

4. Gap analysis

In an earlier report released by the Solar Energy Cluster, we explored the cost of energy access. Even for tier-3 access, which is much more power than provided by most paygos and mass-distributing SHS today, distributed and off-grid solar energy is the cheapest option for electrification in most unelectrified areas of Africa.

The economics of the SHS paygo makes sense. While most utilities in Africa sell their power at a loss¹, paygo SHS units are sold with a positive gross margin, making this a real market with enormous opportunities. Unlike public utilities, this market has been developed by private players. Solar paygos provide lightweight, clean, efficient and cost-effective energy to rural Africa.

Paygos are essentially small, distributed utilities. Like for grid investments, paygo is capital intensive and requires payback over time. However, the income comes from many small payments from a large population of rural customers. Hence, unlike for more ring-fenced infrastructure investments, delayed payments and defaulting customers poses a risk to profitability on portfolio level.

As a less mature sector with direct end user risk exposure, raising institutional and commercial debt at scale has been challenging, especially for the small- to mid-sized companies.

How can the financing gap be closed?

1 The Solar Energy Cluster

In this section we explore if and where there are gaps in the funding of off-grid energy in the context of the Solar Energy Cluster (the cluster). The cluster in general, and the off-grid group in particular, has member companies across the value chain from R&D/technology providers to C&I electrification projects and last-mile paygo SHS distributors.

Based on the feedback and contributions in the group, this gap analysis has primarily focused on financing of small-scale/paygo companies. These are companies where

- 1) the distributor is an entity operating in a country in Africa
- 2) goods are primarily sold through paygo solutions
- 3) the collateral is mainly tied to receivables from distributed assets in rural Africa

While the group's members cover a much wider span than this, lack of financing of the last-mile distribution companies impacts several sectors of the value chain.

PAYGO service providers currently require hundreds of millions of dollars in working capital financing. From 2017 to 2022, this working capital gap will grow to USD 3.5 billion [African Fronteer Capital]

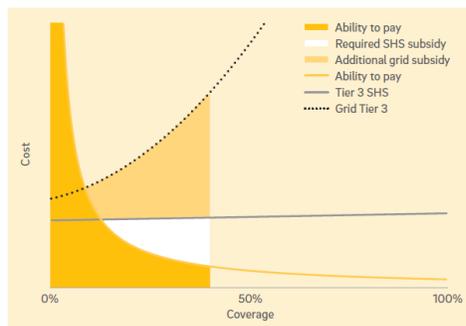


Figure 1: Per-unit off-grid electrification cost

¹ [Trimble et al \(2016\)](#)

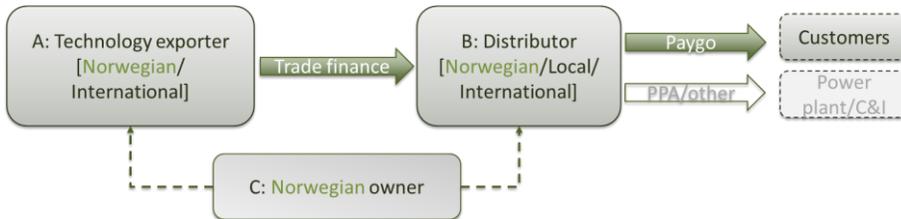


Figure 2: Simplified value chain, off-grid solar

The off-grid group has members in both A, B and C, who are all impacted by difficulties to obtain finance for distributors in Africa.

The financing complex contains more than one element of financing and will look different for a technology producer than for a distributor. As a rough overview excluding normal corporate finance, R&D, product development, etc. we can say that the distributed energy value chain at least needs production, trade, inventory, and receivables finance.

The main part in terms of time is **receivables financing** where distributors in the paygo business sell products through credit sales and leasing agreements. This means that the distributor will get paid for the products over a period of time, normally from 12 to 36 months. In practise, the distributor then needs to obtain working capital for a period including the trade finance, inventory finance prior to sale (3-12 months) and the subsequent credit sale period. This total financed period for a product could be as much as four years long with the outlined intervals. The goods are in or on the way to Africa the entire period, and installed in rural, off-grid locations for most of the period.

