HOW CAN PAY-AS-YOU-GO SOLAR BE FINANCED?

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Developed in partnership with:

SunFunder

FIre AWARDS

Bloomberg NEW ENERGY FINANCE

This report is published by Bloomberg New Energy Finance and reflects the authors' current judgment on the advantages and risks of solar home system financing in emerging markets.

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An initiative led by the World Bank Group in partnership with the Global Off-Grid Lighting Association (GOGLA) has over the last year worked to establish industry-wide key performance indicators (KPIs) for solar home system operators. This initiative has won a Fire Award and subsequently received support from a working group of energy and finance experts and Fire Secretariat analytical staff. We would like to thank the members of this group for their insight and expertise that informed this paper.

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ABOUT FIRE AWARDS

The Fire Awards accelerate powerful, early-stage pilots and businesses that can unlock finance for clean energy and green growth. The awards focus on initiatives that are already "on fire" – and need business development support to achieve impact at scale. The Fire Awards are presented by the Global Innovation Lab for Climate Finance.

ABOUT SUNFUNDER

SunFunder is a solar energy finance business based in the US and Tanzania with a mission to unlock capital for solar energy projects in emerging economies. Since 2013, SunFunder has made over 80 loans to 30 companies in Africa and Asia, directly improving energy access for over 2.5m people. SunFunder has historically raised capital through private debt offerings and in 2016 closed its first structured fund, the $50m Beyond The Grid Solar Fund.

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Pay-as-you-go solar companies are the start-up community's proposed answer to the challenge of 1.2bn people living outside the reach of the electricity grid. To scale, they need debt capital. Lots of it. Some operators are creating structured finance products to cut costs and address more potential investors.

- Pay-as-you-go solar companies retail solar home systems to power basic appliances, primarily in East and West Africa. The systems are sold against a small upfront payment and regular 'top-ups', usually sent via low-cost mobile money services. The leading companies, including M-Kopa, Off-Grid Electric, d.Light, BBOXX, Nova Lumos and Mobisol, have raised more than $360m and serve about 700,000 customers – a microscopic fraction of the addressable market.
- After several years of early pilots, a number of these companies have now reached the stage at which they are seeking triple-digit million dollar amounts in debt capital to finance an accelerated roll-out of their services. Asset-backed debt vehicles are the primary candidate for this. But companies face the challenge of raising debt for an unproven industry and serving customers without a formal credit history.
- Many risks inherent in pay-as-you-go refinancing are far more pronounced than in conventional asset backed securities. These include currency risks, different tenor expectations and correlation risks arising from end-customers clustered in particular regions.
- Sector-wide harmonised portfolio performance metrics for pay-as-you-go companies, such as those currently developed under a World Bank-led initiative, make possible a structured assessment of some of the largest risks. This will reduce transaction costs for investors assessing structured deals in the sector.
- These metrics are currently being tested, in parallel to the first structured deals in the pay-as-you-go sector that were agreed earlier in 2016. If successful, such financial vehicles can scale quickly – residential solar securitisation in the US rose from $53m to $803m in two years.

SECTION 3. WHAT IS PAY-AS-YOU-GO SOLAR?

Some 1.2bn people are living without access to the power grid, with hundreds of millions more suffering from inadequate grid connections that fail for hours every day. While many of these are poor, an estimated 40-50m households falling into this category have a household income of $4,000-18,000 per year – enough to constitute a significant market opportunity.

Distributed energy options such as solar and batteries can provide these people with a readily available and competitive alternative. They are now cheaper than most stop-gap technologies when considering life-cycle costs. They can be purchased by individual households and businesses, offering a readily-available alternative to national electrification programmes often marred by delays.

Such solar home systems cost around $150-200 per household for the most common configurations – a figure most potential customers cannot or do not want to pay in one instalment.

