Going greenfield with utility pay-as-you-go models:

Enabling access to water, sanitation and energy in and beyond East Africa

DECEMBER 2017

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Image courtesy of PEG

1. Introduction

This report is a follow-on to the GSMA Mobile for Development (M4D) Utilities report, "Lessons from the use of mobile in utility pay-as-you-go models". Here, we focus on the opportunities and challenges involved in replicating pay-as-you-go (PAYG) mobile-enabled solutions in "greenfield"[1] markets, which we define in this report as new geographies for PAYG solar lighting solutions beyond East Africa, as well as new sectors for PAYG service models beyond solar, such as water, sanitation, cooking and solar irrigation.

In the off-grid energy sector, the PAYG solar model has enabled affordable and sustainable access to clean energy. By overcoming affordability, access, quality and payment challenges, it has supported clean energy solutions since the early 2010s. Mobile channels have played a role in four key ways:

- **enabling remote payment collection** through mobile money or other mobile payments;
- **updating and controlling PAYG-enabled assets or services** through Machine-to-Machine (M2M) (i.e. long-range technology such as GSM or shorter range, such as Zigbee) or keypad;
- **enabling communication between service providers, customers and local agents** through mobile devices and services such as SMS or mobile apps; and
- **supporting service providers** through mobile operator assets, such as sales networks, logistics support, warehousing, after-sales support, branding and marketing.

While affordability is the biggest challenge PAYG models have overcome, the ease of two-way communication through M2M technology and customer service and maintenance (if delivered well), can also strengthen customer confidence in a product, encouraging adoption and more active usage. Mobile money usage not only helps to reduce the costs of collecting payments, but also to collect meaningful data, shining a light on consumer behaviour and creditworthiness for PAYG suppliers. Driven by advancements in technology, falling solar hardware prices, expanding mobile networks, mobile money and M2M penetration, GSMA M4D Utilities estimate that global PAYG solar sales have increased six-fold in the last three years from nearly 260,000 units in 2014 to nearly 1.6 million units by 2017.

Most of this growth has been concentrated in East Africa, where the success of mobile money and a conducive business environment have provided a breeding ground for early uptake of PAYG solar services. We discussed this and role of mobile connectivity, mobile money and IoT in enabling PAYG services in our recent report -

1. The term "greenfield" was originally used in construction and development to describe land that has never been used (e.g. green or new), where there was no need to demolish or rebuild any existing structures. Today, the term "greenfield project" is used in many industries, including software development, where it means to start a project without the need to consider any prior work. This is used in contrast with the term "brownfield", which refers to starting a project based on prior work or to rebuild (engineer) a product based on an existing one.

Lessons from the use of mobile in utility pay-as-you-go models. The PAYG providers are actively working to replicate the East African success in other regions and sectors. However, replication can be challenging in more complex market environments where providers need to adapt their payment collection methods, educate customers in digital financial tools and rethink their last-mile distribution strategy.

In partnership with the UK Department for International Development (DFID), the GSMA M4D Utilities programme has provided funding to 42 organisations in 21 countries since 2013, most of which are looking to test and scale mobile-enabled PAYG models. Over the years, our Innovation Fund has increasingly broadened its focus from PAYG solar in East Africa to PAYG in greenfield markets. In this report, we share some of our grantees' stories and lessons, which highlight the innovative PAYG utility models in greenfield markets.

FIGURE 1 Source: GSMA M4D Utilities

PAYG utility models in greenfield markets

Brownfield - Previously tested business models

Greenfield - Emerging areas for trialling new business models

Note: This list is neither representative nor exhaustive

2. PAYG in greenfield markets: the opportunities

2.1. PAYG solar: taking the sun from east to west

In the last two years, PAYG solar solutions have expanded their global footprint and now reach more than 37 countries, including 25 countries in sub-Saharan Africa. We estimate that by June 2017, PAYG solar sales[2] exceeded 1.6 million globally with the majority of sales in East Africa. Led by M-KOPA, Off-Grid: Electric, Fenix and BBoxx, Kenya, Tanzania, Uganda and Rwanda account for most of these sales. However, the share of PAYG solar home systems sold outside East Africa is increasing and now represents 17 per cent of systems installed by mid-2017 (up from eight per cent in 2016).

PAYG sales in West Africa have increased over five-fold over the last year, with over 170,000 PAYG systems sold in 2017. The region has become a hotspot for providers looking to be the first entrants in greenfield markets. For instance, Fenix International, which has sold more than 130,000 units across East Africa, is now scaling its operations to West and Southern Africa. Building on its relationship with pan-African mobile operator, MTN, it is targeting close to one million new users in Zambia over the next three years. BBOXX is also expanding its operations, through licensing and direct entry, to other parts of Africa and Asia, including DRC, Togo, Nigeria and Pakistan.

In South Asia, we estimate over 40,000 PAYG systems have been sold in 2017, mainly in India and Pakistan. Some markets such as Bangladesh have also seen relatively higher penetration of solar systems sold outright.[3] However, despite large addressable markets, the complexity of doing business in some South Asian markets have meant PAYG models have not been as widely adopted. First, subsidy programmes have helped to achieve current levels of solar sold outright, but ongoing subsidies in some markets have made it difficult for businesses to grow and sell larger assets on PAYG. Second, as in West Africa, many South Asian markets do not have mature mobile money ecosystems and depend on over-the-counter transactions rather than customers using their own wallets, which can inhibit regular customer repayment. Third, South Asian markets may have a higher prevalence of affordable substitute products, or higher use of car batteries. Accurately sizing a range of consumer products can also be a challenge given variable temperatures in the region, the impact this has on batteries and consumer demand for fans. Moreover, high electrification rates, even if electricity is unreliable, make it difficult to build a compelling case for such services. All of this has slowed the growth of PAYG solar in the region.

