

CASE STUDY

# The Fight for Light: Improving Energy Access through Digital Payments

JULY 2017



ENERGY

BETTER THAN CASH  
ALLIANCE



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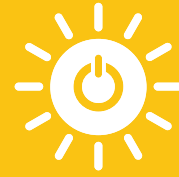
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## ENERGY CASE STUDY

### 7 AFFORDABLE AND CLEAN ENERGY



The Sustainable Development Agenda and the accompanying 17 Goals (SDGs) would represent the greatest increase in human welfare in history. Ending poverty and hunger, achieving universal access to education, health care, energy, and water; targets that would have seemed inconceivable in recent memory are now within reach. Yet meeting this ambitious agenda will require new paradigms for connecting markets and people that have been historically overlooked. Digital payments are at the core of the most successful new models for reaching last-mile customers, enabling businesses and governments to link under-served households with essential services.

Modern energy will likewise play an essential role in this development agenda as it powers growing economies, facilitates connectivity, and improves the quality of peoples' lives. Sustainable Development Goal #7 is to ensure access to affordable, reliable, sustainable and modern energy for all. This report examines new business models and government initiatives for energy access that rely upon digital payments. While numerous solutions exist to meet the needs of the more than one billion people who still lack access to clean, affordable, and reliable energy options, one of the key challenges is in how to expand efforts to rural areas, where a lack of traditional grid expansion has denied many households opportunities for advancement. In the following study, we see how, by incorporating digital payments into existing energy services, off-grid innovators, progressive utilities, private investors, and government agencies have all found ways of bringing light to some of the darkest corners of our world.

# 1. EXECUTIVE SUMMARY

Over 1 billion people live in darkness, and 3 billion people light open fires in their homes every day to eat. Without a connection to modern energy, even minor visions of advancement remain out of reach: “Energy is central to nearly every major challenge and opportunity the world faces today. Be it for jobs, security, climate change, food production or increasing incomes, universal access to energy is essential.”<sup>1</sup>

The Sustainable Development Goals (SDGs) were adopted on September 25, 2015 by the 194 member states of the United Nations, which spearheaded their creation. Collectively, they represent an ambitious and vital agenda for the next 15 years of global development, during which the world’s nations have pledged to eliminate poverty, reduce inequality, and shift the world’s economy to long-term sustainability. A core component of this agenda is SDG #7: Ensure access to affordable, reliable, sustainable modern energy for all.

The purpose of this paper is to explain the important role that digital payments and inclusive digital ecosystems will need to play in order for the world to achieve universal energy access, and to outline specific actions that policymakers, energy businesses, and payment providers can take to bring this goal closer to reality.

## **ENERGY ACCESS AND ENERGY POVERTY**

SDG#7 is a crucial acknowledgment that energy enables households to boost their productivity, living standards, and human capital.<sup>2</sup> Conversely, a lack of modern energy – energy poverty – prevents households from participating in the modern economy. SDG #7 recognizes that almost 1.1 billion people live without access to electricity and 3 billion people do not have access to clean fuels for cooking and heating,<sup>3</sup> creating indoor pollution responsible for 4.3 million premature deaths each year.<sup>4</sup>

At the same time we acknowledge that increasing energy access is crucial for inclusive social and economic development, there exists a parallel and growing imperative to combat the global threat of climate change, which threatens to derail recent developmental advances and push millions of people out of their homes and into deprivation. This imperative is reflected in SDG #13: Take urgent action to combat climate change and its impacts, as well as the Paris Climate Agreement struck in 2015 which created a framework requiring all signatory countries to put forward nationally determined contributions for climate change mitigation.

# IMPROVING ENERGY ACCESS THROUGH DIGITAL PAYMENTS

DID YOU KNOW?

DIGITAL PAYMENTS CAN HELP  
**1.1 BILLION**  
PEOPLE GAIN ELECTRICITY

SOLUTION

UNIVERSAL ENERGY ACCESS WILL REQUIRE  
DIGITAL PAYMENTS FOR:

ENABLING GRID  
UTILITIES & MINI  
GRID OPERATORS  
to shift towards  
**lower-cost,  
pre-paid service**



CATALYZING  
NEW BUSINESS  
MODELS such as  
pay-as-you-go  
solar, which could  
reach **15 million**  
households by 2020

7 AFFORDABLE AND  
CLEAN ENERGY



Securing the  
**\$50 BILLION**  
that is required annually in  
**PRIVATE INVESTMENT AND GOVERNMENT**  
transfers to achieve universal energy access



# Key Findings

This study finds that if the world is to achieve universal energy access, the expansion of digital payments and the development of inclusive digital payments ecosystems will be critical. As a mounting body of evidence now demonstrates, digital payments have the capacity to drive financial inclusion, create new economic opportunities particularly for women, increase transparency across the private, public, and development sectors, and support economic growth by driving major cost savings, efficiencies, and higher productivity. The study also finds that decoupling economic growth from the growth of greenhouse gas emissions will be extremely difficult, if not impossible, if cash remains the dominant method of transaction, particularly in developing countries.

