pursnani, P., & West C., 2014).

A major factor in this turnaround is enterprises’ ability to understand customer needs. Unlike large international entities or NGOs, social enterprises are able to deploy their resources in a more flexible manner. They do not rely exclusively on project grants or government contracts to financially sustain their mission. This means that they are not committed to an idea or initiative in the long term. They are relatively free to pursue opportunities as they arise. This allows them to position themselves to best serve their customers’ needs. These freedoms allow social enterprises to invent new mechanisms to overcome unjust equilibriums within markets. These innovations can be seen throughout different aspects of social enterprises’ business models (Desjardins, S., Gomes, R., Pursnani, P., & West C., 2014). Social enterprises also provide an opportunity to apply lessons across regions.

Social enterprises serve as business laboratories. They are constantly testing new innovations to see how they can most strongly impact their customers. Organizations pursuing SDG 7 must take advantage of the opportunity to learn from the growing network of social

entrepreneurs. This is much swifter than paying for expensive, lengthy studies that validate a product's impact only to find out it is only to later discover that it is only appropriate in certain contexts. Lieberman argues that the development community should support capacity building in order to help entrepreneurs develop their ideas and create a pipeline for business models and products that can be replicated (Universal Energy Access: An Enterprise System Approach, 2015).

Ideally, impact investors should view social entrepreneurs as partners in this regard. When investors work with social entrepreneurs both can benefit. Entrepreneurs gain access to the capital and business acumen investors bring to the table. In return, investors can generate more sustainable returns and identify key lessons to consider when making future investments. Investing in pioneers helps drive sustainable financial returns in the future by developing a healthy ecosystem within energy markets (Desjardins, S., Gomes, R., Pursnani, P., & West C., 2014). Pioneers fill a major role within energy access markets because of their ability to test new business models and technological innovations. However, they are at a disadvantage because of the uncertainty they face. Investors should view the opportunity to invest in pioneers as an investment in future companies within the energy access space. These are just some of the mechanisms of how the framework of social entrepreneurship can provide the urgent innovation that it will take to achieve the ambitious and worthwhile goal of universal energy access by 2030.

This will only work if investors are willing to participate in this process. Thus far, support from impact investors has been insufficient. One of the largest barriers to achieving the SDGs is a lack of funding. Judith Rodin, President of the Rockefeller Foundation observes, “while there are many pathways forward to achieve the SDGs, one thing is clear: business as

usual is not an option to close the \$2.5 trillion annual funding gap in developing countries alone” (“UN Private Sector Platform”, n.d.). The Sustainable Clean Energy for All Initiative experiences a significant portion of this gap.

The International Energy Agency estimates that it would take an average annual investments of \$49 billion from 2011 to 2030 to achieve universal access to electricity and clean cooking fuels (“Energy Access Projections”, n.d.). This number is reduced to \$30 billion for solely universal electrification (“Energy Access Projections”, n.d.). Other organizations, such as the U.N. place much higher estimates on these totals. Either way, public funding for these initiatives is currently insufficient to meet these ambitious targets. Intergovernmental organizations and foundations have recognized the role that private companies and funds can play in achieving the SDGs.

The U.N. has collaborated with several other institutions to create a platform for partnering with private finance to develop a platform for investing in SDG related initiatives. USAID’s Power Africa project that partners with various investors provides an example of how governments can steer private finance towards the common good (United States Department of State, 2017). The Rockefeller Foundation’s vision of how private funds could be used to generate both financial and social returns led it to coin the term “impact investing” in 2007 and later found the Global Impact Investing Network (“What You Need to Know”, n.d.). While some funds had used this strategy before 2007, the Rockefeller Foundation’s voice and brand has played a crucial role in the recent growth of resources within impact investing.

Today, “impact investor” is an ambiguous term because of the variety of actors the term encompasses. The GIIN defines impact investments as, “investments made into companies, organizations, and funds with the intention to generate social and environmental impact

alongside a financial return” (“What You Need to Know”, n.d.). Note that this definition carries forward the fundamental ambiguity of impact investing: the relative focus on social impact versus return on investment. Impact investors have a variety of theses, impact goals, and expectations for financial returns. It is difficult to measure the performance of the industry as a whole because of the wide-range of priorities within the industry. For this reason, analysis of impact investors within this paper will focus on impact investors’ ability to contribute to the goal of energy access for all listed under SDG 7.

Impact investing has grown rapidly within the impact investing industry in the ten years since the Rockefeller Foundation founded the GIIN. Assets under management within the impact investing have consistently grown between 15-20% in recent years according to recent reports from the GIIN (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017). The impact investing space encompasses a wide variety of investors. This makes it difficult to estimate the magnitude of funds available. Growth within the industry was originally fueled by philanthropic funds and family offices.

Recently there has been an increasing number of traditional investors entering impact investing markets. New investors include pension funds, endowment funds, and insurance companies. These funds, known as LPs, are massive players in the investing industry. The GIIN divides the various institutions within impact investing into seven distinct categories - fund managers, direct foreign investment (DFI), banks and other diversified financial institutions, foundations, family offices, pension funds and insurance companies, and others (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017).

These investors can empower the social enterprise movement to defeat energy poverty. Impact investors recognize the opportunities the energy sector presents. Energy represents the

sector with the second most assets under management available within the impact investing industry. It ranks fourth when survey results are limited to funds focused on investing in emerging markets (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017). A net 28 investors within the GIIN's annual 2017 survey stated that they planned to increase the number of assets they will allocate towards energy related investment in 2017 (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017).

However, there are concerns that increased investment isn't necessarily a good sign for the Base of the Pyramid (BoP). BoP is a term used to refer to the billions people at the base of the global economic pyramid. They generally operate in informal markets and suffer from market failures because of the long-held belief that they are not a profitable customer segment. Some institutions worry that impact investors are bringing a returns first mentality to industries that should be serving BoP communities, who they believe cannot support businesses aiming to attain market rate returns. The industry will not maximize the impact of its capital using this paradigm. Funds that aim to achieve market rate returns are not truly participating in a practice that was originally founded to serve vulnerable populations and conquer the massive socioeconomic inequalities within the global community. In fact, such funds are harming these communities because their current framework skews some social entrepreneurs' missions when they seek investment.

Case Studies in Impact Investing's Problematic Framework

A) ONergy: A Case Study in Skewed Missions

It is important to consider the depth of social impact that is lost due to the lack of the right kind of capital. One can observe how the need for investment leads enterprises to skew their mission through the timeline of ONergy, a solar energy social enterprise in eastern India.