2. GSMA M4D Utilities estimates, based on the volume of solar home systems sold on a PAYG basis, including systems from 4W to 200W+ (either under a lease-to-own and solar-as-a-service model) through our grantees and other players.
3. Global Off-Grid Lighting Association, 2017, Global Off-Grid Solar Market Report Semi-Annual Sales and Impact Data, January to June 2017

FIGURE 2 Source: GSMA M4D Utilities estimates

Share of total PAYG sales by region

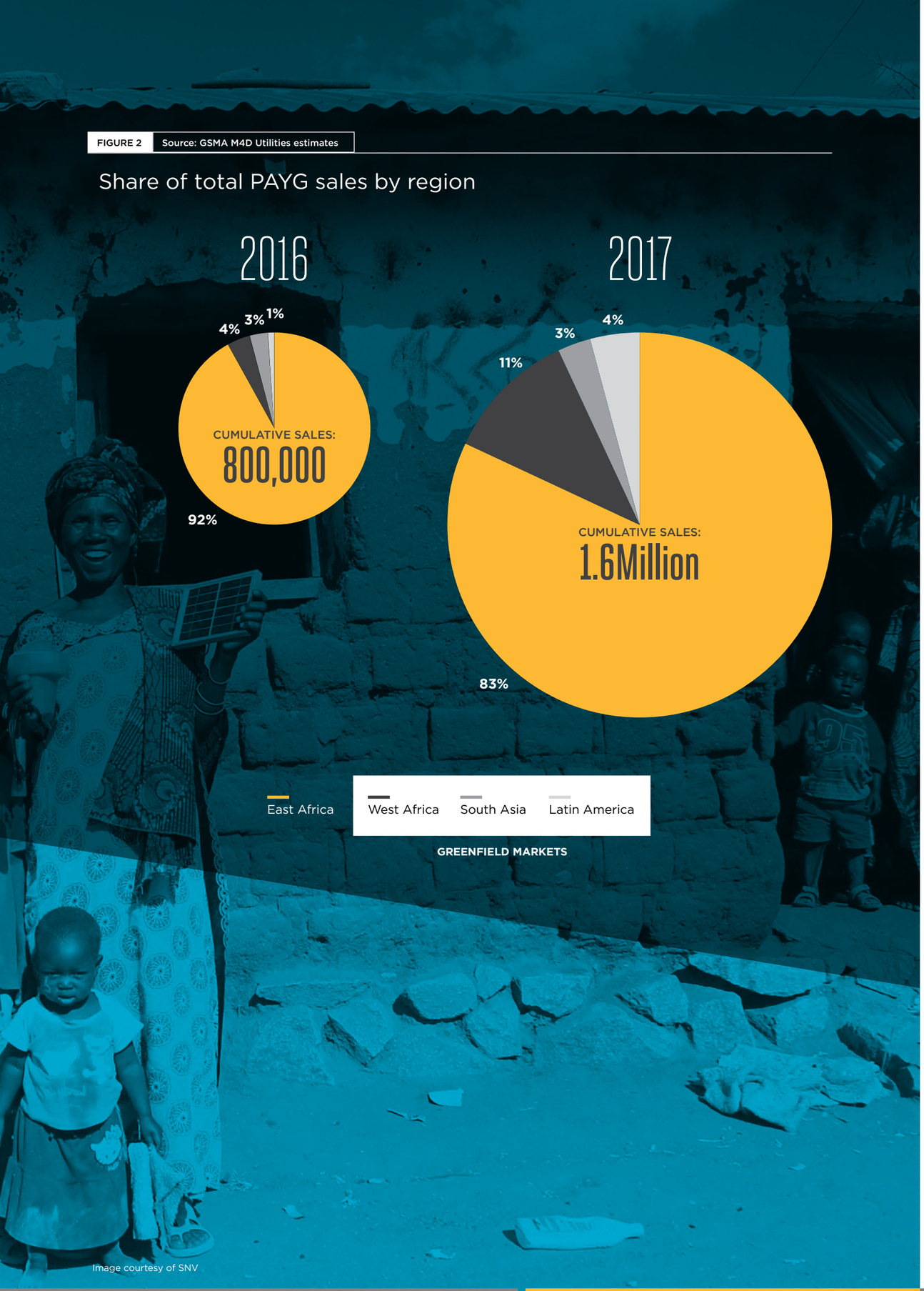


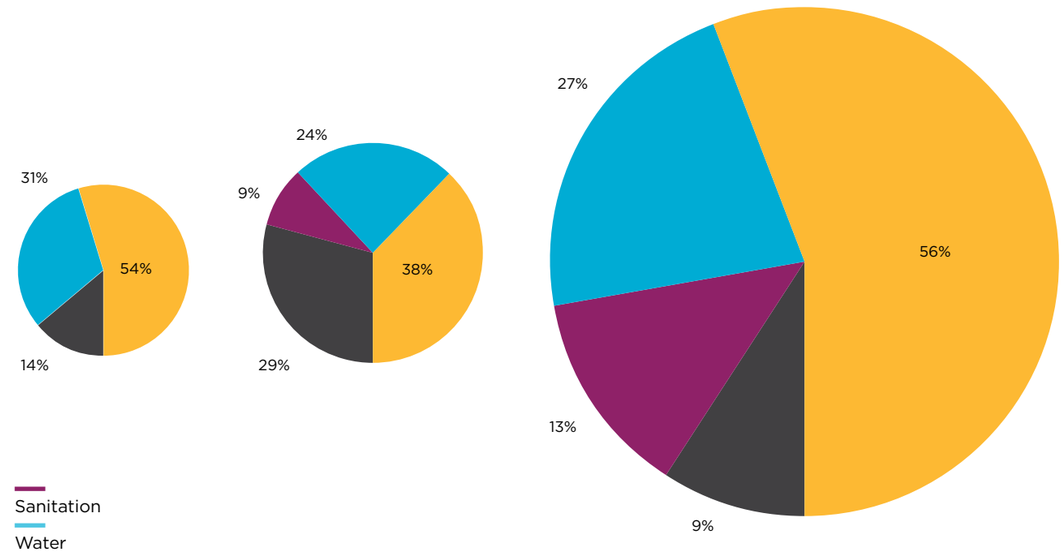
Image courtesy of SNV

2.2. Beyond solar: opportunities to replicate PAYG in other utility services

The success of PAYG solar in East Africa has encouraged other sectors to replicate the model, from water and sanitation to irrigation and energy. Over the three phases[4] of our Innovation Fund, the total number of applications (both PAYG and non-PAYG) not only have tripled, indicating growing entrepreneurial interest in mobile-enabled utility access, but applications from the water and sanitation sectors have also risen sharply. Clearly, entrepreneurs are seeing opportunities beyond the solar sector and beyond East Africa. It is worth noting that Nigeria accounted for the highest number of applications in the latest round of Innovation Fund applications, and more applications came from Ghana, Senegal and Zambia, while nearly 25 percent of applications came from Asia.

FIGURE 3 Source: GSMA M4D Utilities

Analysis of concept notes received by the GSMA M4D Utilities Innovation Fund (2013–2017)



4. GSMA M4D Utilities Innovation Fund Phase 1 (2013–2015), Phase 2 (2015–2017) and Phase 3 (2017–2020)

Using the same functionalities as used for PAYG solar systems (mobile payments, M2M and mobile services, new models at an early stage of commercialisation include energy access beyond electricity such as cooking, solar-powered irrigation and in other sectors such as water and sanitation. We briefly discuss some of the sectors where PAYG is gradually gaining momentum in these sectors below and highlight experiences and learnings from some of our grantees and others.

Water: Of all the sectors outside solar lighting, PAYG business models have shown the most promise with pre-paid clean water access. According to a recent CGAP brief,[5] there are at least four use cases for digital financial services that are catalysing new water service delivery models: water bill payments (both pre-paid and post-paid), pay-as-you-drink (public pre-paid water access through water ATMs or pre-paid household meters), digital credit to offset connection costs and the transfer of government subsidies through digital channels.