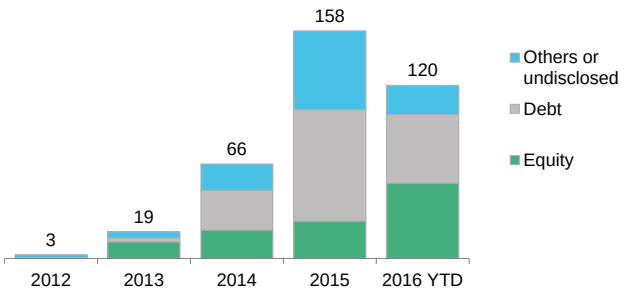
Several start-ups have begun to combine sales of such systems with consumer loans, often managed via low-cost mobile payments. Altogether, these companies have sold almost 700,000 units. Their success with investors has been partly fuelled by the promise of leapfrogging the centralised power system towards a distributed, digital, consumer-centric system. The latter would generate vast amounts of data and prepare the market for more powerful appliances, consumer payments and even more traditional banking services.

But pay-as-you-go solar business models are hungry for capital to meet demand for their product. To make a dent in the number of under-served households will require billions of dollars of debt capital – and that will mean tapping the capital markets.

3.1. PAY-AS-YOU-GO FINANCING TO DATE

Investments in the off-grid solar industry have accelerated rapidly since 2013. The industry has attracted financing of more than $360m over the past five years, with more than half of that amount in 2015 alone (see Figure 1).

Figure 1: Investments in pay-as-you-go solar companies ($m)

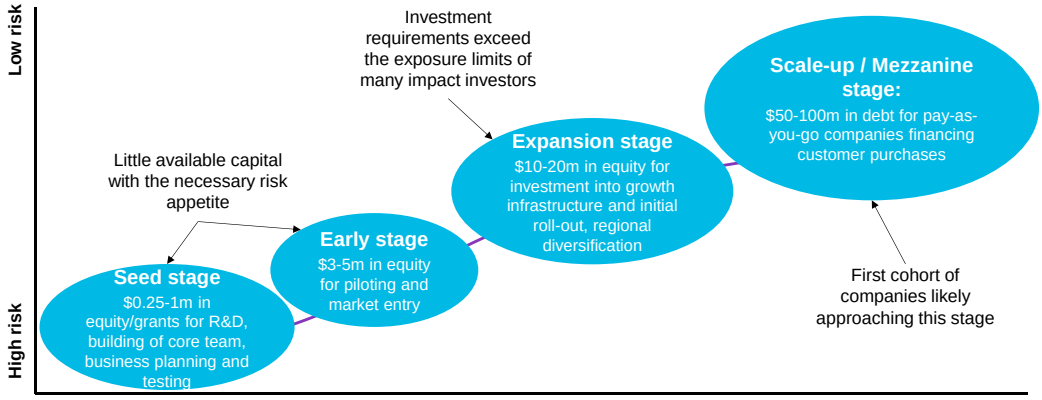


Source: Bloomberg New Energy Finance. Note: 2016 figures as of 30 September 2016.

Companies' financing requirements change dramatically as they mature, both in terms of scale and type. This is illustrated in Figure 2 below. At the **seed stage,** firms look for amounts up to $1m, typically equity from the founder and angel investors, or grants. In the **early stage,** firms typically seek to raise $3-5m, primarily in equity. In the **expansion stage,** firms have historically sought to raise $10-20m, often through a combination of equity and debt. Pay-as-you-go operators M-Kopa, Off-Grid Electric, d.Light, BBOXX, Nova Lumos, Fenix International and Mobisol have all announced at least one transaction larger than $10m already.

In the **scale-up / mezzanine stage**, which the first cohort of pay-as-you-go companies are approaching, the financing requirements change dramatically. This is when the firm's operations have proven that they work at scale with several tens of thousands of customers, and companies seek to expand their model. Financing this expansion requires debt capital. Several pay-as-you-go companies have reported financing requirements of $50-100m or more to achieve their business plans over a period of 2-3 years. None has yet announced a single transaction crossing this threshold. Deals of this size will likely require a different level of complexity and sophistication than the balance-sheet debt that dominated in the past.