ONergy was originally founded with the mission to positively impact rural livelihoods through enhanced energy access. The company grew and eventually impacted hundreds of thousands of people as it scaled. The company was profitable despite the challenges that came with its complex business model and slim profit margins per unit sold.

ONergy struggled to find investors for over a year despite its promising balance of impact and financial sustainability. The company needed capital to continue to drive its mission. But the necessary funding didn't come, despite the fact that the company had outperformed the general breakeven timelines advanced by Shell Foundation and Oxfam. After months of searching for investors, ONergy's executives were faced with a tough decision. The company could continue onward with its same mission driven approach and hope for the best, or pivot away from its mission of serving rural markets in search to become a more profitable business and attract investors. Leaders at ONergy chose the latter approach. ONergy's story serves as a real world example of how impact investors' current priorities push innovative, mission driven entrepreneurs to skew their missions in pursuit of investment.

ONergy started out as an NGO called SwitchON. SwitchON aimed to alleviate energy poverty in India by delivering low-priced solar lanterns. SwitchON grew into a partner with a for-profit branch, called ONergy, when its founders recognized the opportunities to scale that come with a for-profit model. ONergy eventually evolved into much more than a solar lantern distributor. The company expanded into markets for solar microgrids and irrigation pumps, among other products.

Unlike most solar businesses, ONergy used to act as more than a commercial retailer and installer of solar panels. ONergy's mission was originally to serve people living in energy poverty in eastern India. The company approached this goal utilizing a variety of decentralized

energy solutions, ranging from solar lighting that allows families to productively use their time after dark to solar irrigation pumps that can help farmers save money and increase crop yields. ONergy was originally committed to conquering energy poverty in rural communities.

This allowed the company to maximize the impact of its services. It also forced the company to face a litany of difficulties that aren't present in urban markets. Certain challenges come with serving rural communities. This is particularly true for solar lighting companies because of the struggles that come with the goal of satisfying low-income, rural consumers with affordable products and high quality after-sales service. These issues are compounded by another defining characteristic of companies like ONergy. Unlike governments or NGOs, they're expected to serve vulnerable populations and produce financial returns.

ONergy's business model followed a customer-centric approach. Its founders, Piyush and Vinay Jaju started the company with the intention of distributing small solar lanterns in rural communities. They quickly realized the people they were serving would never be satisfied with such a simple solution. Vinay Jaju, now the company's COO, described the company's process for innovation as follows, "innovation at ONergy has been market driven... We are a very field oriented organization with over sixty staff on the field on a daily basis and a lot of us travelling to the field... What that means is there's a lot of feedback on our products, our services, and the solutions that we offer. We're constantly able to see gaps within our existing offerings and that's what really drives the innovation" (Jaju, V., 2016). This emphasis on the customer went beyond the company's expansion of its product offerings.

ONergy strives to provide customers with high-quality products and excellent service. Both Piyush and Vinay Jaja emphasize that what differentiates ONergy from other solar companies is its dedication to high quality products. The company goes above and beyond

industry standards, choosing to design and assemble its solar solutions in-house. This allows the company to meticulously control the products it distributes.

Rural customers are often weary of solar products. Many are unfamiliar with the technology or don't trust companies like ONergy because they have about similar companies that distribute cheap products. When ONergy worked within these communities it utilized the quality of its products and 24 hour customer service lines to build trust within communities. This is key for companies that aim to serve Base of the Pyramid customers. Even a small investment like a solar lantern can represent a huge financial risk for BoP consumers.

Affordability is the number one challenge for enterprises working in these markets. Customer interviews revealed that a typical ONergy customer could be making as little as \$90-\$150 a month to sustain a family of five. Rural consumers are exposed to a number of risks. Incomes are highly variable and are dependent on family members' ability to perform manual labor. Matters will only get worse as climate change increases the uncertainty they face. Vinay Jaju described the challenges ONergy faced with an analogy, "I like to say that when I buy a car I don't buy an oil well with the car. And in the case of solar you actually do... For many of our consumers it's their most expensive asset... We address affordability by connecting our products with end consumer financing for systems as cheap as 1300 Rs., which is say \$20. We offer financing facility through our partners and the consumer has the option of paying over six months, which is cheaper than what they're already paying for their energy use for their lighting or for mobile charging, which is very substandard" (Jaju, V., 2016). There are two main tactics to make products affordable.

Beyond the practice of consumer financing, the company utilized a variety of strategies to make its products affordable. ONergy delivered products through local organizations like NGOs

and Microfinance institutions (MFIs) This significantly decreased ONergy's need to develop its infrastructure as it scaled, made its products more affordable, and utilized potential customers' existing relationships to build trust. Still, ONergy faced difficulties working within communities with such slim profit margins. ONergy continued to find new ways to strengthen its business model to serve rural communities suffering from energy poverty.

ONergy expanded into more lucrative markets in order to subsidize its mission of serving BoP communities that lack access to clean, reliable energy. This change required the company to function more like a traditional solar energy distributor. Providing petrol stations, schools, and residential properties with grid-connected solar energy served as an opportunity for ONergy to increase its bottom line, while also working towards a secondary impact goal of offsetting carbon emissions. Previously, ONergy was only using smaller solar home systems in middle-class, under-electrified markets to serve this purpose. This recent expansion theoretically had the added benefit of making the company more appealing to investors.

ONergy struggled to find suitable investors even after making these strategic changes to its business model. This severely hindered the company's ability to scale its mission, as it needed an influx of cash to fund a variety of strategic initiatives. ONergy's frustrations in its search for investments led its leadership to rethink the company's business model. ONergy had to pivot. Providing high-quality products and services to rural communities was simply not profitable enough to encourage optimism from investors. This has driven the company to focus on delivering clean energy to urban markets through more traditional grid-connected solutions in the future. ONergy is not the only example of impact investors leading companies to skew their mission. The incentive to serve up-market communities is strong across social enterprises focused on meeting energy access needs.

B) Investment in PayGo: Targeting More Affluent Customer Segments

Pay-as-you-go (hereafter Paygo) solar home lighting systems are very similar to existing models of customer financing. Customers buy solar lighting systems for their home by placing a down-payment and then paying for the rest of the system over an extended period time with interest. PayGo business models remove some of the complexities associated with these business models in the past. Firstly, depending on a country's banking laws, companies can finance consumer debt themselves instead of partnering with a bank or microfinance institution. They can also automate the collection of payments, utilizing mobile money. PayGo systems also remove the need to collateralize debt. Companies can simply use an automated system to shut down non-paying customers' systems until they catch up on payments.