One of our grantees, Africa Water Enterprises (AWE) in partnership with eWater[6] has designed eWATERtaps, a low-power solar device that turns on a water supply and dispenses water. These taps operate on any communal water system with a piped flow. To access water, customers pre-pay via mobile money or an agent, using an app to add credit to their account. They then swipe their NFC tag on the solar-powered tap reader to get as little or as much water as they need, and credit is deducted from their account per litre dispensed. The system is also equipped with a GSM module for remote monitoring. So far, with support from the GSMA M4D Utilities Innovation Fund, eWater has installed about 130 eWATERtaps in The Gambia and with support from DFID is now expanding to more African markets, including Tanzania, where its customers can pay for water using mobile money accounts.

Another GSMA grantee, Safe Water Networks (SWN) developed a mobile app to track service and maintenance at their stations where water was treated and dispensed. Working in partnership with Vodafone Ghana, upon introduction from the GSMA, SWN is piloting mobile money integration into water sales to improve financial viability in safe water services delivery. Additionally, the SWN team is currently quantifying the impact of 100 mobile money enabled pre-paid smart meters for household connections.[7] The smart meters enable mobile pre-payment for water, improving operational efficiency in meter reading and revenue collection. This initial pilot aimed to reduce operating expenditures at the station level, increasing station revenues and improving customer satisfaction.

Sanitation: While the PAYG business models are still nascent, mobile money has great potential for collecting payments for sanitation services. Loowatt in Madagascar, CleanTeam in Ghana, and BRAC in Bangladesh are some of the organisations leveraging mobile payments, either for customers to pre-pay for a sanitation service (access to a container-based toilet and emptying service) or for financing access to toilets.

In Ghana, CleanTeam[8] provides its customers with a container-based toilet and a bi-weekly waste collection and disposal service for a low monthly fee. By enabling customers to make small, cashless payments through mobile money, Clean Team has been able to eliminate costly cash collections and automate payment reconciliation. With some advisory support from GSMA and its grantee PEG Ghana, as of June 2017, 1,250 of Clean Team's customers had signed up to the mobile money service (a 96 per cent sign-up rate). The mobile money platform has been integrated into Clean Team's mobile-based enterprise system, providing real-time data for business and payment monitoring, ensuring program efficiency.

