Digital Finance for the Real Economy: Energy

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Photo: Dominic Chavez / World Bank
Digital finance can help to achieve universal access to clean, affordable energy.

**Sustainable Development Goal No. 7:**
“Ensure access to affordable, reliable, sustainable and modern energy for all.”
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Progress on energy access has been insufficient

**992 million** people lack access to electricity worldwide\(^1\)

- **603 million** live in Africa
- **351 million** live in developing Asia
- **18 million** live in the Middle East
- **20 million** live in Latin America

650 million people will be in the dark by 2030—600 million in sub-Saharan Africa, most in **rural areas**. Universal access for these people will require distributed solutions\(^2\)
Energy access is a spectrum, not a binary: Quality matters

The Multi-Tier Framework for energy access helps households move up an “Energy Ladder”

As you move up the Energy Ladder, power becomes more reliable—there are fewer disruptions and unscheduled outages. Power also becomes available for longer periods of time. For example, a Tier 1 customer would have access to at least 4 hours of power during the day and 1 hour at night; a Tier 5 customer would have access to at least 23 hours of power during the day and 4 hours at night.
Energy poverty is a rural problem

Most of the energy-poor live in rural areas

84% of those without electricity live in rural areas

Cost to reach low-density, rural Africans with a traditional grid system

$2,500 per rural grid connection

Photo: Curt Carnemark / World Bank
“The belief was, you’d eventually build the U.S. grid here, but the U.S. is the richest country on earth, and it wasn’t fully electrified until the nineteen-forties, and that was in an era of cheap copper for wires, cheap timber for poles, cheap coal, and cheap capital. None of that is so cheap anymore, at least not [in Africa].”

—Xavier Helgesen, co-founder and CEO, Off-Grid Electric
Development Challenges in Energy

Decentralized or distributed systems are the most cost-effective ways to connect millions in rural areas

Unlike traditional, centralized electricity distribution and its high fixed costs, mini-grids and solar home systems (SHS) can be set up in remote areas and sized to meet demand.

Note: this is only an illustration and does not correspond to actual electricity connections

Share of new electricity customers worldwide by 2030 for whom decentralized/distributed systems will be the most cost-effective option
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3 ways digital financial services (DFS) increase energy access

Remote bill payment and prepaid energy

Pay-as-You-Go (PAYGo) financing

Innovative funding structures
The Role of Digital Finance in Universal Access

Smart meters—used with grid or mini-grid connections—combine digital bill payments and prepaid energy to **lower the cost of energy access**

Automated systems + No meter reading or billing + Real-time, remote collections = Low-cost, flexible, pro-poor service

**Utilities: Digital bill payments are crucial for cost recovery**

- of developing country energy sectors are not profitable

**Mini-grids: Smart meters combined with digital payments are...**

- “more cost-effective in terms of collections, but also substantially minimize the risk of non-payment”

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CGAP
The Role of Digital Finance in Universal Access

PAYGo solar: Asset financing enabled by 2 innovations

Digital Payments allow companies to sell to anyone who has mobile connectivity

Remote Lockout reduces portfolio risk by ensuring willingness to pay

Financed, Affordable Solar Home Systems

- Solar home system is purchased on credit, paid for over 12–36 months
- Customer makes a $10-30 deposit to acquire the asset
- Monthly payments of $8-$20 combine loan installments and use fees
- Flexible repayment adapts well to low-income cash flows
The PAYGo industry has raised unprecedented levels of venture funding for social enterprises in emerging markets. DFS have helped fuel growth by enabling off-balance-sheet financing structures.

$750M+ raised in past 5 years

Digital payments enable capital to flow into the distributed energy sector

**M-KOPA**

$55M syndicated commercial debt facility, secured on future receivables and M-KOPA’s bill pay account

**BBOXX**

2,500 PAYGo loans that Bboxx securitized into every Distributed Energy Asset Receivable (DEAR)

**VULCAN**

Funded construction of 10 microgrids in Kenya. All electricity revenue routed directly to Vulcan through mobile money platform
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PAYGo has a unique potential to advance financial inclusion. Its potential goes beyond energy—it is asset financing for poor households.