Figure 2: Financing needs across an off-grid solar start-up development cycle



Source: Bloomberg New Energy Finance

SECTION 4. STRUCTURING OFF-GRID SOLAR FINANCE

4.1. WHY STRUCTURING?

Some pay-as-you-go companies already have secured, or are attempting to raise, structured debt – in an attempt to take consumer receivables off their balance sheets and imitate a common way of refinancing consumer debt in other industries such as mortgages, credit cards and car loans. The ultimate aim of structured debt is to provide increased volumes of lower-cost capital than is possible with on-balance sheet lending. Structured financing could therefore increase the amount of capital that is made available to pay-as-you-go solar companies and help them reach a larger share of the population without a grid connection at home. Structured debt, through which consumer-finance receivables would be bundled into a special-purpose vehicle, could lead to several advantages for the market:

- **For pay-as-you-go companies:** Cheaper debt means companies can offer their customers a more competitive service. Getting debt off corporate balance sheets and into a special-purpose vehicle also reduces the risk of creating overleveraged companies that could become vulnerable if a specific part of their portfolio underperforms and defaults (for instance due to a natural disaster). These issues may not yet be urgent for many companies, but are likely to increase in importance as the business model matures.
- **For investors:** Special-purpose vehicles can simplify and lower the risk profile for investors, while off-balance sheet debt could ultimately be commoditised by securitisation or syndication, making possible the creation of a secondary market. This would increase liquidity, giving investors more confidence about being able to exit a position, and would enable risk-sharing with other parties, possibly making it easier for commercial investors with deeper pockets to participate in the market.
- **For consumers:** Mainstream special-purpose vehicle structures are expected to reduce borrowing costs because they separate the risks associated with the receivables from those associated with the originator of the debt.

Background: solar securitisation in developed economies

The 2008 crisis has left investors wary of committing funds to ‘exotic’ debt instruments relying on unsecured cash flows, in particular from those with bad or unproven credit.

Despite these concerns, nearly all of the leading US solar installers have explored ways to securitise the cashflows associated with residential solar leases, power purchase agreements and loans. Total issuance of solar asset-backed securities (ABS) has grown from $54m from one SolarCity issue in 2013, to a total of $803m of outstanding bonds today.

The residential solar leasing business model has come under intense pressure in the US, as consumers have also shifted towards more direct ownership of PV – often financed by loans – as opposed to leases and PPAs. The US market has diversified in response: SolarCity sold its first solar loan-backed securitisation in the second half of 2015, followed by Spruce Finance in early 2016.

Solar securitisation in an off-grid context differs significantly in terms of average deal size, the way customers have their credit scored, and a myriad of macro-economic factors. Despite the differences, the US experience may offer a few lessons for the pay-as-you-go solar industry.

Financial structures are just one avenue to reduce product costs, and deal structuring should not take precedence over a focus on delivering affordable products and services. Residential

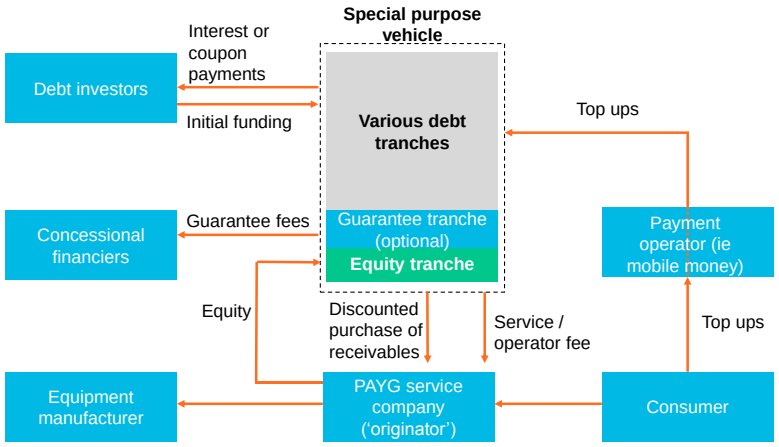
solar has thrived through direct cash or bank financing in places like Germany, but also in India's off-grid sector by pioneers such as Selco. Loans were arranged through trained local banks or micro-finance institutions, which are comfortable with the technology but also understand the credit risk of the local population. The off-grid sector is changing rapidly, and it is still possible that partnerships with local banks or microfinance institutions may cut financing costs faster than would be possible by using debt from securitised receivables.