BRAC's Water, Sanitation and Hygiene (WASH) programme in Bangladesh has also tried to address cost issues by providing loans to poor households to construct latrines. Since 2006, BRAC has disbursed loans to adult female family members , empowering them with greater decision-making power. In 2015, the programme sought to digitise this process through a pilot project in northern Bangladesh that provided sanitation loans through mobile money. BRAC's WASH programme staff conducted regular training sessions where 350 women learnt how to operate mobile phones and use bKash (a mobile money service provider), including how to send money from one account to another and recharge airtime. The timely, 100 per cent payment rate (i.e. no overdue or late payments) through bKash demonstrates the tremendous opportunity to work more intensively in this sector and in other regions.[9]

Cooking: The upfront cost of cookstoves and lack of access to small quantities of fuel remain some of the biggest challenges to displacing solid fuel cooking.[10] In Tanzania, with support from the GSMA M4D Utilities Innovation Fund, KopaGas has launched a pay-per-use Liquefied Petroleum Gas (LPG) model, enabling customers to access clean cookstoves and LPG fuels on a pre-paid basis and make payments using mobile money. This model eliminates the upfront costs of gas cylinders, making it possible for low-income customers to access gas for cooking instead of relying on charcoal. In collaboration with Oryx Tanzania, KopaGas provides households with a kit that includes a cookstove, an LPG cylinder, a meter and accessories, after payment of a small commitment fee.[11] Payments are made using mobile money and the gas supply is controlled remotely through GSM smart meters when the credit runs out or is pre-paid. The customer also receives a mobile phone alert when the canister is about to run out of fuel. KopaGas also leverages a traditional LPG distribution business, which serves over 13,000 monthly users using digital payments.

Image courtesy of KopaGas

5. CGAP, 2017, "Quenching a Thirst: Digital Finance and Sustainable Water Service for All".
6. eWATER is a technology provider, harness mobile and solar technologies to develop affordable and sustainable water systems in Africa
7. GSMA M4D Utilities, 2017, "Reducing water station operational costs through mobile monitoring"
8. https://www.cleanteamtoilets.com/
9. Md. Rakib Uddin, BRAC Bangladesh, 2017, "Empowering women through digital sanitation services"
10. Global Alliance for Clean Cookstoves, 2017, "Pay-as-you-go" technology to boost access to cooking fuel".
11. MIT, 2017, "Bringing poverty-alleviating solutions to market in India, Kenya, Nigeria, Tanzania, and Uganda".

Irrigation: In Kenya, SunCulture, with support from the GSMA M4D Utilities Innovation Fund, has been piloting its "Pay-As-You-Grow" model, providing farmers with access to financed solar-powered irrigation systems. Their RainMaker solar water pump system[12] is available to farmers in daily PAYG installments as low as $1.45 per day, reducing the upfront cost of the system by an average of 97 per cent when compared to AgroSolar Irrigation Kit, an older SunCulture product. Beyond providing access to financed irrigation systems, SunCulture aims to provide tailored intelligence to farmers, such as sending a daily SMS with pump usage information and weather reports along with recommendations for crop management, monitoring crop health and how to apply machine learning to predict pest outbreaks. SunCulture has also developed distribution partnerships in Zambia, Tanzania and Uganda, and plans to expand into three additional countries in 2017/18.

Image courtesy of SunCulture

12. SunCulture, 2017, "New solar-powered water pump poised to transform agricultural output"

3. Experimenting with PAYG in greenfield markets: what have we learnt so far?

A growing number of innovative PAYG business models are being trialled in greenfield markets, and our Innovation Fund has supported a number of these in different sectors and regions. Here, we discuss some of the challenges and approaches stakeholders should be aware of when "going greenfield" with PAYG utility services.

3.1. In underdeveloped mobile money ecosystems the right partnerships are key

Mobile money has seen rapid growth around the world, enabling national and, increasingly, international remittance transfers, bill payments and merchant payments. However, there is a persistent gap in adoption and usage between urban and rural users. Below are a few key considerations to help close this gap:

1. **Tackle digital literacy and simplify the user interface.** Often in greenfield markets, users are not familiar with using digital services such as mobile money. Complex user interfaces add to the difficulty and, in some cases, to customers abandoning mobile money altogether. For example, making a payment through Loowatt's USSD menu was originally a 13-step process, with the session often timing out before users could navigate through the menu. PEG, who was one of our first Innovation Fund grantees in greenfield markets,[13] a noticed a similar issue in Ghana, where 76 per cent of payments were made not by the customer directly, but via someone else's wallet (over-the-counter by mobile money agents and PEG field staff) because customers found it difficult to navigate the payment process themselves. In late 2016, CGAP collaborated with PEG Africa in Ghana to devise strategies to increase mobile payments among their customers. CGAP piloted two alternative payment methods to encourage customers to use their own mobile money accounts: pay over the phone (POP) and STAR payments(using a USSD string).[14] In May 2017 alone, more than 20 per cent of PEG's users

13. GSMA M4D Utilties, 2016, "PEG Ghana-Licensing Solar-as-a-Service in a New Market"
14. In this method, the customer as a contact can save a generic USSD string. They can then dial this number, which is a numeric equivalent of the USSD menu, and enter the amount they want to pay and their PIN to execute a payment.

paid using the POP or STAR method, up from approximately five per cent in December 2016. This illustrates how, in addition to educating customers and field agents, simplifying user interfaces can increase mobile money adoption for this purpose.