In the past year, companies using PayGo technologies for consumer finance have received the bulk of private capital investments within off-grid lighting. PayGo is a promising technology with the potential to simplify business models, provide consumer finance, and introduce new people to the global financial system. However, investments in PayGo companies serve as a reminder of the problematic contradictions within the practice of impact investing. The bulk of companies receiving investment within the industry focus on middle and high-income customer segments. Investors' decision to primarily finance PayGo companies focused on these customer segments has spurred controversy within the international development community. On the one hand, off-grid lighting has been underfunded historically. Nearly any sign of increased investment within the sector could be interpreted as a good one. On the other hand, the companies receiving these investments are not maximizing the impact of this capital in-flow. The large systems they sell are financially inaccessible to BoP consumers. Other aspects of the PayGo business model, such as securitizing loans, do not seem to have poorer consumers in

mind either. This is a worrying sign for SDG 7. Current investments in PayGo will not reach the customer segments at the highest risk of remaining in the dark come 2030.

In 2016 alone, companies focused on providing PayGo systems and services raised \$223 million in various forms of private capital (Orlandi, I., Kawahara, T., Edwards, I. Wilshire, M., 2017). Four companies raised over \$18 million in private funding in 2016 (Orlandi, I., Kawahara, T., Edwards, I. Wilshire, M., 2017). The largest companies in the sector have raised over \$250 million over their lifespan (Bardouille, P., Shepherd, D., & Vanzulli, G., 2017). Even d.light, one of the earliest energy access driven social enterprises is focusing on monetizing its pay-as-you-go infrastructure. This move, announced in June of 2016, helped the company to raise \$40.5 million from September 2016 through January 2017 (“d.light design”, n.d.).

These companies offer an excellent opportunity to for investment return due to their customer segments’ strong desire and ability to pay for more electricity. Bloomberg estimates that 40-50 million people living in under-electrified communities possess household incomes between \$4,000-\$18,000 annually (Orlandi, et al., 2016). PayGo systems represent a streamlined way to meet the needs of these more affluent consumers. These large-scale investments are partially driven by Paygo companies’ focus on relatively well-off consumers. These consumers deserve to have their demand for energy satisfied, just as BoP consumers do. However, the decision to focus investments on companies selling systems to up-market consumers does not contribute as much to SDG 7 as an equivalent investment in a company working within BoP communities.

Two of the four largest series’ raised were by companies targeting well-off consumers with systems worth upwards of \$1,000 (Orlandi, I., Kawahara, T., Edwards, I. Wilshire, M., 2017). One of these companies, Nova Lumos, raised the largest sum. The company received \$50

million in debt and \$40 million in venture funding during the final quarter of 2016 (“Nova Lumos”, n.d.). Many believe this to be the largest private investment in off-grid lighting ever. Industry data indicates that companies that offer PayGo options within the off-grid lighting industry are the most well-positioned to benefit from the growing availability of capital within the industry (Orlandi, I., Kawahara, T., Edwards, I. Wilshire, M., 2017).

Investors are highly interested in the opportunities PayGo business models offer beyond companies’ growth prospects and high revenues per unit. PayGo companies and investors have already identified alternative ways to increase earnings and decrease risk. Some companies that incorporate PayGo services in their business model seek to use structured debt as a mechanism to remove consumer receivables from their balance sheets (Orlandi, et al., 2016). BBox has already struck a deal to securitize its customers’ debt with Oikocredit (Sanyal S., Prins J., Visco F., & Pinchot A., 2016, P.12). This is already common practice within solar markets in the United States, though the industry has seen some growing pains in the process (Orlandi, et al., 2016). While there is no doubt that these opportunities to securitize the sector are tantalizing for investors, it is hard to see a world in which this financial innovation can be used to serve BoP markets. Trading debt associated with people who live off as little as two dollars a day is too risky to be worth the small profits to be made. This is why microfinance - a much more mature industry - only began a similar process less than a decade ago. The business of securitizing high risk, low-income populations does not seem fruitful for the PayGo industry in the near future.

The trend of focusing on wealthier customer segments instead of BoP communities is harmful for the push to achieve SDG 7. If impact investors are most willing to invest in customer segments that they believe are easiest to reach and represent large profit margins, then are they truly impact driven? Or are they co-opting the name impact to be a part of the next trend and get

out ahead in a market that is preparing to serve socially conscious millennials? Examining these investments in the context of recent revenues within the solar lighting industry sheds more light on the issue. These investments came during a down year for sales within the off-grid lighting sector. The data shows that impact investors' current focus on wealthier customer segments comes at a time when entrepreneurs are selling more expensive systems than they traditionally have.

Units sold dropped within the global off-grid lighting markets, yet revenues rose. The Global Off-Grid Lighting Association, an independent, not-for-profit industry association that represents over eighty members of the off-grid lighting industry, reported a 12% drop in units during the second portion in 2016 (Peters K., & Sturm., 2017). This decline was driven by a decrease in sales in both India and Sub-Saharan Africa (Peters K., & Sturm, R., 2017). The decrease in sales is cause for concern. People in East Africa and India are the main consumers of off-grid solar products - mainly because they possess a massive portion of people who lack access to high-quality energy solutions. The majority of those who lack energy access are rural BoP consumers. BoP consumers cannot afford to buy large solar lighting systems without significant subsidy. GOGLA tries to place blame for enterprises' movement up-market outside of the industry, pointing to various external forces as the cause for the disappointing second half of 2016. These forces include; currency devaluation in Nigeria, Modi's drive for demonetization in India, drought in East Africa, and changes in import tariffs (Peters K., & Sturm, R., 2017). Variations in demand can also be attributed to fluctuations caused by large orders from institutions (Peters K., & Sturm, R., 2017).

Off-grid lighting enterprises played a role in the trend towards more expensive systems as well. Companies within the off-grid lighting sector have made a conscious decision to focus on

selling more expensive systems. Current trends among GOGLA members using Paygo systems signal a movement away from serving Base of the Pyramid consumers. These companies have used these new PayGo systems in tandem with improved home-lighting systems to attract financially driven investors. Investors view these companies as an avenue to avoid the brutal price competition and high capital costs that are historically associated with the off-grid lighting sector. Small solar products have traditionally driven revenues within these markets. These products are attractive to BoP consumers that can't afford larger energy systems. Even during the second half of 2016, cash sales of small (<3 watt peak or WP) solar energy products accounted for 82% of cash sales and 62% of cash revenues (Peters K., & Sturm, R., 2017). Companies serving these customer segments sacrifice profits to provide a more impactful service, which is demonstrated in the ONergy case.