If this is to be financed with debt, the financial institution (FI) providing the funds must be comfortable about the deal in terms of

- receivables/cash flow available to service the debt
- satisfactory collateral and/or guarantees for the transaction

There are many facets of this, which we will explore further.

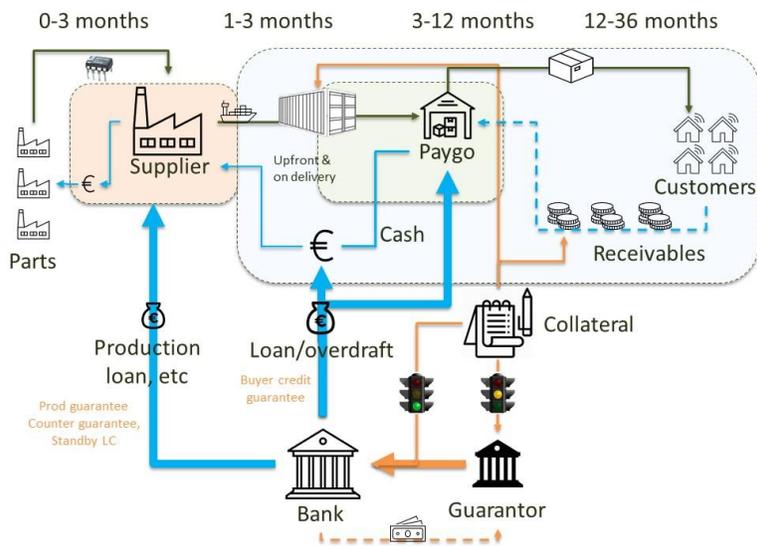


Figure 3: Financing "overview"

2 Development of the paygo market

The paygo market is relatively new. So far, the declared success stories are relatively few. Most companies are still in a growth phase. The market has over the past few years started a transition from grant and equity financing to a more blended financing picture with more debt in the mix. In Figure 4 below, analysts in Wood Mackenzie placed the solar paygo market in the scaling phase, indicating that while the small-scale solar market in general is relatively new, the SHS paygo sector has grown standardised enough to attract debt funding.

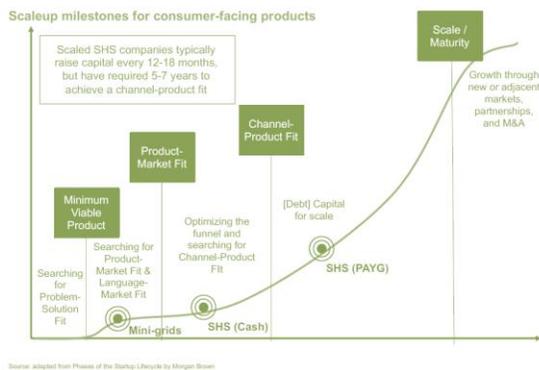


Figure 4: Scale-up of consumer-facing products (WoodMac)

We have started seeing some market consolidation, and an increasing concentration of capital around a few relatively large companies. On the consolidation side, the “Engie cluster” of companies is steadily growing (including both Fenix and Mobisol). On the capital side, the large capital seems focused around a few large actors. According to [Gogla](#), the three largest funding deals in 2020 comprised about 74% of the known funding. At the same time, almost all this funding is public or impact finance.



Figure 5: Funding of paygo market, top 3 and 10 players as % of total

Gogla’s analysis also shows that most of the funding now is debt, with transactions totalling \$31M in equity and \$142 in debt by the end of August 2020.

In a general company life cycle, early-stage businesses are financed by equity (and grants) while the most mature companies issue their own bonds. So far, distributed energy companies would be considered up to medium-sized and should be well into the debt space.