2. **Strengthen the agent network and create incentives to use wallets.** Closely linked to the above is the need for a strong and well-trained agent network. Evidence shows that agents play an especially important role in the uptake and use of mobile money in rural areas, particularly in greenfield markets where mobile money ecosystems are not mature.[15] Therefore, selecting the right mobile operator partner — one with a strong agent network, particularly in rural areas — is an important first step. Second, it is important that agents support the customers to transact independently using their own accounts. Independent transactions can reduce the need for the customers to frequently travel to the agents, enhancing the overall mobile money usage experience. Another approach, taken by our grantee d.light in Haiti, was to encourage mobile money adoption through incentives for mobile money agents. ReVolt (the distribution partner for d.lite) gave financial incentives to agents to sign up more customers, while at the same time providing discounts to customers who pay with their own mobile money account.

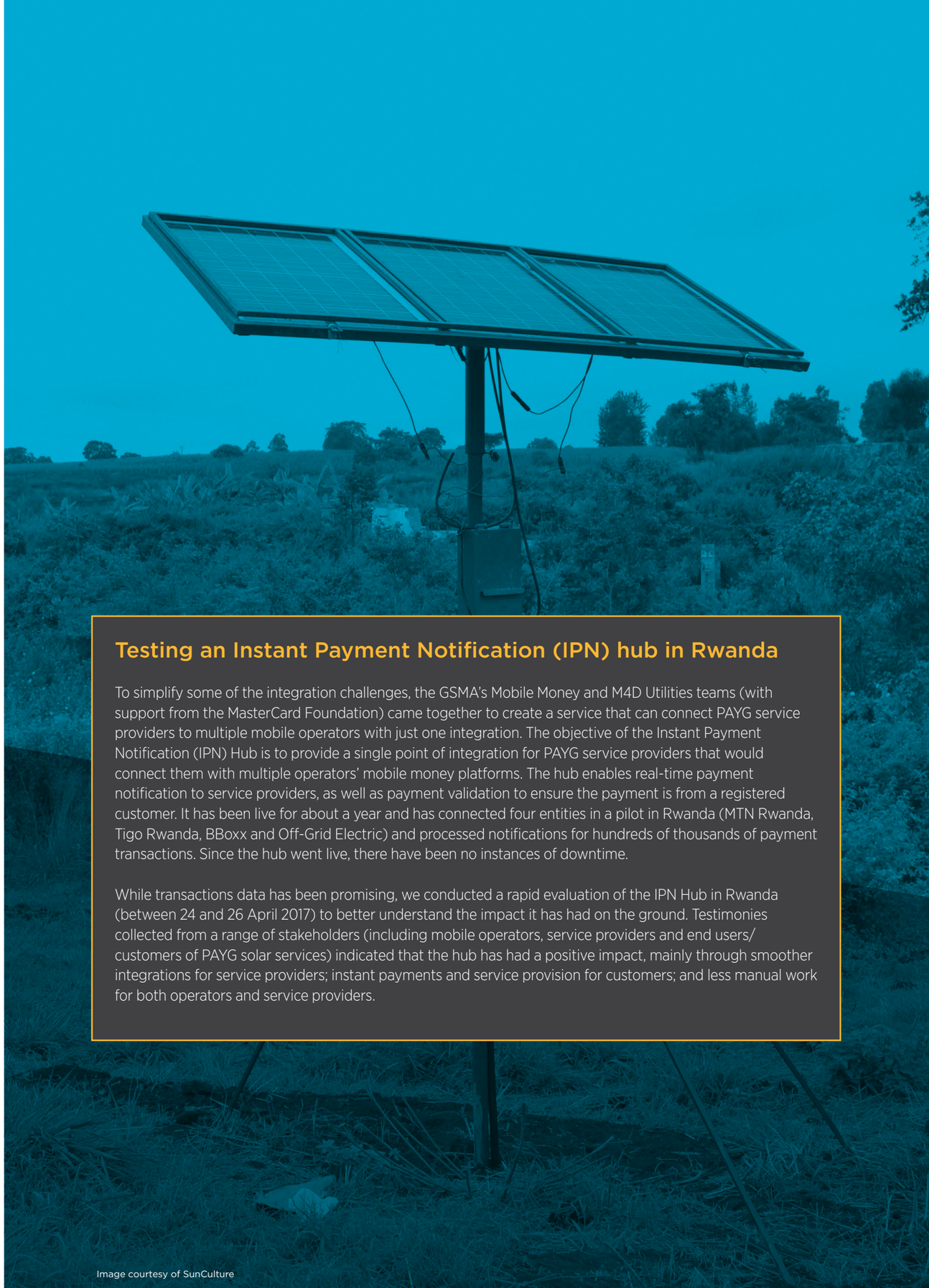
3. **Technical integration for real-time mobile money payments requires time and careful planning.** Integration occurs when a utility service provider's platform connects, communicates and interacts with a mobile money provider's platform at a systems level. As outlined in our "Mobile Money Payment Toolkit for Utility Service Providers", opening a merchant account is a good way to pilot a PAYG proposal but, for PAYG services, obtaining a notification and processing the transaction in real-time or near real-time can be crucial. This is especially important when the volume of transactions per day is high (over 50–100). Nevertheless, integration takes time and money, and in markets where the mobile operator's mobile money team has limited capacity, the process can be complex and take months to complete. Working with local mobile money aggregators may be an option to facilitate access to operators' mobile money platforms, though this can be costlier than integrating directly with mobile money providers.

Overcoming these challenges can be tough but rewarding, not only for PAYG providers but also mobile money providers. PAYG utility services can help mobile money providers to:

- scale their agent network to rural and off-grid areas;
- acquire new customers, particularly in rural areas where customers are traditionally slow to adopt new services;
- facilitate digital financial literacy; and
- generate frequent account activity.