PayGo sales have been driven by other segments of the off-grid lighting industry thus far. GOGLA recorded zero PayGo revenues for the small products that have traditionally driven cash sales. Revenues from Paygo systems outperformed cash revenues in nearly every market segment above 3 WP (Peters K., & Sturm, R., 2017). These products are far too expensive for consumers at the BoP to afford. In recent years, the cheapest PayGo system on the market has been an eight watt system offered by M-Kopa (Sanyal S., Prins J., Visco F., & Pinchot A., 2016). It costs \$208 over the course of a year. Consumers pay \$33.50 up-front and \$0.48 every day throughout the year (Sanyal S., Prins J., Visco F., & Pinchot A., 2016). This is a steep jump up from the \$9 lanterns BoP consumers already require financing and subsidy to afford. If these are the markets investors continue to target, it could severely stunt the Sustainable Development Goals, as the majority of people who lack energy access will be left behind. Signs within the marketplace indicate that this is occurring. Bloomberg's report on financing for off-grid solar in

2016 states, “we are not aware of any significant investments into companies selling kit on a cash basis” (Orlandi, I., Kawahara, T., Edwards, I. Wilshire, M., 2017).

Impact investors’ current focus on PayGo companies selling home-lighting systems needs to be met with a critical eye. There are upsides and downsides to this trend. PayGo companies are pioneering a technology that could have large-scale applications throughout the off-grid lighting sector by offering a practical way to overcome some of the obstacles that persist within last-mile distribution. The technology also offers a range of ancillary benefits and applications that could impact various off-grid customer segments in the future. Furthermore, there is no denying that these companies are impacting the livelihoods of a large number of people within the markets they have chosen to operate in. However, impact investors’ current frameworks are hindering this technology’s ability to reach BoP communities. Investors have shown little interest in PayGo companies serving poor, rural consumers and have cut out investments in companies selling cash kits simultaneously. Both of these markets need to be served in order to achieve SDG 7. Impact-first investors need to fill this void that currently exists within investments in off-grid lighting. These complexities have combined with the momentum behind the PayGo industry have been the subject of recent debate within the impact investing industry.

Philosophical and Practical Arguments Regarding PayGo

The trends within impact investing and PayGo have stirred controversy within the energy access community. CeniARTH, a single-family office, recently voiced concern about the implications this rapid increase in funding for PayGo companies may have. CeniARTH is concerned enough that it used the trend to serve as the basis for announcing its decision to stop investing in solar home lighting systems on “the Next Billion,” a subsidiary of the University of

Michigan that is used to drive discussion within the international development community. This came as a shock to many.

Ceniarth had been very involved in the development of the PayGo sector up until this point. Clean energy was a staple within the family fund's investment thesis. Yet in its post, Ceniarth's directors revealed a myriad of concerns about recent trends related to off-grid lighting. Venture investments in solar home lighting systems sat at the heart of these concerns. This was a serious about face for a fund that had previously been exuberant enough about PayGo systems to extend credit to BBOX, support financial intermediaries, and assist Off-Grid Electric by supporting a vehicle to move its liabilities off its balance sheet (Neichin, G., Roach, M., & Isenberg, D, 2017).

Ceniarth argued that the massive increase in funding for solar home systems stands to damage an industry that is only in its infancy. Its directors pointed out that that the industry has not developed enough to support the 10x increase in investment it has experienced in the past four years (Neichin, G., Roach, M., & Isenberg, D, 2017). Business models are underprepared to scale at this level and ultimately clean energy access for BoP communities will be sacrificed to meet the demands of investors (Neichin, G., Roach, M., & Isenberg, D, 2017). These new pressures could greatly influence the behavior of these enterprises. The authors voice concern about this simultaneous increase in competition and financial incentives within the sector.

The directors of Ceniarth argue that this will further decrease the impact focus of these companies and lead to a race to the bottom within the industry. In this proposed scenario, these pressures would create a market where vendors drive prices down and relax credit constraints in order to compete for and retain customers (Neichin, G., Roach, M., & Isenberg, D, 2017). This competitive market could drive firms to focus on more profitable, peri-urban geographies and

decrease their customer-service orientation (Neichin, G., Roach, M., & Isenberg, D, 2017).

While this represents a sound business decision, it comes at the cost of serving those who need these products most.

CeniARTH also questions the product's true impacts. The fund believes some investors will be disappointed when have invested in these companies are unable to move customers up the energy ladder. This means the existing market will not see increases income that are enough to buy larger, more profitable systems (Neichin, G., Roach, M., & Isenberg, D, 2017). For these reasons, CeniARTH has chosen to focus on serving rural communities and investing in clean energy for productive use. However, CeniARTH's statements do not necessarily represent the industry as a whole. Plenty of members of the industry came out in support of increasing investments in off-grid lighting.

GONGLA was the first to offer an opposing perspective to CeniARTH. GONGLA acknowledged that private investment in solar off-grid lighting has grown exponentially in the past few years. However, the association points out that the Special Representative for the Secretary General of the UN for SEforAll recently estimated it would take \$50 billion annually through 2030 in order to reach clean energy access goals set forth within the Sustainable Development Goals (Keane, J., & Sunblad, L., 2017). In this case, growth within the industry would represent historic underfunding, rather than recent overfunding.

GONGLA addresses the concerns CeniARTH expresses related to customer care, but remains largely silent on issues relating to the industry's lack of regulation. In GONGLA's view, worries relating to customer-care will be sorted out by the market. Competition amongst firms will drive customer-centric approaches rather than detracting from them (Keane, J., & Sunblad, L., 2017). GONGLA argues that the industry will not suffer from the same issues as the microfinance

industry because PayGo can adapt learnings from microfinance to fit its model. Aside from ensuring customer satisfaction, GOGLA also believes that the market will inform companies which products to offer (Keane, J., & Sunblad, L., 2017).

GOGLA argues that the proliferation of large solar lighting systems and the various markets solar lighting systems are sold in reflect the breadth of the need for such products. The fact that one company chooses to serve a peri-urban market does not detract from another's ability to serve rural customer segments (Keane, J., & Sunblad, L., 2017). The same is true for providing home lighting products versus a focus on productive uses for clean energy. All of these needs must be met in order to achieve the SDGs.

While GOGLA raises many reasonable points, Ceniarth is right to voice concern about the markets impact investors are choosing to fund. For all of GOGLA's rhetoric about customer choice, it is ridiculous that investors have turned away from investing in a customer segment that has historically driven revenues within the industry. Hystra notes that there are about 40 million more consumers living in energy poor areas fit the typical profile of solar lantern consumers than solar household system consumers ("Reaching Scale in Access to Energy", 2017). If PayGo's potential as a technology is the driving force behind these investments, it could have also driven sales within solar lantern markets due to the prevalence of mobile payment systems in East Africa.

