

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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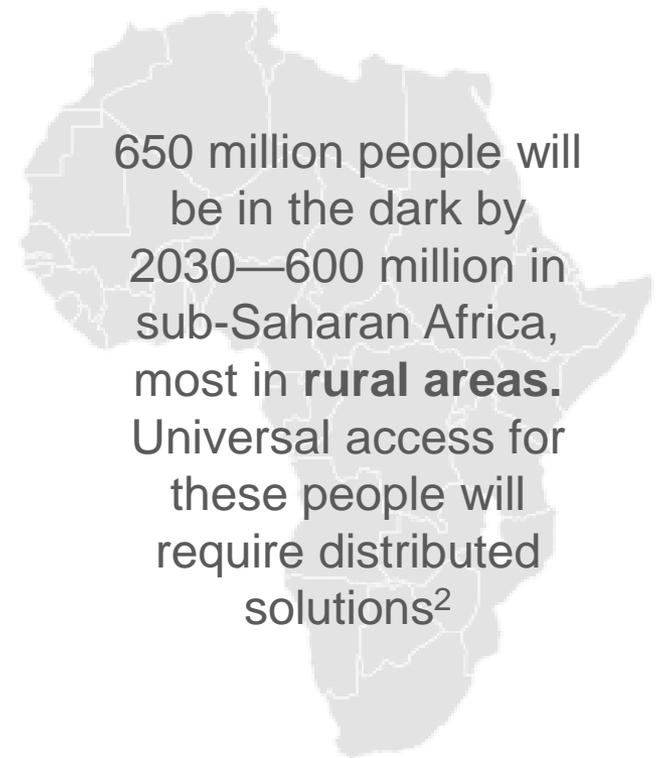
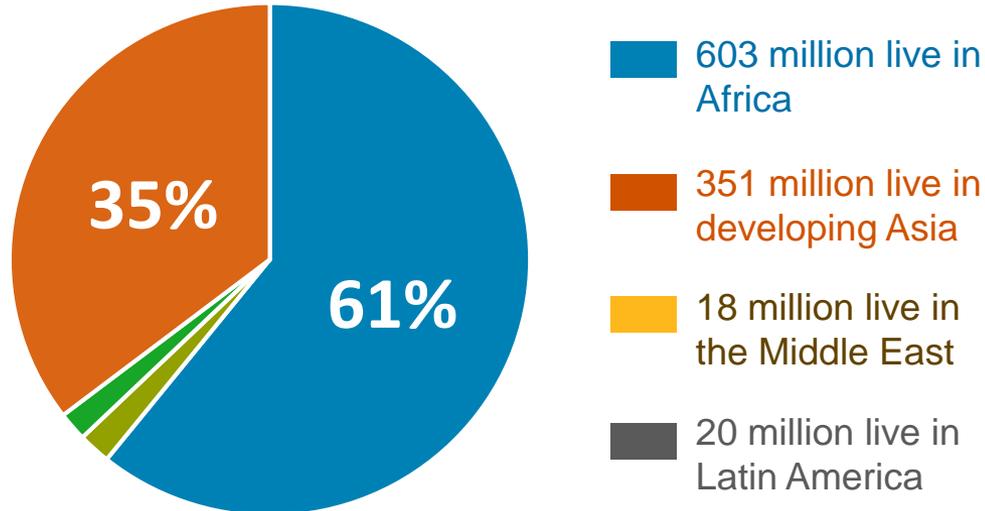
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Development Challenges in Energy