4.2. HOW DOES IT WORK?

While there are endless ways in which pay-as-you-go consumer-finance receivables can be structured into a special-purpose vehicle, the general framework is common to all of them. In a special purpose vehicle (SPV) model, the company's role in terms of the financial structure is reduced to that of an originator and servicer. The company purchases equipment from manufacturers and finds end-customers for these products, usually collecting an initial deposit or instalment. Once a customer is signed up, the company creates an accounting receivable for the future cash flows owed or expected from either the specific customer or any other customer to whom the solar kit may be redeployed (depending on whether it is a rent-to-own or energy-as-a-service model).

Simultaneously, the special-purpose vehicle is created and receives an equity injection from the company and additional cash from debt investors. If desired, concessional financiers can also take an equity or first-loss debt stake in the SPV.

Figure 3: Cashflows through a special purpose vehicle for pay-as-you-go off-grid solar (sample structure)



Source: Bloomberg New Energy Finance

With this cash, the SPV purchases the rights to future cash flows from the company at a discount that reflects the interest rate charged on the funds. The pay-as-you-go company is at this point no longer entitled to receive the customer payments, although it will in most cases still function as a collector of the funds. All payments are eventually channelled to the SPV, which in turn uses the proceeds to return the principal and interest owed to its debt investors. This risk can be allocated across different investment 'tranches' if desired, with tranches first in turn to take losses receiving higher interest rates. Rights to each of these tranches could then be securitised, creating a financial instrument that can be transferred easily, and therefore, in theory, be traded on a secondary market.

The pay-as-you-go company continues to serve as an operator, ensuring that customers pay and solar kits are maintained. For these services it may receive a service fee (or share of ongoing

payments) from the SPV, which is structured to incentivise the company to maximise customer repayments. Business models that prescribe a clearly defined payment stream to their customers are easier to re-finance than offerings that leave consumers more flexibility in the timing of their payments.

The shareholders are entitled to the residual value in the SPV (i.e. after its debt investors have been repaid). The equity contribution required from the company serves as collateral. The SPV therefore has three pricing levers (upfront price, service fee / ongoing payments and residual) and a collateral base by which it prices and mitigates the portfolio's risk.

4.3. SAMPLE DEALS TO DATE

BBOXX AND OIKOCREDIT

BBOXX, a solar home system distributor active primarily in East Africa, announced the first of several planned securitised receivables transactions in the pay-as-you-go industry, on 17 December 2015[1]. The round was led by Dutch impact investor Oikocredit and was made up of 2,500 customers that had already been issued with a BBOXX system, worth in total the equivalent of about $0.5m. The note was issued in local currency with an interest rate of 21% and a maturity of 30 months, equivalent to the remaining tenor of customers' three-year contracts. This structure allowed Oikocredit to ensure that only receivables from customers with a healthy track record in the first six months were placed in the note. A 30% over-collateralisation further reduced Oikocredit's risk exposure.

SOLARNOW AND SUNFUNDER

SunFunder launched its Structured Asset Finance Instrument (SAFI) in May 2016 via a $2m deal with SolarNow in Uganda. SAFI is forward-looking: rather than the repackaging of an existing portfolio financed by a solar company, it provides financing for SolarNow to acquire new customers within a 12-month period. SAFI is designed to be replicable to other pay-as-you-go solar companies and to be expandable, with other investors joining a syndicate alongside SunFunder.