In East Africa, where mobile money is widespread, previous studies have shown that the PAYG solar model generates 13 per cent to 20 per cent new registered mobile money customers.[16] However, in markets where mobile money was less mature, evidence suggests that PAYG solar services have facilitated mobile money adoption, and the proportion of new registered customers has been higher than in East Africa. For example, our grantee d.light, in partnership with ReVolt and Digicel in Haiti, observed that 40 per cent of their customers during the grant period were new to mobile money (based on operations in both urban and rural settings). Anecdotes from other PAYG service providers suggest that, in some markets, almost all customers are new mobile money users. Therefore, scaling PAYG services outside East Africa can be an extremely valuable effort for both mobile money providers and mobile operators. Continued and focussed efforts are required by all stakeholders to replicate the East African success in these markets.

15. CGAP, 2013, "Rural vs Urban Mobile Money Use: Insights From Demand-Side Data".
16. GSMA, 2017, "Lessons from the use of mobile in utility pay-as-you-go models".



Testing an Instant Payment Notification (IPN) hub in Rwanda

To simplify some of the integration challenges, the GSMA's Mobile Money and M4D Utilities teams (with support from the MasterCard Foundation) came together to create a service that can connect PAYG service providers to multiple mobile operators with just one integration. The objective of the Instant Payment Notification (IPN) Hub is to provide a single point of integration for PAYG service providers that would connect them with multiple operators' mobile money platforms. The hub enables real-time payment notification to service providers, as well as payment validation to ensure the payment is from a registered customer. It has been live for about a year and has connected four entities in a pilot in Rwanda (MTN Rwanda, Tigo Rwanda, BBoxx and Off-Grid Electric) and processed notifications for hundreds of thousands of payment transactions. Since the hub went live, there have been no instances of downtime.

While transactions data has been promising, we conducted a rapid evaluation of the IPN Hub in Rwanda (between 24 and 26 April 2017) to better understand the impact it has had on the ground. Testimonies collected from a range of stakeholders (including mobile operators, service providers and end users/customers of PAYG solar services) indicated that the hub has had a positive impact, mainly through smoother integrations for service providers; instant payments and service provision for customers; and less manual work for both operators and service providers.

Image courtesy of SunCulture

3.2. Alternatives to mobile money work, but often create operational challenges

Expanding mobile money ecosystems takes time, as partnerships are forged with third-party providers and mobile money platforms are integrated. What happens in areas where access to mobile money is either nascent or non-existent? To overcome this challenge, service providers are turning to alternatives such as airtime and cash.

Village Infrastructure Angels (VIA), a past grantee, used cash-based transfers to provide energy for lighting and productive uses to off-grid communities in Vanuatu by building agro-processing mills monitored remotely through machine-to-machine (M2M) technology. In the absence of a strong mobile money ecosystem, a cash-based alternative worked, but required many more checkpoints than mobile money to ensure transparency in cash handling and guard against agents issuing credit before they received payments.

In some cases, airtime is being trialled to reach a larger client base and to use a payment mechanism consumers are already familiar with. In Nigeria, the Lumos solution is marketed, distributed and sold by MTN Nigeria as the MTN mobile electricity service,[17] and customers can top up their electricity account using their MTN airtime. Similarly, Brighterlite, a grantee from Myanmar, tested the viability of airtime payments for fee collection, as mobile money was not available in Myanmar at the time of the pilot. Customers could make payments by sending an SMS and have the cost deducted from their airtime credit. The share of customers using airtime payment increased from 20 per cent of payments in October 2016 to 65 per cent by February 2017. Not only have airtime payments given customers more payment options, they have also reduced Brighterlite's operational costs for collection.

Airtime brings its own set of challenges, however. First, technology integration is significantly more complex for airtime than for mobile money.[18] Second, airtime is regulated differently in different jurisdictions because of the taxes and commissions embedded in it, making it difficult to convert airtime to a monetary value and impossible to use as a currency. This also means that revenue-sharing agreements between operators and PAYG companies may be more complex and require deeper partnerships. Therefore, airtime integration and usage for solar payments may require careful setup and regulatory consultation.

17. GSMA, 2016, "Lumos: Pay-as-you-go solar in Nigeria with MTN"
18. Ibid.

3.3. Finding the right change agents: the importance of partnering with mobile operators

Mobile operators, though somewhat new to utility sectors outside energy, are proving to be strong partners for PAYG providers. The scale of their access to potential customers, channels for remote payments, and knowledge of marketing to customers at the bottom of the pyramid can all help providers improve their operational efficiencies through advanced billing and customer relationship services. For mobile operators, there is an opportunity to collaborate with decentralised service providers to offer basic services for their customers while also generating new revenue through the adoption and usage of mobile services in underserved, off-grid settings.

Brighterlite, a past grantee in Myanmar, partnered with Telenor Myanmar, leveraging its brand equity to co-brand with them, and benefiting from Telenor's valuable soft knowledge of target markets and allowing it to identify off-grid areas based on the energy consumption of its GSM network. Often, in a sales pitch, customers responded positively, indicating they had heard of Telenor before, while Brighterlite was a new name for them. Another grantee, SNV, collaborated with MTN in Benin to capitalise on its strong rural distribution network and its marketing expertise to sell solar lanterns in rural parts of the country.[19] The partnership also raised awareness of mobile money and increased adoption among MTN customers.