## **CASH AS AN ENERGY PAYMENT MECHANISM**

Central among the findings of this report is that utility bill payments are overwhelmingly made in cash. In the 2014 Global Findex survey 79 percent of adults who had made a utility payment in the past year had paid in cash. For low- and middle-income countries it was even higher, at 93 percent.<sup>5</sup> Findex does not disaggregate utility payments by sector, but assuming that these results hold true in the energy sector, cash creates the following problems for utilities and energy service companies:

- Slow to collect, process, and reconcile, creating cash flow problems for postpaid energy service providers, including many electricity companies in emerging markets
- Extremely difficult to track, allowing cash to easily be misappropriated throughout the energy supply chain
- Entails high costs in terms of travel and time required to make payments; problems magnified if regular payments are required by providers, such as electric utilities or financiers of energy assets
- Exacerbates existing challenges for energy consumers in rural and low-income areas caused by “last-mile” energy distribution issues, small and irregular incomes, limited access to formal finance, and low population densities

Energy is the golden thread that connects economic growth, increased social equity, and an environment that allows the world to thrive

BAN KI-MOON  
FORMER UN SECRETARY GENERAL



## **BARRIERS TO UNIVERSAL ENERGY ACCESS**

### **Digital Payments Can Help**

This report examines three of the major barriers to expanding energy access, and how digital payments can help overcome each of those challenges.

#### **BARRIER** **Lack of cost recovery impedes grid extension and mini-grid establishment.**

Centralized electricity systems represent the most efficient means of extending energy access, as millions of people can be provided with electricity via a small number of large-scale generation facilities. Unfortunately, municipal and national utilities often fail to leverage these efficiencies:

- A 2016 World Bank evaluation looked at the financial sustainability of national utilities in 40 developing countries, and found that only 10 were profitable.<sup>6</sup>
- In 2015, 19 out of 39 power sectors evaluated in sub-Saharan Africa did not collect enough tariffs to cover overall operating expenses, and only two of the 39 collected enough revenue to cover operating and capital expenses. Over the long term this means that only 5 percent of the countries could reasonably expect to attract outside investment to their power sectors. This gap between expenses and revenue represents an implied subsidy equal to 1.5 percent of GDP on average.<sup>7</sup>

The problem is exacerbated in rural areas, where nine out of 10 people without electricity live. According to the IEA, 46 percent of the total rural population without electricity would be most cost-effectively connected via mini-grids – almost 500 million people.<sup>8</sup> But rural energy service needs to be a low-touch model to scale, even more so than traditional grids. An IFC benchmarking of mini-grids stated that using mobile payments is “more cost-effective in terms of collections, but also substantially minimizes the risk of non-payment” and that “prepayment is the preferred method of collection.”<sup>9</sup>





**POTENTIAL SOLUTION: Bundling prepaid smart meters with a digital payment instrument for new electricity connections.**

Digital payments represent a major opportunity for utilities and mini-grids to realize cost savings by reducing expenses in metering, credit operations, disconnections, reconnections, transporting cash, leakages, and through better monitoring of electricity consumption. Digital payments also enable, allowing utilities to shift customers to smart, prepaid metering systems. In prepaid systems, a customer purchases a set amount of kilowatt hours prior to consuming them, with tamper-proof meters reducing the risk of energy theft.

Prepaid electricity is valuable for customers, who can align their consumption with their income. Instead of queuing in line to pay their electric bill, customers can pay over the phone with a card, online, or via their mobile money wallet. Although prepaid systems can exist without digital payments and digital payments can still cut costs within postpaid systems, when combined, the two innovations create an automated, digitized, efficient utility that can viably expand access.