Shell Foundation's framework predicts that PayGo technology will climb down the energy ladder once the business model is validated amongst businesses, investors, and consumers. Shell Foundation warns, "don't expect early adopters of modern energy solutions to be the poorest of the poor" (Desjardins, S., Gomes, R., Pursnani, P., & West C., 2014). Time will tell if Shell Foundation's theory of "trickle down impact" proves true for PayGo systems. More

affluent customers can serve as the beta-testers for this new delivery system and validate it to consumers and investors alike. However, these are not the most impactful customer segments PayGo can reach. On average, consumers who use small systems (<3WP) save significantly more than the segments companies like M-Kopa are serving. They save as much as \$74 more per year on energy spending by switching to solar products. This superior savings rate is compounded by their smaller household incomes (“Reaching Scale in Access to Energy”, 2017).

In the long run, PayGo technologies may represent a more efficient market outcome for all stakeholders. PayGo will become widespread and inexpensive once the market develops a healthy ecosystem that will allow businesses to outsource ancillary activities (Sanyal S., Prins J., Visco F., & Pinchot A., 2016). Third party businesses can expedite this process. The World Resource Institute notes that PayGo markets can become more efficient by working with technology partners, credit rating assessors, and interface and network developers, citing companies that are already examples of companies working in this capacity in various geographies within Africa (Sanyal S., Prins J., Visco F., & Pinchot A., 2016). These types of partnerships will enable companies to focus on product development and customer service as they move away from more capital-intensive, time consuming cash collection processes.

The PayGo business model could help people gain access to financial instruments and electricity simultaneously. If PayGo companies partner with banks or other non-banking financial institutions, customers would benefit by establishing a relationship with the financial sector and potentially developing a credit score. These organizations would eventually be able to provide other products, like insurance and other necessities. Even if PayGo does prove profitable, the sector may never get funding to move down market. In fact, some groups argue that it could increase competition for these customers and cause companies to move up-market.

Despite these concerns, there are some examples of companies that have already identified PayGo's potential to meet needs at the BoP.

Greenlight Planet developed a platform with Angaza that it uses to serve BoP markets in rural India. The company offers a variety of lighting options, including smaller options like a 0.5 watt system that includes a solar lantern and a 3 watt system that supports a solar lantern and mobile charging. These systems are available at a cost of \$2 upfront with ten weekly payments of \$.75 and \$8 upfront with ten weekly payments of \$3, respectively. Investors are willing to invest in these more affordable markets; Greenlight raised \$5 million in equity as part of its Series C in 2016 and \$10 million in equity during its Series B in 2015 (Greenlight Planet).

PayGo technologies can most meaningfully contribute to SDG7 if investors invest in companies with a desire to implement the technology across customer segments. Investors who wish to do so will need to relax their focus on achieving market rate returns, increase investment timelines, and provide riskier early stage investments. This will inherently decrease financial returns. However, this is currently the most realistic way for impact investors to maximize the impact of their capital. Investors' expectations for financial returns are currently too high for them to do so.

Barriers to Clean Energy Access within Impact Investing

A) Return Expectations

The impact investing industry is still largely fuelled by funds that value financial returns above depth and breadth of impact. According to the GIIN's 2017 annual survey, fund managers are responsible for the most assets under management. For-profit fund managers control about 58% of the assets in the space and not-for-profit fund managers possess 9% of assets under management (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017). Investors that

participated in the GIIN's 2017 survey who target market rate returns are planning on raising nearly 14x the number of assets their below market rate counterparts are targeting. This would nearly double the gap between their capital raises in 2016 (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017). This is compounded by the fact that most investors lack an emphasis on meaningful impact data because of their desire to generate high returns. This skews incentives for social entrepreneurs and gives the field unrealistic expectations.

Many firms within impact investing are bringing a traditional investing mindset to the industry. About 2/3 of equity investors the GIIN surveyed believe that they can and should pursue risk-adjusted market rate returns (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017). Thought leaders within the social impact sector have expressed concerns about this emphasis on market rate returns. Oxfam recently released a piece that expressed doubts that the industry can continue to grow steadily without first reconsidering investment strategies.

Currently many funds' perspectives are driven by experiences within traditional investing. Chief amongst Oxfam's concerns is the impact investing industry's fixation on validating its ability to achieve "risk-adjusted market rate returns" within the volatile, fragile markets associated with social enterprise (Bolils, M, 2017). There are various risks associated with investing within emerging markets. Oxfam states that risks like political and climate shocks push required returns upwards.

These risks are particularly pertinent in the context of investing in social enterprise, as they aim to serve populations most exposed these risks. Investments that would typically require 10-15% returns receive a 10% risk premium. This means entrepreneurs must support 20-25% IRR (Bolils, M, 2017). Very few early-stage businesses - let alone social enterprises - can achieve such exceptional profits consistently. Even companies that receive support from Shell

Foundation - widely regarded as the authority on social enterprises working within clean energy access - can take up to 3 to 4 years to gain additional investors (Desjardins, S., Gomes, R., Pursnani, P., & West C., 2014).

There will be great pressure for individual social enterprises to meet these goals. The venture capital model of allowing unicorns to subsidize failed investments is unlikely to succeed in the context of impact investing. Impact investors share these worries. “Appropriate capital across the risk/return spectrum” ranked as the number one concern amongst impact investors in GIIN’s 2017 survey (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017, P.10). Yet many of these investors are unwilling to fill the gap with creative financing instruments, or more impact-oriented capital. The effects of these expectations are compounded by the fact that most impact investors operate within the narrow timeframes associated with traditional investing. Many impact investors operate within a 10-year closed end fund structure (Bolils, M, 2017).

B) Investment Timelines are too Short

Generally social enterprises that serve BoP communities require a 7-10 year grace period before they can break even (Bolils, M, 2017). This mismatch of timelines places pressure on impact-first funds to provide the lionshare of early stage funding. The vast majority of impact funds for early stage funds come in the form of debt, grants, or a blend of the two. This makes sense in the context of the GIIN’s most recent survey. A significantly higher portion of funds that provide debt are willing to accept below market rate returns.

In some cases entrepreneurs are able to acquire small seed funding deals in the form of equity (Desjardins, S., Gomes, R., Pursnani, P., & West C., 2014). However, most funds prefer larger deals than early and middle stage social enterprises have the capacity to support because of the relatively higher administrative costs associated with small deal sizes. We can see this

through the explosion of investing in PayGo companies that are asking for larger amounts of capital. This leads to a gap in necessary funding for early stage social enterprises that is far too large to be covered by philanthropy alone.