4 building blocks for a long-term financial relationship are in place at the end of a PAYGo loan:

1. Established digital payment channel
2. Remotely secured collateral for future lending
3. Rich consumer data on payment and use
4. Mutual trust between provider and client
PAYGo Solar: Energy and Finance Come Together

PAYGo and digital payments drive uptake and use of each other

To scale, PAYGo needs digital payment infrastructure. Energy is an important use case for mobile money (everyone pays for it); PAYGo can provide a tangible reason for people to start acquiring and using mobile wallets.

- **13%**
  - Fenix PAYGo customers new to MTN mobile money in Uganda

- **50%**
  - PEG Africa customers in Ghana who had never used mobile money until their PAYGo loan

- **20%**
  - Mobisol customers who registered for mobile money to acquire PAYGo in Rwanda

- **1.6 million**
  - Number of mobile money transactions PAYGo providers received in September 2016

PAYGo companies partner with, and receive preferential rates from, mobile network operators.
CGAP and PEG Africa (a PAYGo firm in West Africa) found that incorporating a human element into products can help older and less literate customers.

**Average revenue per user, by transaction type**

![Chart showing average revenue per user by transaction type for PEG and non-PEG customers. The average revenue per user of PEG customers was more than 2.2X that of non-PEG customers.](chart.png)
Remote lockout technology allows firms to offer consumer financing to a wider group of customers

The rise of asset financing in the developing world is partially enabled by the rapid proliferation of smart, connected devices that can report on use behavior and be turned on or off remotely.

Without lockout technology, no-file customers are too risky.

Lockout gives a lender something to “repossess”.

It is a strong incentive for on-time repayment.

All of which can reduce the probability of default.

Same technology allows providers to extend other, nonsolar loans.
• CGAP worked with Fenix (a Uganda-based PAYGo company) to develop an education financing product.

• Households borrowed for a term’s school fees, then could pay off over the next 100 days.

• If they missed a school fee payment, their lights went out.

• Percentage of households selling assets prematurely to pay school fees fell from 46% to 20%.19
PAYGo Solar: Energy and Finance Come Together

Lockout technology is key to offering truly flexible finance

• A 12-month PAYGo loan for an SHS is a commitment to buy 365 energy “days.”
• PAYGo loans have no accumulated arrears and no compounded interest.
• Poor households use this to buy 4–6 days a week, lowering the effective price.
• Providers have enough data that they can price the loan for the average completion term. Fast repayers subsidize the slow ones.20

The “Adapter” starts off slow, but catches up by paying more than the minimum when possible. The loan is paid off on time, and the power is on most of the time.

The “Stretch Flex” puts money toward the loan when possible. It takes longer to pay off the loan, and the power is on when the payments are made, but the total amount of the loan never changes.
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Other types of assets can leverage lockout technology to offer PAYGo service

Liquefied Petroleum Gas is likely the next key PAYGo asset class in Tanzania and Kenya (Kopa Gas and PAYGo).

Both will receive funding and distribution help from energy players (Shell, Total, Oryx).

Subscription model

“Smart valves” disburse gas when a customer makes payments

Sensor alerts the agent for swap-out when tank is running low
Payment and use data make future underwriting easier

PAYGo customers/units generate a lot of valuable data that providers can use to segment customers. This allows providers to underwrite additional loans, using lockout technology to incentivize repayment.