For energy providers, digital payments reduce operating expenses, limit energy losses, improve their cash flow position, and enhance the business case for connecting rural customers by building out rural grid networks or mini-grids, both of which are more likely to rely on renewable energy. For consumers, this can improve the sustainability of energy use and make paying for the service more convenient. The digitization of a routine expenditure will also increase familiarity and comfort with digital payment platforms, leading to more advanced uses of digital payments.

**"The cost of collecting small amounts of cash regularly from low density populations is simply too great without digital payment infrastructure."**

Hugh Whalan,  
CEO of PEG Africa



## **The high upfront cost of energy access, particularly for clean-energy assets.**

For customers that live in sparsely populated areas, stand-alone systems may represent the most economical means of accessing electricity reliably. Unfortunately, even entry-level solar home systems (SHSs) can cost \$100 or more, a large sum for rural households. The same is also true for cooking assets: Improved cookstoves or liquefied petroleum gas (LPG) tanks can save time and improve household health by eliminating indoor air pollution, but they require a level of upfront investment that is frequently unaffordable for households that most need them. Even access to the traditional grid can entail high upfront costs for wiring and installation, which leads to a large number of “under-grid” households that remain disconnected.<sup>10</sup>

The majority of consumers require some level of financing in order to afford an SHS, LPG tank, or grid connection, but until recently such financing was available only through microfinance institutions, requiring high levels of collateral and/or group guarantees.

### **POTENTIAL SOLUTION: Fostering access to digital financial services can enable creative financing schemes that extend energy access.**

A growing number of private sector companies are relying on digital payments to overcome this challenge and offer financed, distributed energy services. In East Africa alone, pay-as-you-go solar (PAYGo) operators have financed the sale of over 800,000 units, and it is estimated that digital payment-enabled solar units will bring distributed, renewable electricity to 15 million households and 75 million people by 2020.<sup>11</sup> This is accomplished by outsourcing cash management to payment providers, linking usage to payment through lockout technology, and allowing customers flexibility in their repayment terms. In rural Uganda, for example, customers of Fenix International can access lighting and phone charging through a system that costs just \$0.19 a day – but only if they are able to pay digitally. And financing for on-grid connections has helped countries such as Laos and Kenya to rapidly expand connectivity.

The benefits of flexible financing via digital payments do not end with the first-order practical impacts such as better household lighting or cleaner cooking fuels. Companies that are able to monitor long-term repayment behavior gain invaluable consumer insights, and are using that data to provide additional financing or financial services. PAYGo companies offer financing for cookstoves and smartphones, and utilities like Kenya Power now extend top-up credit for prepaid customers in good standing.<sup>12</sup> The financing of energy products could prove to be the gateway to a deeper and ongoing financial relationship.

**Digital payment-enabled PAYGo units will bring distributed, renewable electricity to 15 million households and 75 million people by 2020**