This is a major reason that impact investors state that there is not strong pipeline of investment ready social enterprises. Echoing Green, a social innovation fund states, “to really prove the impact investing market’s sustainability, investors shouldn’t all be waiting for evidence of market rate returns in later stage companies, but need to start betting on these young jockeys and provide early stage investment to unleash tomorrow’s impact and financial success stories” (Dorsey, C. L., & Pease, M., 2015). Oxfam expresses similar sentiments, echoing Bridges Ventures statement following its announcement of a move to a fifteen year fund structure, “in most funds announced for social ventures to date, fund managers need to exit their investment to get their money back (plus any additional proceeds)... it chose this new structure because mission-led ventures often have long-term social goals, so they need access to long-term capital and support” (Bolils, M, 2017).

This process represents a large up-front investment. Shell Foundation estimates that even its most successful partners require between \$5 million and \$20 million, along with 6 to 10 years of experimentation before most funds would consider them a viable investment (Desjardins, S., Gomes, R., Pursnani, P., & West C., 2014). Even the PayGo companies investors are optimistic about may take over seven years to achieve break-even cash flows. The International Finance Corporation, one of the lead investors in Paygo, echos this sentiment.

The IFC cautions investors that PayGo companies with aggressive strategies to scale will take 8-15 years to become financially sustainable (Bardouille, P., Shepherd, D., & Vanzulli, G., 2017). These businesses will require a similar timeframe to the entrepreneurs that Oxfam and

Shell Foundation work with. Even these middle class markets face a trade off, as the IFC states, “it is important that both investors and operators recognize that there may be a tension between achieving social returns (or impact on access rates) and investment returns... Otherwise, there is a risk of mismatched expectations over time” (Bardouille, P., Shepherd, D., & Vanzulli, G., 2017). These PayGo companies are all late stage and preparing to scale. If investors need to increase timelines for them, it is no wonder there has historically been a shortage of early stage funding for social enterprises.

C) Lack of Early Stage Funds

The Shell Foundation has voiced concern about the lack of funding available to early stage entrepreneurs since 2014. According to Shell Foundation, these difficulties are amplified within early-stage enterprises. The foundation states, “a staggering level risk and uncertainty surrounds social enterprises and much of it is outside of their control... If pioneers cannot beat the odds to validate new markets, there will simply be no viable deals that allow social investors... to improve energy access across the world” (Desjardins, S., Gomes, R., Pursnani, P., & West C., 2014, P.16). The number one learning Shell Foundation gained from working with entrepreneurs focused on clean energy access was that, “pioneers require significant early-stage support to test, adapt and validate new models” (Desjardins, S., Gomes, R., Pursnani, P., & West C., 2014, P.16).

Enterprises that aim to serve un-electrified and under-electrified communities frequently rely on capital-intensive models to reach those who need their products most. Profits are slim, as low-margin products like solar lanterns often represent the maximum investment BoP customers are able to afford. Costs have increased in recent years because of demand for customer service and after sales support. Such expenses are necessary for social enterprises to fulfill their

missions. Customers are weary, having been spurned by an influx of cheap, poorly designed lanterns in the past (Desjardins, S., Gomes, R., Pursnani, P., & West C., 2014). For these reasons, social enterprises must develop their sales, maintenance, and customer service infrastructure before they seek new markets.

The “missing middle” in funding represents a hurdle for early stage businesses across emerging markets. Very little flexible funding is available for small and medium enterprises despite the growing availability of funds available to micro-entrepreneurs thanks to microfinance. Miller Center research within its Transformative Frontier initiative indicate that there is substantially less debt and equity available within the impact investing industry at levels below \$1 million dollars. This is particularly true within the range of \$250,000-\$1,000,000. This is even more problematic once the capital is siloed by geography. The average deal size amongst impact investors focused on emerging markets was 2.5 million in 2016 (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017). This is significantly more capital than most early stage entrepreneurs require, which generally falls between \$250,000 and \$1,000,000. According to the Transformative Frontier, upwards of 40% of deals under one million dollars took place within the U.S. and Europe, leaving emerging economies the remaining 60% available in these amounts.

Grants have carried the burden of this deficit, but debt and equity investors are needed as well. Recent trends indicate that philanthropic funds available to social entrepreneurs have fallen since they peaked in 2009, according to ANDE reports (State of the Small & Growing Business, 2016,). This means that existing problems with the Missing Middle are now compounded by a decrease in the funds early-stage entrepreneurs typically rely on. These issues are also aggravated by the fact that the right types of grants weren't available in the first place. Shell

Foundation believes there have always been an insufficient number of high-risk grants available to social entrepreneurs. (Desjardins, S., Gomes, R., Pursnani, P., & West C., 2014).

Few funds have stepped in to fill this void. Only 4% of assets under management within funds that target below market rate returns are allocated to investing in energy (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017). This number is smaller once it is narrowed to funds available within emerging economies, reaching a mere \$162 million assets under management within funds who participated in the GIIN's 2017 impact investor survey (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017). These businesses represent a low payoff even from the perspective of entities seeking sub-market rate returns. This explains why below-market rate investors are more than 2.5x more likely to be involved with impact investments in seed or venture stage companies than funds seeking market-rate returns (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017).

Even funds targeting below market rate returns place significant financial pressure on early stage entrepreneurs to produce strong financial results. This is particularly true in the context of investors in emerging economies. Lenders who target below market rate returns in developing countries expect returns of 7.4% on average (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017). Those seeking equity target average returns of 14.4% (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017,). Below market rate investments in emerging markets are expected to exceed what would be considered market rate returns in developed markets. This explains why most investments that seek below-market rate returns take place within emerging markets. Sub-Saharan Africa, Latin America, and South Asia represent the regions with the 2nd, 3rd, and 4th most impact funds available (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017). Only the US and Canada ranked ahead of these geographies.

These problems within the impact investing trace to a larger question. What is impact investing? If a fund is unwilling to sacrifice financial returns for increased depth or scale of impact, how can it be placed within the same category as a fund that legitimately prioritizes impact at the cost of profits? If a fund aims to achieve market rate returns it seems to be performing siloed traditional investing rather than impact investing. These questions sit at the heart of whether or not impact investing can make a meaningful contribution to achieving SDG 7. There needs to be a greater emphasis on offering a wider variety of capital within the industry if they aim to do so.

Sustainable Development Goal 7 needs entrepreneurs to have access to a wider variety of capital because of the complexities that come with serving communities that suffer from energy poverty. There are high barriers to access within rural energy access markets and problems driven by last-mile distribution difficulties persist throughout the industry. Budding social enterprises need to experiment constantly, which means they require access to early-stage, low pressure capital. There is currently a shortage of such capital due to investors' preferences for market-rate returns within a ten-year time frame. This means that many social enterprises are forced to skew their mission, or fail before they ever realize their true potential for impact. SDG 7's timeline is far too urgent for these changes to take place over an extended period. There is an estimated 850 million person gap that needs to be filled by 2030. This gap can only be filled if the right capital is available.