Progress on energy access has been insufficient

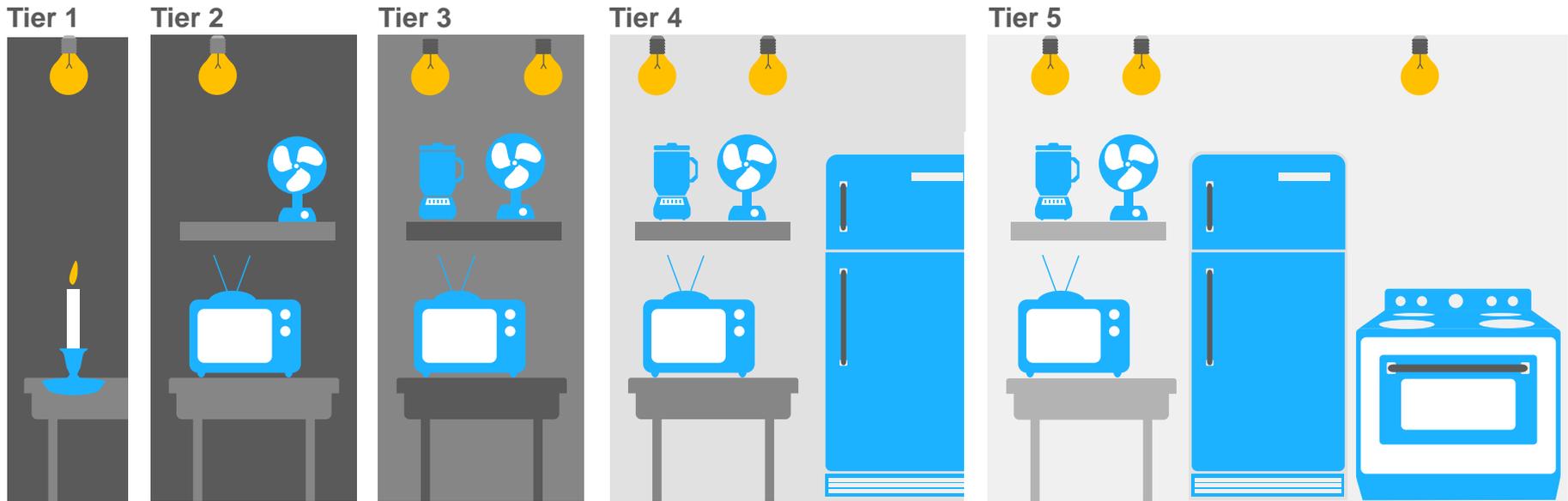
992 million

 people lack access to electricity worldwide¹

Development Challenges in Energy

Energy access is a spectrum, not a binary: Quality matters

The Multi-Tier Framework for energy access helps households move up an “Energy Ladder”³



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.

Development Challenges in Energy

Energy poverty is a rural problem

Most of the energy-poor live in rural areas

84% of those without electricity live in rural areas⁴

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

\$2,500 per rural grid connection⁵

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].”⁶

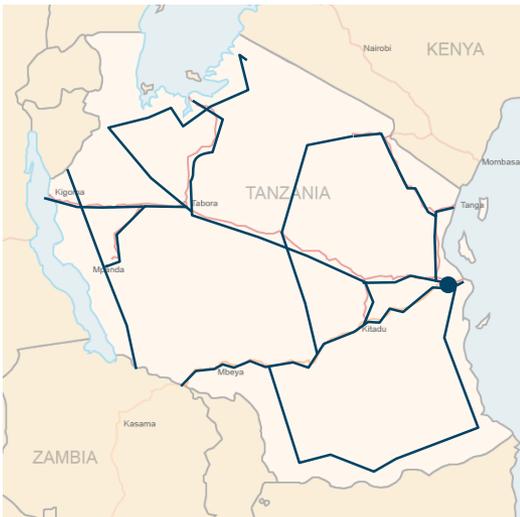
—Xavier Helgesen, co-founder and CEO, Off-Grid Electric

Development Challenges in Energy

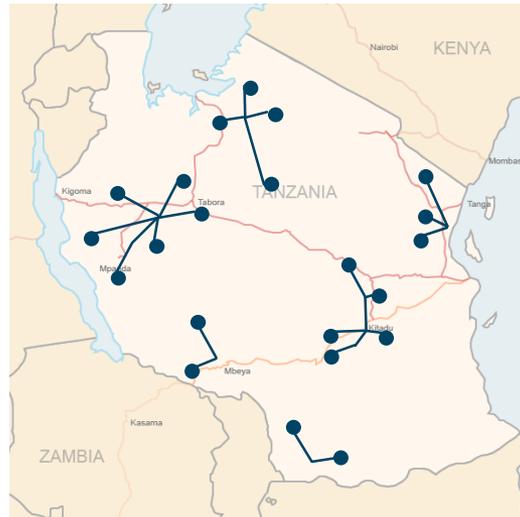
Decentralized or distributed systems are the most cost-effective ways to connect millions in rural areas

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.