2.1 How are paygo companies financed?

There is a plethora of financing instruments in the market. As a general theme in the off-grid market, start-ups and early-stage companies are usually not debt financed. The traditional ramp-up starts with small contributions of equity from own funds, family & friends, etc, or angel finance. This, plus grants, is pretty common also in off-grid energy. As suggested in Figure 6, the early grants and equity are gradually replaced with short-term bank loans, venture capital and private equity before transitioning to public listing or issuing own debt.

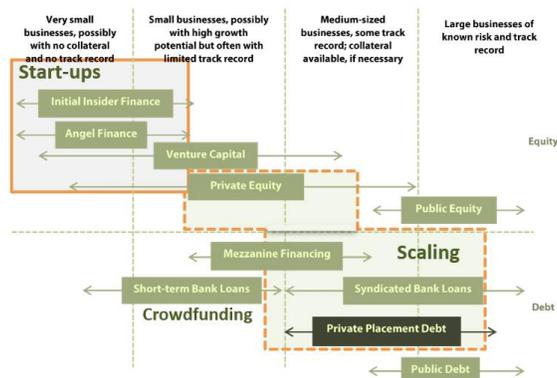


Figure 6: Financing cycles ([Prudential](#))

2.1.1 Crowdfunding and blended finance has provided the short-term debt

Distributed energy in Africa has not had easy access to risk-willing local banks. Instead, the transition to debt in the distributed energy business seems to have happened through crowd funding. This is a relatively new form of financing that has developed over the past few years. In crowd funding, capital is provided by a large number of small contributions, commonly through an online platform. The crowd funding FI organises the financing deal, conducts DD and invites these small investors to participate. Investors usually do not conduct significant own due diligence.

While these platforms were primarily thought of as microfinance institutions, they have been providing companies like BBOX with funding in the magnitude of several million USD. It has been the first debt step for several paygo companies. The main crowdfunding platforms for off-grid energy seems to be Trine and Lendahand, but there are several of these platforms in the market.

Crowdfunding has been able to supply the paygo market with capital by taking out a few key risk elements. First, most CF loans are relatively short, typically with a year's duration. Second, they demand that the company applying for loan has a relatively large portfolio (>10k customers, \$1M+ receivables), and growing. Third, they want the company to have sufficient corporate funding in place before the debt, so that the debt is essentially only financing assets. With a short horizon, this creates sufficient confidence that the loan can be repaid. Finally, Sida has provided guarantees for such transactions.

Rates in this market will vary with risk, but as a rule of thumb, crowdfunding provide debt at a cost range from 8-12% in hard currency. (Euro, USD). (Small) paygos would be placed in the expensive end. Local currency debt is often hard to come by and/or substantially more expensive.

In addition to crowd funding, institutions like SunFunder and CrossBoundary have been offering blended debt products also to some growth companies in the paygo business. The investors to these funds are larger, institutional or impact finance oriented. By providing the debt in layers, these have been able to reduce the cost of capital to its borrowers. SunFunder is also backed by a Sida guarantee.

2.2 Scaling capital requires organisation

A few of the larger paygo companies have been able to secure larger scaling capital through securing debt with longer duration, often together with equity. Some of these have done so in several rounds. These deals are structured in different ways, but there are some trends:

- DFIs are parties to many of the large transactions. A few DFIs are parties to several of the larger deals, for example Norfund, CDC, OPIC and FMO.
- Other funders are targeting development, financial inclusion, solar (SunFunder, responsAbility, Oikocredit)
- There are few commercial debt providers.
- Several of the funders are both providing debt and equity, but not necessarily in the same round.
- Large transactions and scaling capital involves a higher debt share & several financial institutions.
- Several of the deals are looking at special purpose vehicle (SPV) structures where assets are taken off the balance sheet and set up like pure financing arrangements.