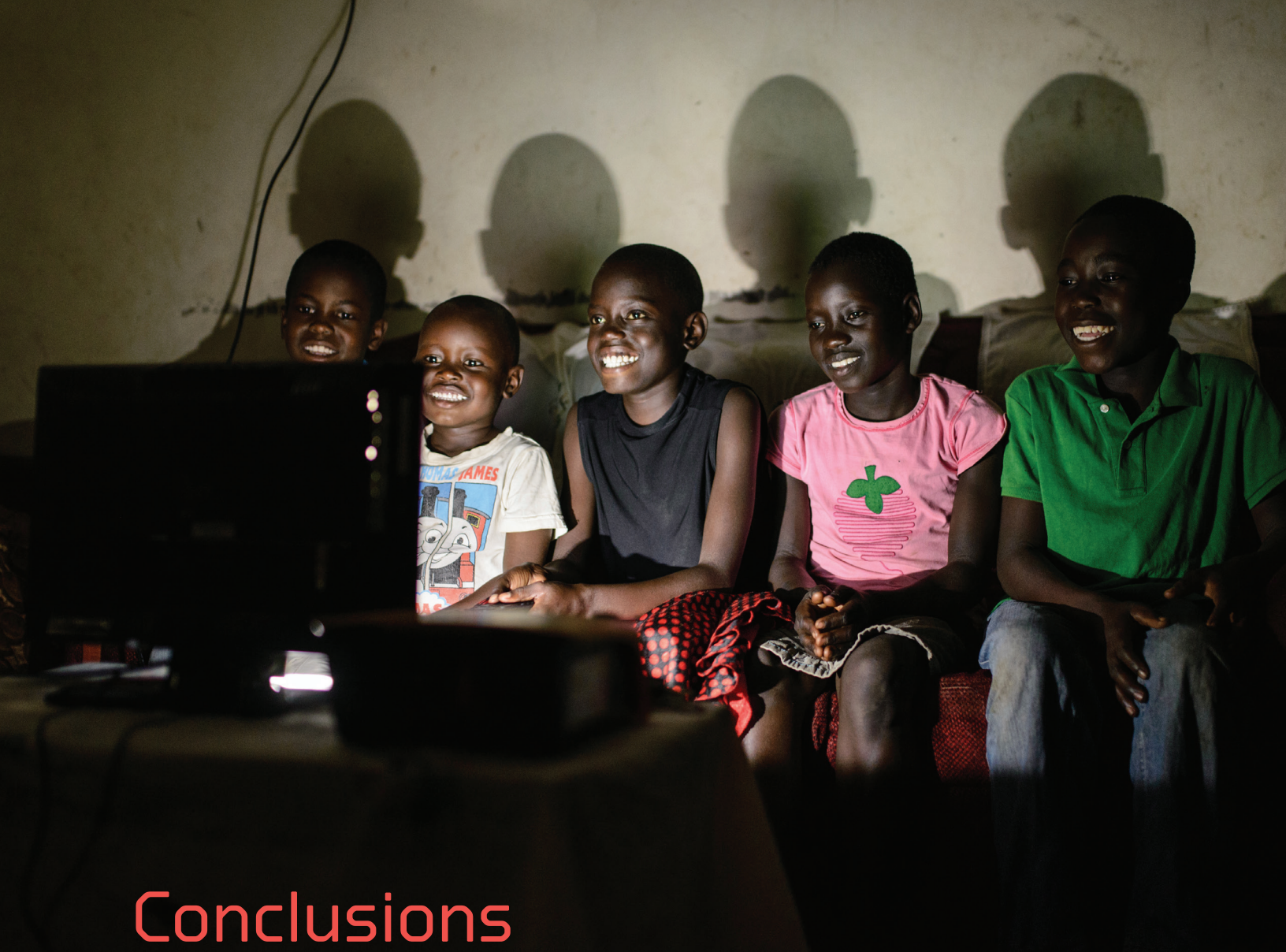
**BARRIER**  **Lack of private investment and well-targeted subsidies to expand energy access.**

Energy access is a capital-intensive sector. Solar home systems, micro-grids, and large-scale generation require upfront investments that are recovered over one, 10, or even 20 years. Unfortunately, the global energy access space has been limited in the amount of private capital it has been able to attract, with only 18 percent of 2013 investment coming from private sources.<sup>13</sup> This financing gap represents the largest single barrier to universal access.

Energy consumption is considered by many governments to be a critical sector for public support. Unfortunately, this support often takes forms that are economically regressive and climatologically unsustainable. Globally, the IEA estimates that governments spent US\$493 billion on fossil fuel subsidies in 2014, against \$135 billion in renewable energy subsidies.<sup>14</sup> These subsidies, although often meant to assist lower-income households, are in fact quite regressive: A 2010 IMF study of 20 countries showed that the top 20 percent of households by income captured 43 percent of the subsidies, compared to 7 percent in the bottom quintile.<sup>15</sup>

**POTENTIAL SOLUTION: Digitizing energy collections/receivables, existing energy subsidies, and exploring a shift to more progressive subsidies.** Digital payments have allowed off-grid providers to access private financing in ways that were unthinkable just a decade ago. In Kenya, Vulcan Impact Investing worked with PowerGen, a mini-grid company, and SteamaCo, which manages off-grid assets, to build and manage 10 micro-grids. Although SteamaCo is monitoring and facilitating payments, all revenue is routed directly to Vulcan's paybill account. Mini-grids can take up to a decade to achieve system payback, and so investors need security to make long-term investments.<sup>16</sup>

At the same time, digitization of energy subsidies can also enable more accurate targeting of recipients and monitoring to ensure intended recipients receive their payments on time and in full. Digitization can also prevent fraudulent or misdirected payments, delivering significant cost savings to governments. Shifting LPG subsidies to bank accounts in India cut transfer leakages by 24 percent, while providing access to cleaner cooking fuel.<sup>17</sup>



## Conclusions

By implementing targeted and progressive policies, including incorporating digital payments into energy access agendas, it is estimated that 150 million people annually can gain access to electricity by 2030, the minimum necessary for universal access, according to the International Energy Agency (IEA) and the World Bank.<sup>18</sup> At the same time, using digital payments to enable better access to cleaner forms of energy, and to improve the efficiency of energy use generally, can play a vital role in decoupling economic development from increasing greenhouse gas (GHG) emissions, as has been the clear but alarming trend accompanying improvements in living standards in recent decades.