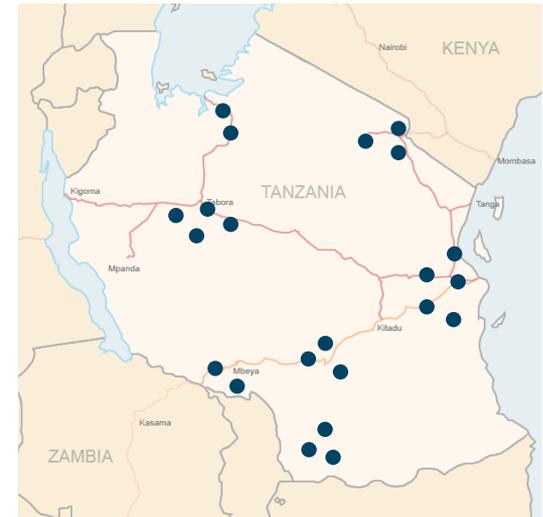
Centralized



Decentralized



Distributed



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

70%

Share of new electricity customers worldwide by 2030 for whom decentralized/distributed systems will be the most cost-effective option⁷

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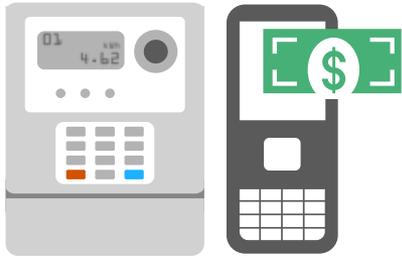
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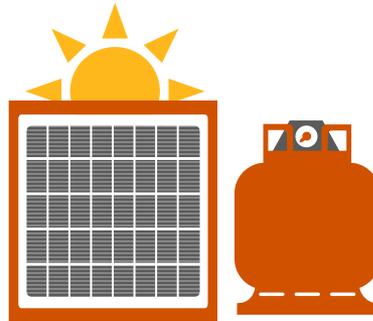


The Role of Digital Finance in Universal Access

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

+



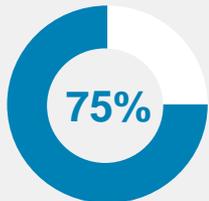
Real-time, remote collections

=



Low-cost, flexible, pro-poor service

Utilities: Digital bill payments are crucial for cost recovery



of developing country energy sectors are not profitable⁸

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”⁹



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 Role of Digital Finance in Universal Access

Digital payments enable capital to flow into the distributed energy sector



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 years¹⁰

M-KOPA

\$55M

syndicated commercial debt facility, secured on future receivables and M-KOPA's bill pay account¹¹



BBOXX

2,500

PAYGo loans that Bboxx securitized into every Distributed Energy Asset Receivable (DEAR)¹²

VULCAN

Funded construction of 10 microgrids in Kenya. All electricity revenue routed directly to Vulcan through mobile money platform¹³



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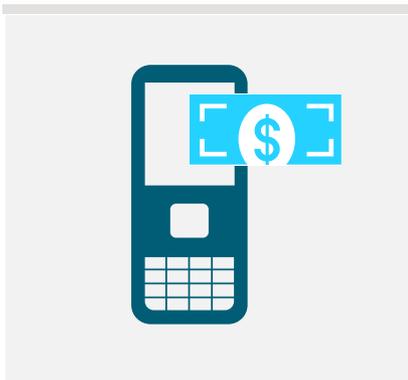


PAYGo Solar: Energy and Finance Come Together

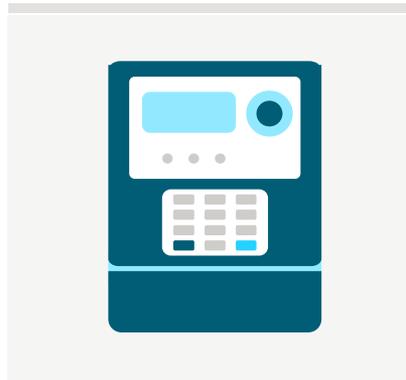
PAYGo has a unique potential to advance financial inclusion. Its potential goes beyond energy—it is asset financing for poor households.