By April 2018, M-KOPA had financed

**630K solar units**

Using repayment data to score customers, it had also made

**170K follow-on loans** for TVs, phones, water tanks, cook stoves, and bicycles\(^2\)
PAYGo Solar: Energy and Finance Come Together

Customers value the relationship with their PAYGo providers\(^\text{22}\)

CGAP and FIBR conducted demand-side research to understand customer value in PAYGo

- **4** providers in the study
- **138** households interviewed
- **4** countries represented

Customers take enormous pride and pleasure from having energy in-home

Most customers have a strong trust in providers

Lower-income customers were not saving money by switching to solar, disproving an early hypothesis

Most repay their loans by tapping additional income sources or savings

Customers feel it is good value for money and would recommend the loan to others

**Bottom Line**

These customers have been **historically underserved**, and they appreciate that PAYGo companies trust them.
“The solar has benefits and there is a saying that everything good is worth the price.”
— PEG Africa Customer, Ghana

“You can be given something but the way you are talked to will either make you want to pay for it or not. They have good language and are not abusive. The way they talk to us makes me feel like I just have to pay. After all, it is helping us, and we are using it.”
— M-KOPA Customer, Kenya
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While the sector shows enormous potential, its future is uncertain and several barriers need to be addressed.

**Headwinds**

- Lack of transparency, benchmarking, harmonized metrics
- Dearth of local currency debt
- Falling sales in Kenya, Ethiopia
- Lack of digital finance infrastructure
- Internal incentives lean toward growth over sustainability
PAYGo and the Future of Asset Finance

PAYGo has grown rapidly; it could saturate key markets\textsuperscript{24}

Although SHS sales continued to grow in 2017, it declined by 25\% in Kenya. More than half of the off-grid population has been reached, and current market-based solutions will not be affordable for poorest customers, requiring innovative subsidies or new business models to achieve universal access.

**Percentage of the off-grid population with access to electricity through off-grid solar systems (2017 estimates)**\textsuperscript{25}

- **Kenya**: 51\%
- **Tanzania**: 50\%
- **Uganda**: 22\%
- **Ethiopia**: 20\%
- **Bangladesh**: 13\%

**9 million households** are in areas where the electric grid does not reach or is unreliable.

**17 million households** are in areas where the electric grid does not reach or is unreliable.
Emerging opportunities and key messages

In new markets, low penetration of DFS in rural areas may force companies to adopt new strategies.

Recent acquisitions and debt raises will allow PAYGo providers to expand more rapidly into new markets like Nigeria, Zambia, Ethiopia, Mali, and Mozambique. As the sector expands, providers will need to teach customers how to make mobile payments using smartphone apps or feature phone USSD apps to ease the transition to mobile money.

- Mobisol is financing smartphones for $0.08 a day in Rwanda
- Preload intuitive payment application

As more difficult DFS markets make up a larger percentage of sales and as portfolio quality becomes a key differentiator, the role of PAYGo agents will become increasingly integral to success.

Companies are shifting to a localized agent model to:

- Encourage repayment through more frequent interactions
- Help customers overcome payment frictions, e.g., by becoming a licensed mobile money agent
PAYGo and the Future of Asset Finance

PAYGo firms are vertically and horizontally integrated companies—a combination of a durable goods retailer and a lending institution.\(^{28}\)

Joining dissimilar operations has enabled unprecedented success, but it may also impede scale.
PAYGo and the Future of Asset Finance

3 basic models to achieve synergies between energy and finance

Solar company acquires deposit-taking license

**PAYGo-led:** Solar Bank

**Bank/MFI-led:** Solar Affiliate

**Joint venture**
PAYGo and the Future of Asset Finance

PAYGo-led model can draw on lessons from retail banking in Latin America\textsuperscript{29}

**Grupo Elektra in Mexico**

- Has potential precedent\textsuperscript{1}
- Durable goods retailers acquired banking licenses
- Mobilized deposits provided financial service to lower-income segments

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<th>Pre-Bank, 2002</th>
<th>Post-Bank, 2014</th>
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<td>Long-term loans</td>
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<th>Cost of funds (interest expenses/liabilities)</th>
<th>Pre-Bank</th>
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<td></td>
<td>14.2%</td>
<td>1.3%</td>
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<td>Decrease of 91%</td>
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PAYGo and the Future of Asset Finance