The Need for Patient Capital

Scarcity of early-stage funds can often lead social entrepreneurs to accept poorly thought-out equity deals. Such funding forces the hand of early-stage entrepreneurs and requires them to take their products and services into new markets before they are sufficiently validated and ready

to perform. Once the first round of equity is inevitably depleted, the entrepreneur must return to raising money rather than expending resources to develop their product or business model (Desjardins, S., Gomes, R., Pursnani, P., & West C., 2014). The Omidyar Network, Oxfam, and the Shell Foundation are all adamant that pioneers require “patient capital”. Much like innovative entrepreneurs in Silicon Valley are given time and mentorship to become profitable, social entrepreneurs require the same mindset.

Patient capital requires investors to look beyond the landscape of just a single investment. Acumen, an impact-first investment organization, defines the approach’s criteria as follows:

- “Long time horizons for the investment”
- “Risk-tolerance”
- “A goal of maximizing social, rather than financial, returns”
- “Providing management support to help new business models thrive”
- “The flexibility to seek partnerships with governments and corporations through subsidy and co-investment when doing so may be beneficial to low-income customers.” (“Acumen’s Patient Capital”, n.d.)

Using patient capital provides entrepreneurs opportunities to experiment and innovate before taking an organization to scale. Patient capital does not necessarily require investors to ignore their desire for returns. Instead, it asks them to reconsider their traditional timelines and prioritize long-term returns. This ultimately allows entrepreneurs to understand customers’ needs and grow without experiencing mission drift in their search for funding (Desjardins, S., Gomes, R., Pursnani, P., & West C., 2014). It also addresses the need for early-stage funding, which will ultimately serve the purpose of increasing the pipeline of deals available to investors down the road. The need for patient capital is not unique to clean energy. Any entity who aims to deploy

funds in early stage social enterprises should consider patient capital. Microfinance is often cited as an industry that benefitted from patient capital before the term had even been coined (Bolils, M, 2017).

Microfinance provides a fitting case study to illustrate how a fresh approach (such as patient capital) can stimulate a new business model or industry. Microfinance institutions' roots date back to Bangladesh in the 1970s. The revolution was originally sustained through donor-driven NGOs. Finally, some organizations felt comfortable scaling their operations into full-fledged financial institutions in the early 1990s. These days, microfinance is considered one of the most stable, safe investments one can make in the impact investing industry. Microfinance yields have historically been a steady investment. This has led microfinance to become a popular investment amongst impact investors. Forty percent of funds allocated by impact investors in emerging markets were dedicated to microfinance (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017). Twenty two percent of funds aimed at achieving market rate returns were allocated to microfinance (Mudaliar, A., Schiff, H., Bass, R., & Dithrich, H., 2017).

Microfinance is commonly placed on a pedestal by those who argue that seeking below market rate returns soils markets in emerging economies rather than building them. Oxfam estimates that it took \$20 billion in patient capital for microfinance to reach its mature status today (Bolils, M, 2017). The microfinance industry proves how rare it is for a business to benefit base of the pyramid communities without adequate time and financial support. However, it is becoming increasingly obvious that not all sectors and customer segments lend themselves to generating competitive returns.

Even promising innovations like PayGo require patience beyond investors' general timelines. Companies like M-Kopa and d.light have both benefitted from years of grants and

other forms of funding targeting low levels of financial returns (Bolils, M, 2017). These companies demonstrate the need for capital that goes beyond the typical trade-off between grant funding or investment that requires market rate of return. Mara Bolils of Oxfam expresses this sentiment by arguing, “we urgently need to progress to more patient capital models that seek to maximize impact while accepting varying levels of return of capital. Without such support we suspect most promising social enterprises will fail to meet their impact potential or become financially viable” (Bolils, M, 2017).

There is no way for impact investors to avoid the complexities that come with operating in energy access markets. All companies aiming to serve off-grid communities require a different mindset than the one traditional investors bring to the table. Investors will have to adjust their investment timelines, return expectations, or else impact will suffer. If investors are unwilling to take this approach, they should consider other avenues to reduce financial expectations on social entrepreneurs. These solutions include using money from philanthropic organizations to subsidize management fees or diversifying their portfolios across various levels of social and financial returns. Either way, firms will need to reduce their emphasis on short-term financial returns if they aim to contribute to energy access for all.

The best approach to investing in clean energy access markets is a patient one that emphasizes partnership. This means providing a variety of capital types and deal sizes throughout the lifespan of enterprises. It also requires investors to think about helping to develop the ecosystem of social entrepreneurship as a whole, by investing in capacity builders and intermediaries. Only then can social and financial returns both be satisfied. If impact investors are unwilling to make these changes, the BoP will be the group that pays the price.

Conclusion

Impact investors will only be able to help achieve SDG 7 by 2030 if they more effectively partner with social enterprises. This requires them to shift toward a more patient investing framework that de-emphasizes returns, increases investment timelines, and allows them to provide more early stage capital. Impact investors with a longer, more impact-oriented approach will be much more effective in addressing the shortfall in funding to end energy poverty by 2030. Impact investors' current framework is not sufficient to serve the needs of a mission driven industry. Investors must be willing to sacrifice returns in the short-term to develop a pipeline of financially strong clean energy enterprises in the future. The current emphasis on market rate returns within the industry causes insufficient availability of funds available to early-stage social enterprises and in many cases rewards companies for compromising impact by serving more affluent consumers. These skewed incentives can be seen through ONergy's changed business model and PayGo companies' emphases on selling larger home-lighting-systems. This has raised concern within the social impact community because of its potentially harmful effects, such as skewing enterprises' missions. Base of the Pyramid, rural communities will continue to see the gap in energy access widen if this is the case. Impact investors must be willing to transition to a new model quickly. Each year that passes by that the status quo remains in place further decreases the likelihood our global community will achieve SDG 7.