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

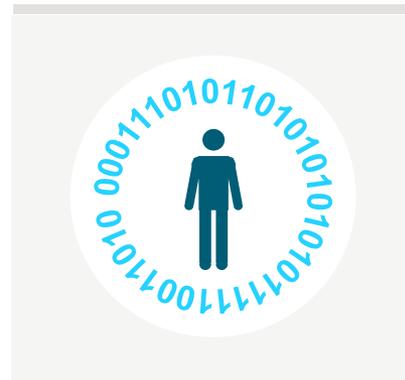
1 Established digital payment channel



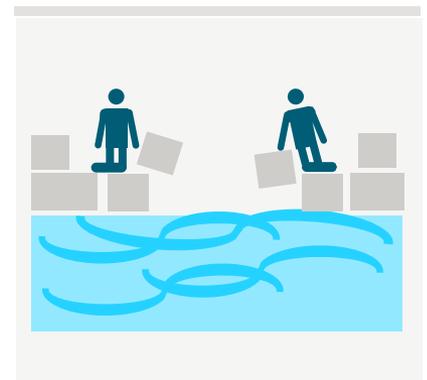
2 Remotely secured collateral for future lending



3 Rich consumer data on payment and use



4 Mutual trust between provider and client

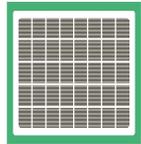




PAYGo Solar: Energy and Finance Come Together

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



PayGo



DFS



13%

Fenix PAYGo customers new to MTN mobile money in Uganda¹⁴

50%

PEG Africa customers in Ghana who had never used mobile money until their PAYGo loan¹⁵

20%

Mobisol customers who registered for mobile money to acquire PAYGo in Rwanda¹⁶



PAYGo companies partner with, and receive preferential rates from, mobile network operators