[1] Greentech Media, "The World's First Securitization of Off-Grid Solar Assets", 17 December 2015. See: http://www.greentechmedia.com/articles/read/the-worlds-first-securitization-of-off-grid-solar-assets

SECTION 5. MEASURING AND MITIGATING RISKS IN PAY-AS-YOU-GO SOLAR REFINANCING

The discount to the face value at which the rights to the cash flows of an SPV tranche sold reflects the cost of capital. To compensate for the various risks and uncertainties, the SPV can offer a higher return to the investor and / or build in higher collateral, which ultimately leads to a higher cost of debt for the pay-as-you-go consumer. Beyond these two primary levers (price and collateralisation), the cost of debt can also be lowered in a more efficient way through mitigation measures addressing specific risks. In the following, we identify several risk components and some potential measures to mitigate that risk.

5.1. MEASURING PORTFOLIO QUALITY

Established credit providers usually offer and price products on the basis of a potential customer's credit history. For instance, in the US, solar leasing companies will only finance and deploy a system if the homeowner meets a certain FICO score. However, pay-as-you-go solar customers in Africa typically have no formal credit history.

To address this, pay-as-you-go companies have adopted a range of strategies. Some have built their own bespoke credit assessment methodologies (e.g. extensive questionnaires) of potential new customers, while others do not undertake any. They also develop their own approaches for dealing with non-performing customers, for example repossessing systems and redeploying them, or exerting legal pressure to restore repayments. Such approaches rely on detailed observations of customer behaviour through the company's payments and, in some cases, performance monitoring platform.

Off-grid solar companies have a growing pool of data on the performance of their pay-as-you-go portfolios. However, the industry lacks a common language for, and definition of, key metrics. For instance, after what period of late payment are customers considered to have defaulted? Are early repayments possible? Finding common terms to refer to payment metrics is further complicated by the range of different business models in the sector; some companies may build in more flexibility for customer repayments than others.

Measures to manage portfolio quality risk	
Standardised metrics	A World Bank-led initiative is focusing on developing a set of standardised industry KPIs. See Section 5 for further information.
Industry benchmarks	A World Bank-led initiative aims to present these KPIs for key companies in the sector, allowing them to be compared. See Section 5 for further information.
Track record of credit assessment	Many companies that undertake bespoke credit assessment are resistant to sharing full information about their methodologies. But the full detail of the methodologies are less relevant than the consistency and predictability of the results.
Portfolio quality target	Some pay-as-you-go companies structure their business models around higher expected default rates than others do (through a combination of reduced customer acquisition costs and enhanced mitigation strategies such as repossession). Therefore, low default rates are not necessarily a measure of the quality of the business model. This should be recognised in any analysis of portfolio quality.

5.2. MAINTAINING PORTFOLIO QUALITY

There is an innate tension in the pay-as-you-go business model between the growth of the portfolio (quantity) and maintaining its credit-worthiness (quality). A structured finance approach may introduce some moral hazard by limiting the company's downside exposure to a lower quality portfolio. For instance, it is in the company's interest to maximise the number of customers, but the SPV takes on the direct risk of non-performing customers.

For forward-looking SPVs, this may be more critical, because they are developing a new portfolio that may not resemble the company's existing track record. Such an SPV would rely on the continued performance of the company itself to originate and service the contracts and deliver the expected revenues.

The experience of the micro-finance sector could provide valuable lessons in terms of how to understand and assess payment patterns of the rural population in emerging economies.