Cited Sources

- Acumen's Patient Capital Model is a New Approach to Solving Poverty. (n.d.). Retrieved June 08, 2017, from <http://acumen.org/ideas/patient-capital/>
- Bardouille, P., Shepherd, D., & Vanzulli, G. (2017, May 2). There is Such a Thing as Too Much, Too Fast: Avoiding Mismatched Expectations in Off-Grid Energy Investing. Retrieved June 07, 2017, from <https://nextbillion.net/there-is-such-a-thing-as-too-much-too-fast-avoiding-mismatched-expectations-in-off-grid-energy-investing/>
- Bolils, M. (2017, April). Impact Investing: Who are We Serving? A Case of Mismatch Between Supply and Demand [PDF]. Oxford: Oxfam.
- d.light design. (n.d.). Retrieved June 08, 2017, from <https://www.crunchbase.com/organization/d-light-design#/entity>
- Desjardins, S., Gomes, R., Pursnani, P., & West C., Accelerating Access to Energy, Shell Foundation, (December 2014), Retrieved from https://www.shellfoundation.org/ShellFoundation.org_new/media/Shell-Foundation-Reports/Access_to_Energy_Report_2014.pdf
- Dorsey, C. L., & Pease, M. (2015, April 7). Mind the Gap: It's Time to Change the Investment Timeline for Emerging Social Enterprises. Retrieved June 14, 2017, from <http://www.echoinggreen.org/ideas/mind-gap-its-time-change-investment-timeline-emerging-social-enterprises>
- Energy Access Projections. (n.d.). Retrieved June 07, 2017, from <http://www.worldenergyoutlook.org/resources/energydevelopment/energyaccessprojections/>

Goal 7: Ensure Access to Affordable, Reliable, Sustainable and Modern Energy for All — SDG Indicators. (n.d.). Retrieved June 07, 2017, from <https://unstats.un.org/sdgs/report/2016/goal-07/>

Greenlight Planet. (n.d.). Retrieved June 08, 2017, from <https://www.crunchbase.com/organization/greenlight-planet#/entity>

Jaju, V. (2016, July 28). What does it mean to ONergize? [Personal interview].

Keane, J., & Sunblad, L. April 6, 2017. Dear Critics: Here's Why the Off Grid Energy Industry Needs Impact Investment. Retrieved June 07, 2017, from <http://nextbillion.net/dear-critics-heres-why-the-off-grid-energy-industry-needs-impact-investment/>

Martin, R. L., & Osberg, S. (2007). Social Entrepreneurship: The Case for Definition. Stanford Social Innovation Review. Retrieved June 13, 2017, from https://ssir.org/articles/entry/social_entrepreneurship_the_case_for_definition

Mudaliar, A., Schiff, H., Bass, R., Dithrich, H., 2017 Annual Impact Investor Survey, The Global Impact Investing Network. (2017, May). Retrieved June 07, 2017 from https://thegiin.org/assets/GIIN_AnnualImpactInvestorSurvey_2017_Web_Final.pdf

Neichin, G., Roach, M., & Isenberg, D. (2017, March 27). An Impact Investor Urges Caution on the Energy Access Hype Cycle. Retrieved June 07, 2017, from <https://nextbillion.net/an-impact-investor-urges-caution-on-the-energy-access-hype-cycle/>

Nova Lumos. (n.d.). Retrieved June 08, 2017, from <https://www.crunchbase.com/organization/nova-lumos#/entity>

Orlandi, I., Kawahara, T., Edwards, I. Wilshire, M., “How Can Pay-As-You-Go Solar be Financed?”, Bloomberg New Energy Finance, January 17, 2017, Retrieved June 07, 2017,

from <https://data.bloomberglp.com/bnef/sites/14/2017/01/BNEF-2017-01-05-Q1-2017-Off-grid-and-Mini-grid-Market-Outlook.pdf>

Orlandi, I., Angus, M., Battley, D. Wilshire, M., Tyabji, N., Falzon, J., Lerner, A., “Q1 2017 Off-grid And Mini-grid Market Outlook”, Bloomberg New Energy Finance, October 7, 2016, Retrieved June 14, 2017, from

<https://data.bloomberglp.com/bnef/sites/14/2017/01/BNEF-2017-01-05-Q1-2017-Off-grid-and-Mini-grid-Market-Outlook.pdf>

Peters K., & Sturm. R, “Global Off-Grid Solar Market Report Semi-Annual Sales and Impact Data”, Global Off-Grid Lighting Association, May 2017. Retrieved June 07, 2017 from

https://www.gogla.org/sites/default/files/recource_docs/final_sales-and-impact-report_h22016_full_public.pdf

Reaching Scale in Access to Energy: Lessons from Practitioners (2017, June 01). Hystra .

Retrieved from:

https://www.gogla.org/sites/default/files/recource_docs/hystra_energy_report.pdf

Sanyal S., Prins J., Visco F., & Pinchot A. Stimulating Pay-as-you-go Energy Access In Kenya and Tanzania: The Role of Development Finance, The World Resource Institute, June 2016, Retrieved June 07, 2017 from

https://www.gogla.org/sites/default/files/recource_docs/stimulating_pay-as-you-go_energy_access_in_kenya_and_tanzania_the_role_of_development_finance.pdf

Shankleman, J. (2016, November 30). Nova Lumos Raises \$90 Million for Off-Grid Solar in Africa. Retrieved June 08, 2017, from <https://www.bloomberg.com/news/articles/2016-12-01/nova-lumos-raises-90-million-for-pay-as-you-go-solar-in-africa>

State of the Small & Growing Business Sector, Aspen Network of Development Entrepreneurs
(2016 June, 20), Retrieved from

http://c.ymcdn.com/sites/www.andeglobal.org/resource/resmgr/Metrics/SGB_Impact-Report_2015_digit.pdf

UN, Private Sector to Create Platform for Financing SDGs. (n.d.). Retrieved June 07, 2017, from

<http://www.un.org/sustainabledevelopment/blog/2016/10/un-private-sector-to-create-platform-for-financing-sdgs/>

United Nations Economic Commission for Africa, “Africa Regional Report on the Sustainable Development Goals”, February 2015, Retrieved June 7, 2017 from

http://www.uneca.org/sites/default/files/uploaded-documents/SDG/africa_regional_report_on_the_sustainable_development_goals_summary_english_rev.pdf

United States Department of State, Office of Global Partnerships. (2017, March 6). State of Global Partnerships 2017 Report [Press release]. Retrieved June 7, 2017, from

<https://www.state.gov/s/partnerships/releases/reports/2017/268159.htm#SDG7>

Universal Energy Access: An Enterprise System Approach [PDF]. (2015, September). Santa Clara: Miller Center for Social Entrepreneurship.

Universal Energy Access. (n.d.). Retrieved June 14, 2017, from http://www.se4all.org/about-us_our-ambition_universal-energy

What You Need to Know About Impact Investing. (n.d.). Retrieved June 14, 2017, from

<https://thegiin.org/impact-investing/need-to-know/>

Where Does the World Stand in Reaching Sustainable Energy Objectives? (n.d.), Retrieved June 07, 2017, from <http://www.worldbank.org/en/news/feature/2015/05/18/where-does-the-world-stand-in-reaching-sustainable-energy-objectives>