1.6 million

Number of mobile money transactions PAYGo providers received in September 2016¹⁷

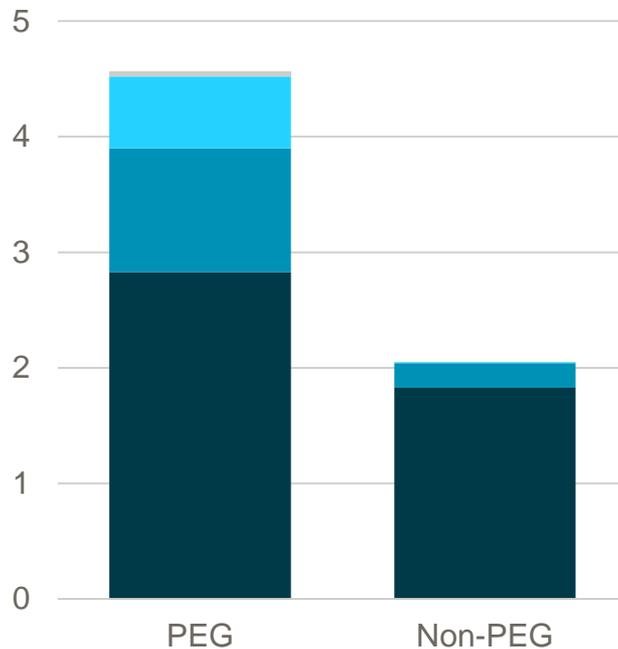


PAYGo Solar: Energy and Finance Come Together Digital Payments— PEG Africa

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

■ Cashout ■ Transfer ■ Payment ■ sTransfer



The average revenue per user of PEG customers was more than

2.2X

that of non-PEG customers¹⁸

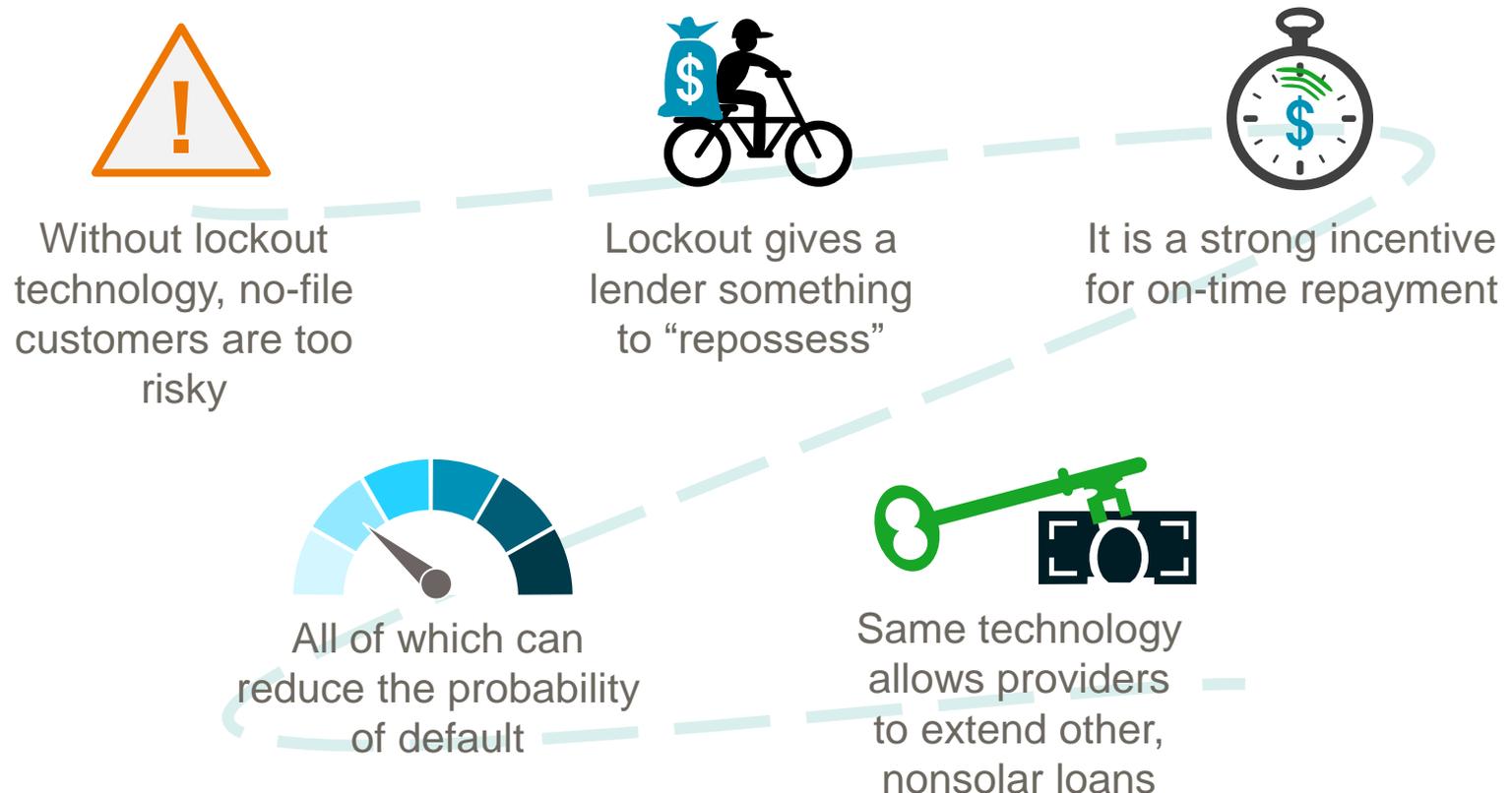




PAYGo Solar: Energy and Finance Come Together

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





PAYGo Solar: Energy and Finance Come Together

Repeat Financing— Fenix International



Photo: Fenix International

- 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**

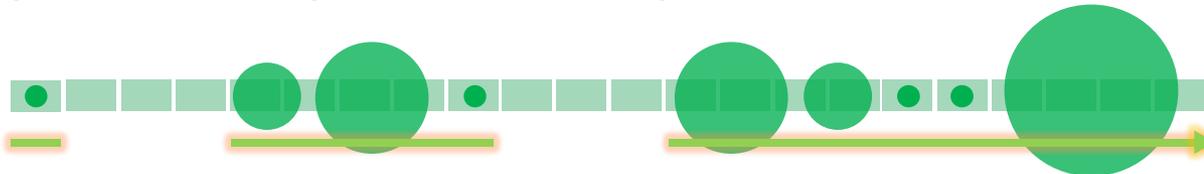


PAYGo Solar: Energy and Finance Come Together

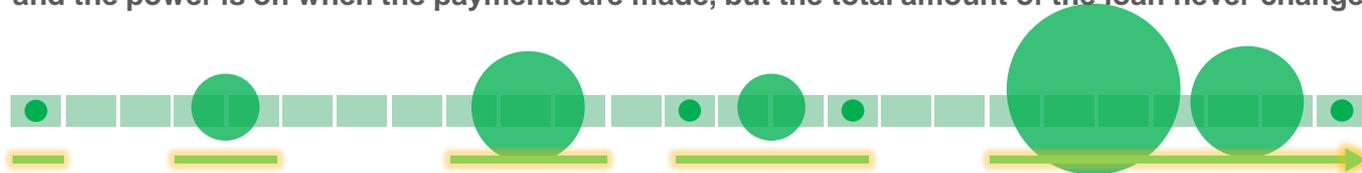
Lockout technology is key to offering truly flexible finance

- 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.



■
payment
is due

●
payment
is made

→
power
is on