Measures to maintain portfolio quality	
Company track record	Investors will have full knowledge of the company's finances, business model and track record, which they can use to form an opinion on its wider performance risk.
Codify sales process and service quality	The SPV relies on the integrity of the company's sign-up and servicing practices – particularly for forward-looking SPVs. These can be explicitly written in an agreement between the SPV and the operator, e.g. as part of the finance documents. It is crucial that companies continue to consider customer service as a top priority. Left without redress on problems, customers will quickly default.
Co-investment in the SPV	The pay-as-you-go company can demonstrate its commitment to maintaining quality by co-investing in the SPV, usually via an equity contribution. This offers upside potential if portfolio performance is better than forecast, and also acts as a first-loss layer to the financiers in the event of higher than expected default or devaluation. Additionally, the SPV fee paid to the originator (the pay-as-you-go company) can be broken down between payments upfront, over time and on conclusion – the latter two of which could be made subject to portfolio performance.
Minimum portfolio quality threshold	SPV finance providers may require a certain portfolio quality threshold, below which mitigation measures need to be adopted (e.g. swapping a defaulting customer for a new active one, or otherwise injecting cash or asset value into the SPV structure).

Note that the SPV itself can support the pay-as-you-go company's financial health: by financing the consumer loans off balance sheet, the company's stand-alone debt-to-equity ratio and cash flows are considerably improved. This simplification can also be helpful for other parties assessing the company.

5.3. CURRENCY RISK

In many developing countries, currency volatility, and devaluation in particular, is a significant factor. Separately, the cash available from lenders will be disproportionately denominated in USD. This mismatch leads to one of the single largest risks to the performance of the SPV. This is because if the SPV finances the portfolio in hard currency, but receives customer payments in

local currency over time, it is directly exposed to local currency movements. This risk can be directly addressed in countries whose currency is pegged to a reference currency that can be hedged relatively cheaply.

Measures to manage currency risk	
Local currency loans	The long-term goal for the sector is to match local currency loans with the repayments in local currency. This requires the participation of local banks, which often have limited experience of, and interest in, the sector or complex products. Local banks may be encouraged to enter the sector through a combination of: beneficial capital availability (such as a donor-funded credit line for on-lending), direct risk mitigation (such as first-loss capital) and advisory services (such as the provision of specialist market and company knowledge, deal origination and syndication).
Currency hedging	Currency hedge products such as cross-currency swaps or FX forwards, for instance from a specialist like MFX, allow the SPV to lock in future exchange rates for repayments. However, they are expensive, adding double-digit interest rates to the company's cost of debt (while these may still be cost-effective, they tend to illicit a negative emotional response)[2] and may not even be available for some currencies.
FX reserve account	An immediate option for lowering the impact of currency risk would be for a third party (e.g. foundation or donor) to partially absorb currency depreciation losses under certain circumstances, such as an extreme devaluation greater than a defined threshold. This would lower the cost for the end-consumer by limiting the extent of the downside risk required to be priced in by the company and/or financier (assuming these cost savings are passed through). A potential incentive to such a third-party funder could be the provision of upside if depreciation is lower than forecast, e.g. through an equity stake in the SPV. This measure can either be structured as an emergency fund or a free option. Relying on donors to de-risk an SPV will, however, limit the scalability of the model.
Over-collaterisation	SPVs can mitigate the impact of depreciation by building in over-collaterisation (e.g. through equity requirements and a discount on the advance rate). This makes the SPV less efficient and more expensive for the company, resulting in a more expensive product for the consumer.

5.4. OPERATOR AND TECHNOLOGY DISRUPTION RISK

The SPV owns the customer contract and payments, but by design relies on an operating company to service them and collect payments over time. In the event of any disruption to the operating company, it will be of critical importance to any financiers of an SPV that the contracts continue to be serviced as seamlessly as possible. The most likely response to a disruption event would be for a third-party operator (or the financiers themselves) to take direct control of the

[2] See Dirk Muench, "Currency risk and mitigation strategies for the off-grid energy sector", November 2015. responsAbility, Persistent Energy Capital,

service provision for this "orphaned" portfolio. Existing pay-as-you-go providers are likely to be best suited for such a role, offering them a route to business growth and income potential.

However, there are currently a limited number of pay-as-you-go companies operating at scale, and each have tended to develop bespoke products and systems, with varying levels of geographic overlap. In the event that any one servicing company ceases operating, there may not be an obvious suitor who would be willing or able to ensure the servicing of outstanding contracts on behalf of the SPV.