Outcomes like this are critical not only to achieving SDG #7, but also to putting the world's energy consumption on a sustainable, inclusive, and equitable footing for the long term. In this respect, the role of digital payments and an inclusive digital payments ecosystem is one that merits very close attention as a set of policy tools that can help solve some of the world's most intractable environmental and developmental challenges.

## RECOMMENDATIONS

By taking the actions specified below the following actors can see immediate returns on investment, achieve important development goals, and lay the groundwork for more ambitious digitization of payments and services.

### **Large-scale utilities** looking to expand their customer base:

- Prioritize the digitization of collections as a means of improving operational efficiency
- Adopt prepaid meters tied to digital payments in order to dramatically improve cash flow position and allow lower-income households to access electricity
- Explore ways of financing connections, allowing households to pay over time

### **Private energy service companies** bringing modern energy to frontier customers:

- Embrace digital payments as a means of lowering operational costs and facilitating investment by securing revenue streams
- Leverage the customer data produced by digital payments to offer additional energy products and services, as well as other digital financial services that can expand economic opportunities

### **Governments** looking to achieve SDG #7:

- Facilitate collaboration between digital payment providers, utilities or energy service companies, regulators, and other stakeholders
- Emphasize off-grid, renewable solutions as a means of achieving universal access
- Explore the digitization of direct benefit transfers as a way of achieving more precise targeting around clean energy subsidies
- Work with regulators, the private sector, the development sector, and other stakeholders to foster digital financial services

### **Digital payment providers** looking to expand use cases:

- Recognize that the digitization of routine bill payments (as described in the Better Than Cash Accelerators report) has the potential to onboard new users to digital payment platforms and activate passive users
- Support utilities and energy service companies by providing adequate network, cash-in points, billpay integration, and technical support

### **Social and impact investors** looking to achieve maximum impact and return on investment:

- Provide risk capital to energy service companies that want to integrate digital payments into their business model
- Encourage potential investees and existing portfolio companies to adopt digital payments as a means of securing investments

## **The Better Than Cash Alliance Case Study Series**

The Better Than Cash Alliance case studies seek to highlight specific examples of shifts to digital payments by governments, companies, and international organizations. Each case study aims to provide insights for a wide audience on the factors that have helped or hindered the digitization process, and also present key results and benefits of the transition away from cash. We hope that readers will be able to adapt the lessons from these cases to their own contexts and local conditions.

## **Acknowledgments**

The author is grateful to the Better Than Cash Alliance for the opportunity to write this report, specifically Camilo Tellez, Angela Corbalan, Marjolaine Chaintreau, and Karen Newman. Thanks as well to CleanStart, especially Hee Sung Kim and Vincent Wierda for their helpful feedback and comments. Technical reviewers Jacob Winiecki and Samuel Choritz provided invaluable feedback. Lastly, multiple energy practitioners, particularly Dr. Sam Duby, Hugh Whalan, and John Foye, took time away from their extremely important work to fact-check key elements, share photos, and provide quotes. Their work and participation is highly appreciated.



## About CleanStart

UNCDF CleanStart is a global programme focused on getting low-income households and micro-entrepreneurs a jump-start on using clean energy. By 2020, CleanStart aims to have over 500,000 households and micro-entrepreneurs make the switch to clean energy, which translates into 2.5 million people benefiting altogether. To this end, CleanStart promotes access to finance across the energy value chain from customer to enterprise by investing in early stage, innovative business ideas from SMEs that have the potential to make a step-change in improving the accessibility, affordability, and reliability of modern energy for people, especially those at the last-mile. CleanStart contributes to achieving SDG 7 on affordable and clean energy for all.

[WWW.BETTERTHANCASH.ORG](http://WWW.BETTERTHANCASH.ORG)

## About The Better Than Cash Alliance

The Better Than Cash Alliance is a partnership of governments, companies, and international organizations that accelerates the transition from cash to digital payments in order to reduce poverty and drive inclusive growth. Based at the United Nations, the Alliance has over 50 members, works closely with other global organizations, and is an implementing partner for the G20 Global Partnership for Financial Inclusion.

BILL & MELINDA  
GATES foundation