┆
loan is
paid off



PAYGo Solar: Energy and Finance Come Together

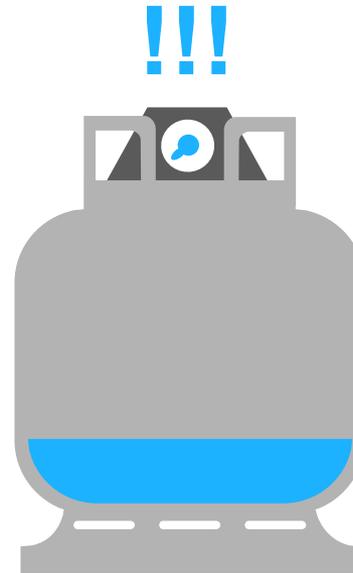
Other types of assets can leverage lockout technology to offer PAYGo service

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



PAYGo Solar:
Energy and Finance Come Together

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 bicycles²¹



PAYGo Solar: Energy and Finance Come Together

Customers value the relationship with their PAYGo providers²²

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, Kenya²³

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Photo: © Photo by Kevin Di Salvo

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

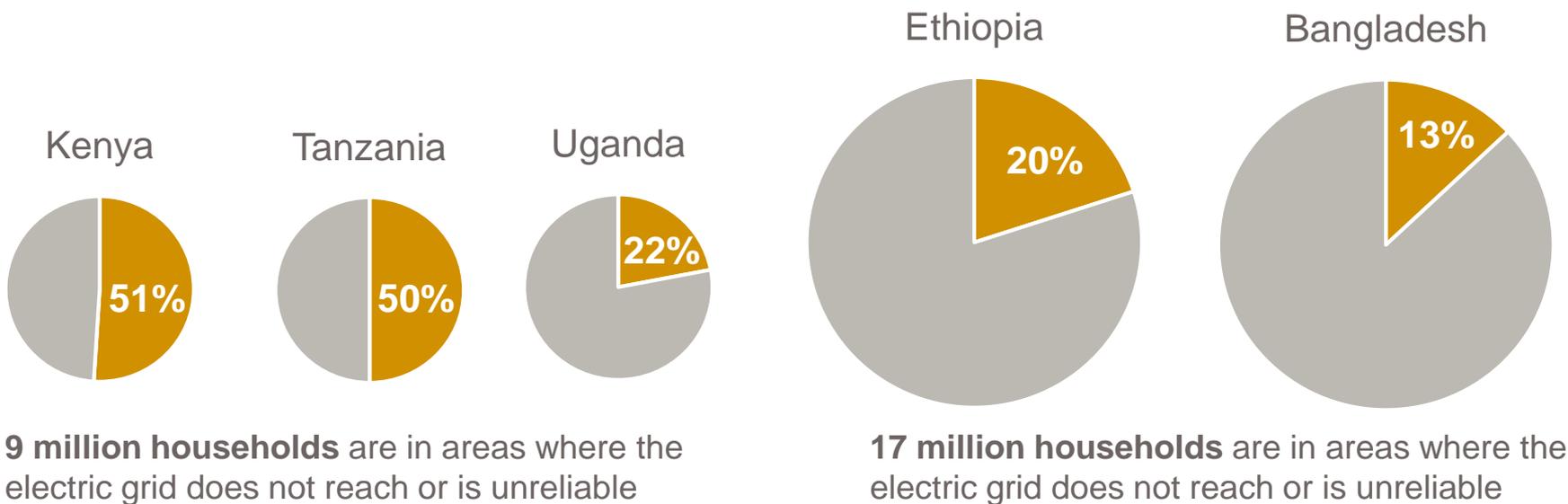
Lack of digital finance infrastructure

Internal incentives lean toward growth over sustainability

PAYGo has grown rapidly; it could saturate key markets²⁴

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)²⁵



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 Rwanda²⁶
- Preload intuitive payment application