As the market develops, there may be more pay-as-you-go companies able to do this, thereby lowering the risk associated with operator default over time.

Measures to manage operator risk	
SPV share transfer	A typical security package of an SPV might specify that in the event of the pay-as-you-go company ceasing operations, the ownership of the SPV will transfer to its finance providers.
Software / intellectual property rights	In the event of transfer to a third party, the SPV arrangers should ensure that rights to any proprietary software and payment platforms are included.
Fair value guarantee fund	There may be certain measures that external actors can take to enhance the attractiveness of an orphaned portfolio to a potential buyer, while limiting the downside potential for financiers when considering the initial SPV investment. A fair-value guarantee fund or similar options could achieve this.
Fund of SPVs	Investors can reduce operator risk by gaining exposure to a portfolio of SPVs from different operators, which could be managed by an investment fund.

For many pay-as-you-go companies, the smooth flow of repayments also relies on the integrity of the technology applied, particularly mobile money, and to a lesser extent remote shut-off and monitoring. It is unlikely that external interventions such as quality ratings for mobile money providers offer any significant benefit for improving SPV capitalisation terms.

5.5. CORRELATION RISK

The off-grid solar market is still young, meaning that pay-as-you-go companies have generally built their customer base in specific locations. The correlation risk arising from this clustering, for instance if a competitor enters or the grid is extended there, increases the risk of widespread default and offsets any portfolio effect.

Measures to diversify the receivables pool	
Increasing portfolio diversity	As pay-as-you-go companies grow, they may diversify their portfolios beyond specific countries and areas.
Syndication	Investors should consider diversifying their risk through risk-sharing on individual deals (e.g. syndication) and investing in a range of companies or SPVs. This could also be achieved by investing in a portfolio fund with sector expertise.

5.6. DEBT TENOR

Pay-as-you-go contracts tend to last 1-3 years in the rent-to-own business models that are gaining popularity. As companies or arrangers look to attract greater levels of institutional capital, there is a risk that there will be a mismatch between these short tenors and the longer tenors sought by institutional investors.

Measures to manage debt tenor differences	
Revolving capital structure	SPVs could be designed to recycle capital into new portfolio customers prior to repayment, thus extending the tenor of the loan beyond an individual repayment timeframe. However, this may introduce additional transaction risk, and increases the SPV's exposure to currency movements.
SPV portfolios	Specialist portfolio companies or funds could offer longer-term products by aggregating multiple SPVs. Investors with appetite for longer tenors could consider investing in these.

5.7. REGULATORY RISK

The pay-as-you-go solar market has grown in the absence of specific regulatory regimes. It is likely that governments will introduce regulations that could directly impact the market, such as operators offering consumer credit becoming subject to microfinance-like regulations.

Measures to address regulatory risk	
Political leadership	Industry bodies and third parties could work together to ensure their inputs can be heard by governments looking to introduce regulatory changes, including highlighting best practice from leading markets.

5.8. OTHER CONSIDERATIONS

- Some pay-as-you-go operators have started extending consumer financing for non-solar products such as TVs, cookstoves and even school fees. A customer-owned solar system may serve as collateral. Some operators may eventually depend on such non-solar loans to grow their businesses, and the extent to which such a dependency changes the risk and cash flow profile may create a more complex financial structure for the operators. Eventually, growth in such non-solar loans may require a new set of metrics.
- Pay-as-you-go companies currently see investor interest from both donor and commercially oriented capital. If this overlap is not managed well, donors may end up crowding out for-profit money through cheaper and softer terms. Focusing interventions on first-loss or subordinated positions is likely to be more effective and enable the sector to scale more quickly.

SECTION 6. HARMONISED PERFORMANCE METRICS FOR THE DISTRIBUTED SOLAR INDUSTRY

Among the many options outlined to manage and mitigate the risks of creating pay-as-you-go SPVs, the development of industry-standard metrics to assess portfolio performance stands out.