Image courtesy of Lumos

19. Edouard Fagnon, 2016, "Bright Lights for Benin: Market Introduction of Pay-As-You-Go Solar"

3.4. Approaches to getting M2M functionality: build fast, fail fast

With the hardware cost of M2M modules progressively declining, a growing number of organisations in the utility space are looking to add mobile connectivity to their solutions to collect data on operations and/or control systems remotely. The type of mobile connectivity an organisation selects for an M2M connection will vary depending on several factors, including GSM network coverage, density of connected devices, cost constraints and plans for scale. We discuss these in detail in our recent IoT guide, which was based largely on our work with Eseye and with other Innovation Fund grantees.[20]

One of the main recommendations of the IoT guide was that service providers should adopt an iterative approach to testing IoT solutions and discard ones that do not work. For example, AWE (see page xx) initially tested the LoRa[21] technology (spoke and wheel connectivity) and found it to be too expensive, with unreliable connectivity in the field. They quickly moved on to use GSM connectivity exclusively, with each tap connected directly to the cloud. Even after the grant period ended, the eWATERtap continued to follow an iterative development cycle, resulting in new versions of the product with improved hardware and IoT usage.

It is also very important to test prototypes of IoT products early in targeted locations. One of our grantees, Upande, realised that laboratory tests about water resistance were proven wrong in the field through subsequent iterations of the M2M modules. Also, while the devices performed predictably using GSM networks in the lab tests, they malfunctioned in the field, delaying the testing process considerably.

Cost estimates also need to consider the lifespan of the product. Sanergy, a grantee, noted that in addition to the unit cost of sensors, there were also costs related to installation, calibration, data analysis, operation and maintenance, and sometimes change management in rolling out IoT products.

3.5. Utility services are unique and so are the challenges: being adaptable is key

Every utility service — water, sanitation, cooking or others — operates differently than off-grid solar. This means there is no one-size-fits-all PAYG model that will work across all sectors. Assessing sector-specific nuances can be key to successfully replicating a PAYG model.

For instance, one major challenge in the water sector is pricing PAYG solutions. Access to water is a basic human right, but safe drinking water comes at a cost. Hence, the very concept of paying for water faces resistance from those who have access to free (though often unsafe) alternatives to clean water. Second, it is difficult to determine an optimal price point for customers, given that water is typically billed at very low rates and the additional margin for billing for mobile-enabled water services is also very low. This can affect the sustainability of PAYG solutions for water, where the costs of manufacturing and operating PAYG technology are high. Finally, these small payments mean that the mobile money fee per transaction must also be low, making it even more difficult for providers to identify a profitable price point.

This is also a challenge in the sanitation sector and is compounded by behavioural barriers of defecating in public or disposing of human waste on the street, which are very hard to overcome. Moreover, on the business side, the value chains in the sanitation sector involve multiple stakeholders, typically including local government and sometimes informal workers, making PAYG business models difficult to execute.

With cooking, ensuring hardware safety becomes very important due to the use of highly flammable gases in LPG cylinders/canisters. These unique challenges are compounded by the more generic challenges of digitising traditional, process-oriented utilities, which have consumer barriers such as technical literacy, unaffordable 'safe' utility options, behavioural barriers that hinder adoption of new technology and budgetary barriers to fund innovation in sectors where funds are limited.

Thus, business models that work for water might not work for sanitation, and those that work in urban/peri-urban areas might not work in rural areas. For example, water kiosks or ATM-based models, such as Sarvajal[22] in India, are beginning to see some success in rural areas where mobile money transactions are largely in person and can be done using Near Field Communication (NFC) cards. In the sanitation sector, where public toilets are no longer considered 'improved access to sanitation', there is a stronger use case for household toilets that require regular cleaning. In the absence of large capital expenditure needed to build sanitation infrastructure, mobile payments are increasingly facilitating last-mile services in this sector. Organisations such as Loowatt are providing end-to-end services by designing and installing waterless flush toilets, as well as collecting, transporting and treating waste.

20. GSMA, 2017, "The IoT development journey for utility enterprises in emerging markets".
21. Long-range, low-power wireless platforms
22. http://www.sarvajal.com/

3.6. Seeking government support early on is a must

Successful innovative solutions depend heavily on an enabling environment provided by government, policy makers and other stakeholders. Favourable fiscal policies, robust mobile money infrastructure and customer familiarity with mobile payments, lower taxes for renewable energy products and services, and overall ease of doing business, are all essential building blocks of an enabling environment for PAYG solutions.

For PAYG service providers, it can be useful to assess the policy environment and ease of doing business in greenfield markets. Often, bureaucratic government processes and structures slow the pace set by PAYG providers. According to the 2016 World Bank Sustainable Energy Global Scorecard for Policymakers,[23] Africa in general exhibited weaker policy frameworks for energy access than other parts of the world. But three countries, Kenya, Uganda and Tanzania, were among the top five on the scorecard, behind India and the Philippines. Perhaps the success of PAYG in these East African markets can be attributed in part to an enabling policy environment. Equally, recent policy changes surrounding higher import tariffs on solar products in East Africa have also had an adverse impact on sales and revenue growth in an otherwise booming market. This illustrates the impact of government and policy support has on improving access to utilities for the underserved.

While providing opportunities for private players to scale access to utilities through supportive policies lies in the hands of government, service providers should adopt a market-specific approach that aims to improve access at scale, at speed and at low cost to government, making it an attractive option for resource-constrained countries.[24] In addition, many innovations come from outside the country, making it hugely beneficial to have local human resources working on the project. This brings a wealth of country- and culture-specific knowledge that can be helpful when dealing with local government bodies.