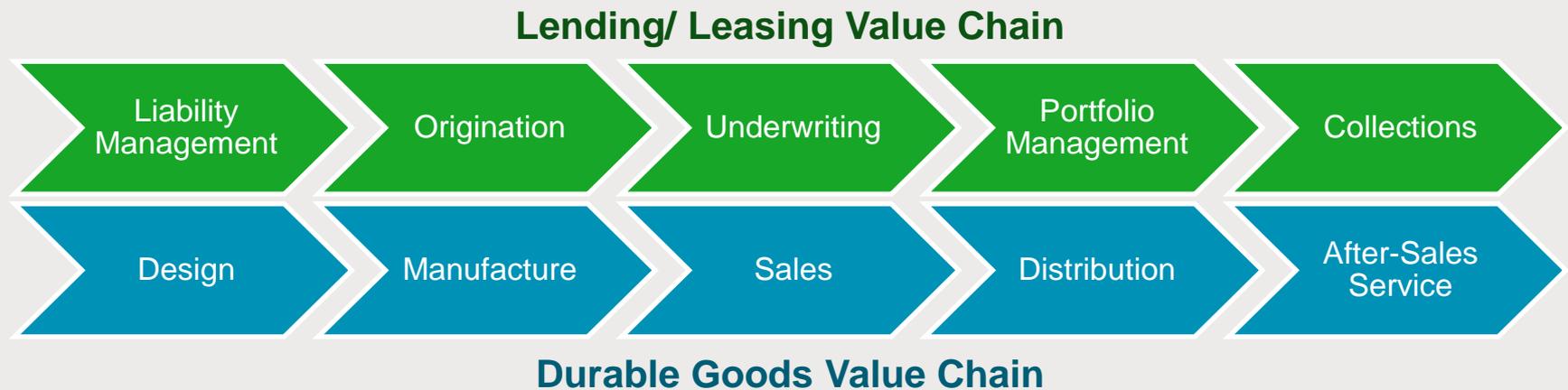
As more difficult DFS markets make up a larger percentage of sales and as portfolio quality becomes a key differentiator, the role of PAYGo agents will become increasingly integral to success.

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 agent²⁷

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 America²⁹

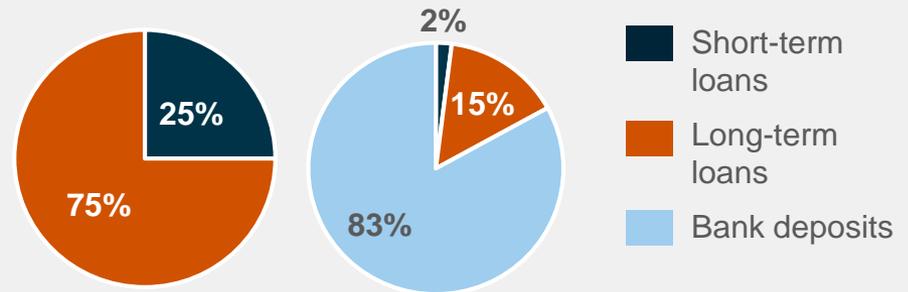
Grupo Elektra in Mexico

- Has potential precedent¹
- Durable goods retailers acquired banking licenses
- Mobilized deposits provided financial service to lower-income segments

Funding sources

Pre-Bank, 2002

Post-Bank, 2014



Funding amount, in millions US\$ (loans + deposits)

Pre-Bank

\$350

Post-Bank

\$7,893

Increase of 20X

Cost of funds (interest expenses/liabilities)