Bank- or MFI-led model: Financial institutions with PAYGo affiliates

What Baobab is doing

Established MFI (MicroCred Group) sees PAYGo as a way to reach a new customer segment

What Baobab wants

Creates asset distribution company (Baobab Plus) to sell valued assets like PAYGo solar to low-income customers

Much lower cost of funds, lower price point than existing PAYGo

Entry point for new customers; migrate successful ones to MFI

Other financial institutions—FINCA, Equity Bank, Musoni, etc.—are following a similar path. They have expertise in risk assessment, portfolio management, and matching assets and liabilities. Can they compete with PAYGo companies on product, distribution, and service?
**PAYGo and the Future of Asset Finance**

**Joint Venture Approach: PAYGo/bank partnerships**

**Initial Transaction**
- Bank pays PAYGo retail cost of solar unit
- Bank provides loan directly to customer
- PAYGo provides SHS to customer

Customer repays loan to bank; PAYGo may act as collection agent.

**Loan Servicing**

This approach has proven successful in many markets.

Issues may need to be resolved around:
- loan servicing
- moral hazard
- customer ownership
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Monitor developments that could help scale digital finance-powered solutions to energy access gaps

- More decoupling of the PAYGo solar business model, as financing becomes increasingly outsourced
- Stronger focus on managing credit risk for PAYGo solar providers
- More countries adopt digital finance; it is incorporated into new business models
PAYGo solar business models will become increasingly decoupled as companies seek to outsource financing while maintaining the customer relationship.

Companies that outsource financing to financial institutions via securitization can focus on core competencies to grow.

This trend follows a similar decoupling on the product/software side: new PAYGo firms don’t create hardware, they distribute existing technology.

Success of experiments hinge on the ability to isolate loan servicing from product servicing.

As financing is split off, there will be fewer incentives to make high-quality sales. Moral hazard is something to watch.
What’s Next

Credit risk management: PAYGo providers must demonstrate they can distribute energy solutions AND get paid for them

The potential of PAYGo solar to address energy access has allowed the sector to raise huge sums of debt in a relatively short time.

However, this debt and its inherent growth commitments are forcing companies to add clients who are less likely to repay.

Recalibration is necessary (and rescheduling likely) to create more sustainable lending operations.

Recalibration includes a greater focus on screening out bad payers, internal structures to manage risk, and adequately pricing risk when raising debt.

These concerns may drive many providers up-market.
What’s Next

Digital finance-enabled businesses will pop up in new geographies and new sectors.

PAYGo models are already tested and starting to scale in new energy subsectors such as productive appliances (solar water pumps, biogas digesters) and LPG cookstoves.

The models are also poised to expand into critical new geographies such as Nigeria and Ethiopia, which recently have taken steps to adopt DFS.
By 2016, Codensa had lent **$1 billion** to **1.2 million** customers

**96%** customers in lower-income strata

Payments made through utility bill

**77%** customers for whom Credito Facil was first formal credit

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**Codensa**

**What's Next**

Utilities and mini-grids may adapt digital finance-based, PAYGo-style financing for on-grid assets

**Introduction**

Codensa was the electric utility for the city of Bogota

**Challenge**

With increasing competition, it needed to retain clients

**Solution**

It established Credito Facil to finance appliances and consumer goods

**Solution Refined**

Credito Facil had been on Codensa's balance sheet, but eventually partnered with a bank

Source: Manaus Consulting, 2016
There remains great potential to expand the use of digital finance in the energy sector, starting with utilities.

In the 2017 Findex, over half the adults in low- and middle-income countries reported paying a utility bill. Of those, **two-thirds paid using only cash**.

Energy utilities are still the primary way to access electricity. Digital finance can help them to reduce their costs, as seen in Uganda and elsewhere.

Policy makers and digital finance providers are leaving financial and energy access gains on the table if they do not digitize collections.
Thank you  
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References


References, continued