Image courtesy of Kamworks

23. Global Off-Grid Lighting Association, 2016, "Providing Energy Access through Off-Grid Solar: Guidance for Governments".
24. Global Off-Grid Lighting Association, 2016, "Providing Energy Access through Off-Grid Solar: Guidance for Governments".

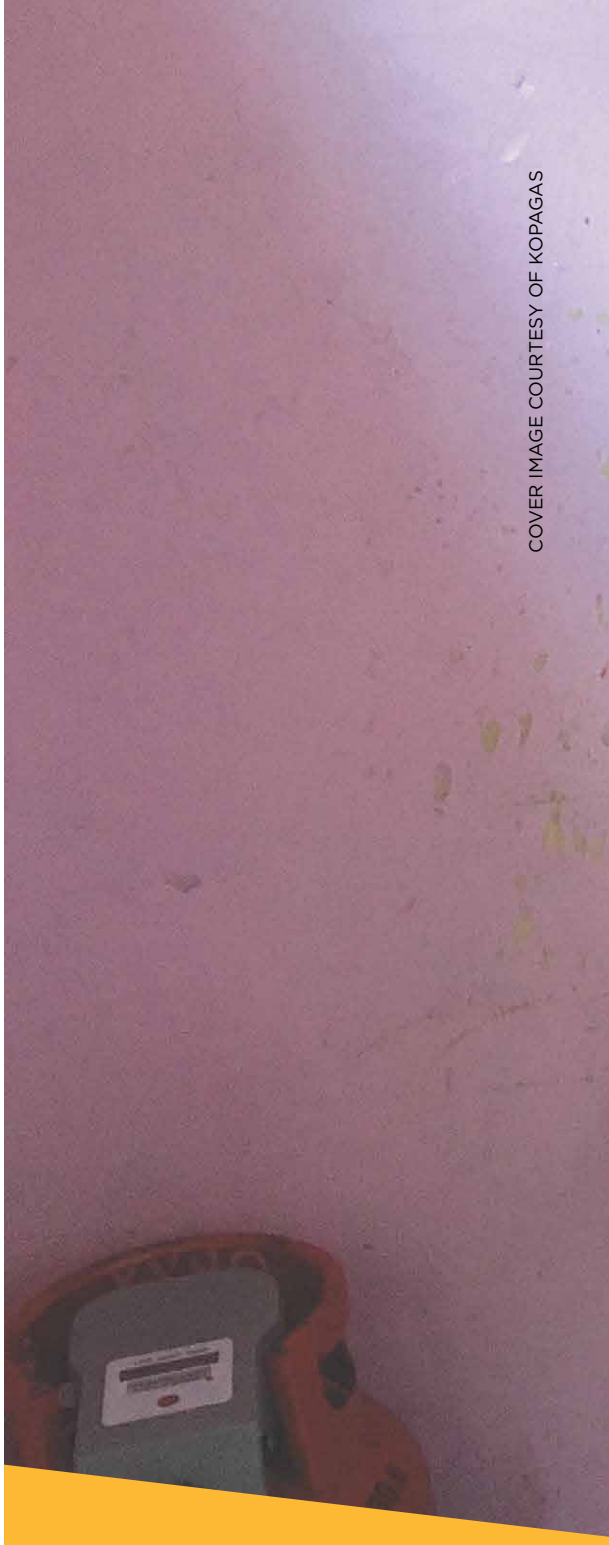
4.Conclusion

PAYG utility models are increasingly garnering interest from service providers, mobile operators and investors as a commercially successful use case. In the energy sector, PAYG services are maturing quickly and attracting more private investment. For example, PEG, which is expanding in greenfield markets of Ghana and Côte d'Ivoire, recently raised $13.5million through a combination of debt and equity financing. The sector is also experiencing consolidation, as was seen when French multinational utility, Engie, acquired Fenix International, Mobisol's acquired Lumeter (one of the largest providers of PAYG software for the off-grid solar industry) and very recently EcoEnergy a solar energy provider in Pakistan, acquired the customer portfolio of Brighterlite Pakistan.

Service providers are more commonly bundling PAYG services to enable access to more than one utility, (for example, lighting and cooking or water and sanitation) making the proposition more valuable to customers. While many companies like M-KOPA have been bundling products for a while, one of our phase 3 grantees, Vitalite will offer smartphones and cookstoves for Vitalite solar home system customers in Zambia. The smartphones will be sold on a PAYG basis, making the devices more affordable, while the improved cookstoves will provide clean and affordable energy. Bundling services in this sector is expected to lead to more upselling and better credit-profiling opportunities for service providers, as well as more coherent and flexible payment options for customers.

We are beginning to see a real race to bridge the addressable gap in utility access to scale quickly in greenfield markets. The impact of PAYG in driving mobile usage, mobile money and IoT adoption among customers is being increasingly explored and in some cases also already substantiated by individual studies. For mobile operators, there's an opportunity to partner with decentralized service providers to support access to basic services for their customers but also generate new revenues through the adoption and usage of mobile services in underserved off grid settings. After mobile airtime, data and mobile money, utility services (energy, but increasingly water and sanitation) could become a priority for mobile operators willing to engage with off-grid, underserved customers, and reap the benefits of stronger customer relationships.

For more information on the Mobile for Development Utilities programme visit:
www.gsma.com/mobilefordevelopment/programmes/m4dutilities



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