Pre-Bank

14.2%

Post-Bank

1.3%

Decrease of 91%



PAYGo and the Future of Asset Finance

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

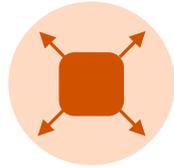
What Baobab is doing



What Baobab wants



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



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



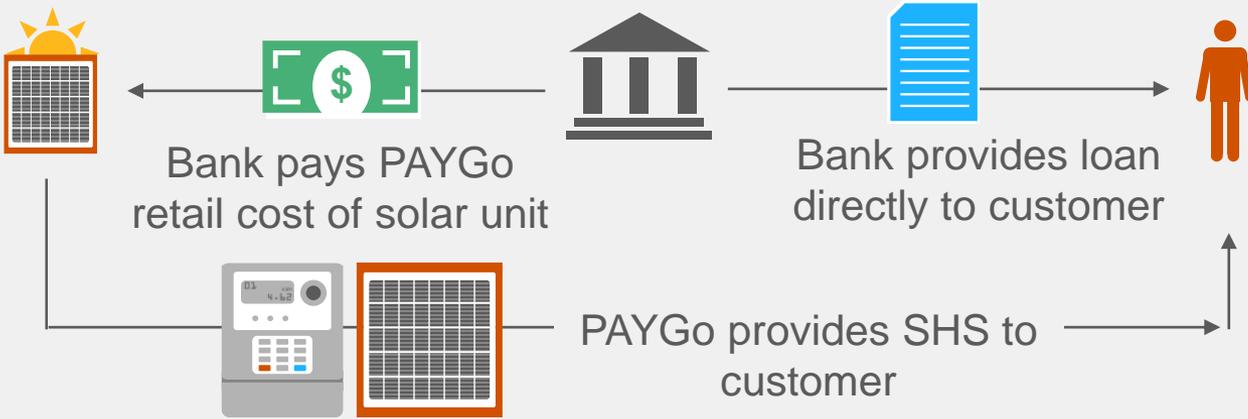
Entry point for new customers; migrate successful ones to MFI

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?



Joint Venture Approach: PAYGo/bank partnerships

Initial Transaction



Issues may need to be resolved around:

loan servicing

moral hazard

customer ownership

This approach has proven successful in many markets

Loan Servicing

Customer repays loan to bank



or

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



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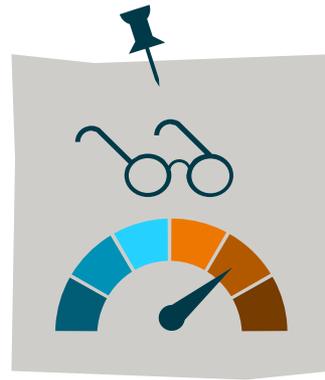
Photo: Dave Lawrence / World Bank

What's Next

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

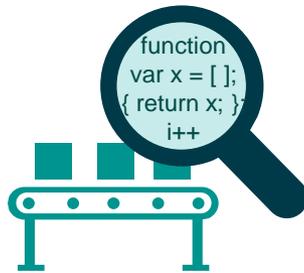


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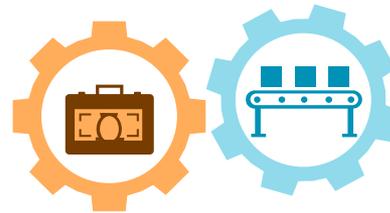
PAYGo solar business models will become increasingly decoupled as companies seek to outsource financing while maintaining the customer relationship



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.

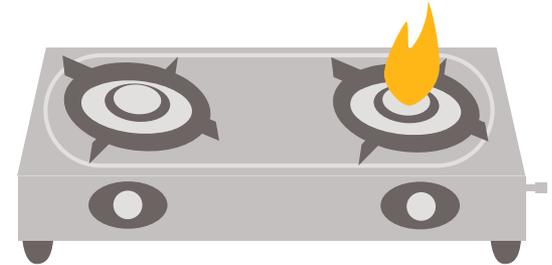
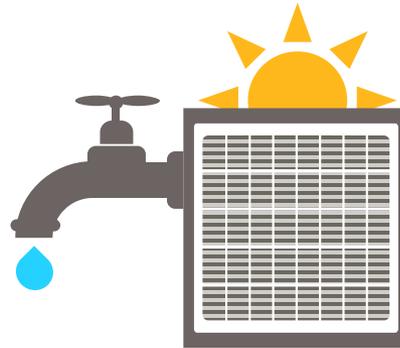




What's Next

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



What's Next

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

Codensa³⁰

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

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



What's Next

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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