Recognising the cross-cutting nature of such metrics, an initiative led by the World Bank Group (WBG) in partnership with the Global Off-Grid Lighting Association (GOGLA) has over the last year worked to establish and share industry-wide key performance indicators, based on company and industry performance data and advanced analytics. The initiative was voted a 2016 Fire Awards Winner[3] for its potential to transform the sector and unlock new forms of investment.

To date, the WBG and GOGLA have drawn up a long list of KPIs from early investors, and pencilled a preliminary short list that is currently undergoing testing. The KPIs will facilitate characterisation of the different risks identified in the previous section in a consistent manner across the industry. For example, the *Number of Delinquent Payments*, *Portfolio at Risk (PAR)*, and *Percent Write-Off* are likely to be key indicators for the measurement of the overall portfolio quality. Likewise, the *Average Credit Period* will inform assessments of debt tenors, and the *Forex Exposure* indicator will provide quantifiable insight on the level of currency risk.

Table 1: List of preliminary key performance indicators currently undergoing testing

Customer-level: calculated separately for each deployed asset	Company-level: calculated across a company's entire portfolio[4]
• System size (W) • Date of System Acquisition • Credit Period (nominal) • System Landed Cost • Initial Deposit • Current Days Ahead/Behind in Payment • Total Paid to Date • Total Maintenance Cost to Date • Total Number of Connectivity Failures to Date • Expected Total Payments Upon Completion • Number of Delinquent Payments	• Business Model (Rent-to-own, Pay-per-use, Lease) • Average System Size • Average Credit Period • Average Customer Deposit as a Percentage of System Landed Cost • Monthly ARPU (average of (total paid to date/months since system acquisition)) • Installed Cost Base (sum over all system landed cost) • Average Expected Total Payments Upon Completion • Portfolio at Risk (PAR) for business model-dependent time periods such as 7, 30 and 90 days • Distribution of Days Ahead/Behind • Percent Write-Off • Lifetime Revenue Ration and/or Utilization Rate (dependent upon business model) • Churn • EBITA Breakeven (true company-level, not computed over cohort) • Average Maintenance Cost per Month • Average Connectivity Failures per Month • Compliance with Lighting Global Technical Standards • Forex Exposure (true company-level, not computed over cohort)

The KPI short list was refined through a series of industry consultations, including a roundtable with pay-as-you-go operators, pilot data analysis, and targeted investor meetings. In total, more than 40 stakeholders from off-grid solar firms and investors were consulted by the WBG. Several

[3] http://www.financeforresilience.com/
[4] Primarily, but not entirely, aggregations of customer-level KPIs

partners have agreed to use the framework to assess their upcoming investments and apply more systematic performance tracking of their portfolios, according to the World Bank.

During the World Bank-led consultations, operators emphasised the importance of investor-friendly, simple and precisely defined metrics that provide enough flexibility to account for the diversity and potential evolution of different business models. Pay-as-you-go companies also highlighted the need for information aggregators to provide guidance on how to correctly interpret the KPIs within the context of different business models and diverse customer pools.

Financiers will need to apply the metrics within the context of varied business models and strategies. For example, a rent-to-own model will likely focus on different metrics than a perpetual lease business model. As such, the KPIs will not be suitable for universal scoring but rather as a tool to make the financial and operational performance of the sector more transparent.

It is important to emphasise that the KPIs are not meant to replace the role of investment officers, nor will they replace more detailed data collected directly from the operators. The KPIs are meant to support a first assessment, and empower officers to benchmark and make faster investment decisions. As such, KPIs are expected to improve communication within the sector and with new entrants, as much as they will support investment decisions.

At present, the World Bank-led initiative is in the process of performing data testing of the KPIs in real company environments in order to determine which of these KPIs will be most effective for quantifying and predicting risk. In parallel, partnerships with financial institutions in Kenya, Tanzania and Nigeria have been set up to do in-country testing, explore what tools and structures will be most useful for local financial institutions, as well as develop training modules for local actors.

ABOUT US

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