Table 1: Deal examples

Company	Year	Transaction details
 M-KOPA	2017	M-KOPA Secures US\$80M Debt Funding (Stanbic , CDC, FMO, Norfund, responsAbility ++)
 ZOLA	2018	Zola Electric closes \$20 million in debt financing, (Sunfunder++)
 solar now	2019	SolarNow closes \$9M debt facility (Sunfunder, Oikocredit and responsAbility)
 sun king.	2020	Greenlight Planet secures \$90m in equity and debt funding (CDC, Norfund, FMO, responsAbility++)
 d.light	2020	d-Light creates working capital facility with Solar Frontier Capital (USAID Scaling Off-Grid Energy). D-light has secured \$158M in debt, \$56M in equity and \$10.5M in grants over past four years. Funding has been from EIB, Norfund, OPIC, SunFunder, Sima, Citi
 Bboxx	2015-2020	BBOXX has secured financing for several debt facilities, per country, from \$2M to \$8M, also with local banks. (They also completed a series D equity round of \$50M in 2019 with Mitsubishi & Engie)

3 Experience from Norwegian cluster members

The Off-grid group are naturally exposed to the off-grid sector. Some of the members have shared insights in funding and financing processes with the group. A short summary is as follows:

3.1 Bright

Bright is a Norwegian exporter of solar PV equipment for the off-grid energy market. Bright was founded in 2011. They have developed lanterns and solar home systems and sold through both UN channels and to paygo distributors in Africa.

While Bright themselves do not require working capital for paygo activity, their customers are dependent of ensuring financing when ordering with Bright. Bright has therefore taken an active position in assisting customers obtaining required finance. This has been done by assisting in processes with potential financiers and guarantors. This work has primarily taken place with African banks.

The following are observations from the processes they have been involved in:

- The process of obtaining financing is slow and the process of obtaining a guarantee is slow. Nothing happens without pushing
- African banking is local, and even if there are possibilities within the bank, local branches are not aware, and banking is not efficient.
- Finding the right people is key. Need to find and have process including the actual decision maker.
- Many banks are not ready for funding off-grid electricity or invoking guarantee facilities. Easier to work with those that have guarantees in place.
- Have tried several banks before finding one with possible path. Have also had to change banks.
- There are repeated issues regarding nomenclature, particularly issues w.r.t. guarantee products have taken quite a while to understand and eliminate.
- Guarantees need to be elevated from local branch to holding company
- Good hope that proposed deals will come through, although this takes time
- Have needed to suggest alternative structures (insurance, on-lending²) as neither banks nor guarantee facilities have been satisfied with setup/security provided.
- GIEK's demands for minimum credit rating also causes problems.

3.2 Solar Village

Solar Village (SV) sells solar and agricultural products on paygo in Zambia. The company was founded in 2013. The company is a registered Norwegian company with Norwegian owners. They have previously secured funding from NCF in addition to shareholders. Their business activity is in Zambia.

Solar Village has attempted to obtain financing for their paygo activities, so far without success. In summary, Solar Village have tried debt sources in Zambia and Norway, as well as some international institutions. According to their experience, there are limited banks to try in Zambia, and all seem uninterested.

This list is probably longer, but in general, Solar Village sees the following key problems:

² On-lending: FI #1 lending to FI #2, FI #2 lending to customer. Only FI #2 is exposed to customer.

- The cash flow is not considered strong enough to take on debt funding and should be balanced with equity or grant
- Goods in storage and receivables in Zambia are not accepted as collateral by Norwegian banks.
- There are few banking alternatives in Zambia, and the identified Zambian/African FIs have so far not been interested. AGF requires African FI.
- AGF/GIEK/EK all require an external financial lead that initiates the transaction and either requires or strongly prefers it to be local. They also need a local FI involved. Involved FIs should have skin in the game.

Solar Village is working to secure equity financing in parallel. This could be used as co-financing/own contribution for the debt transaction. Solar Village has not yet closed the current equity round.

3.3 Differ

Several companies in Differ's portfolio are looking for financing. We will include two examples here.

The first example is a distributor of small and medium sized solar home systems, usually sold over 12-18 months' paygo contracts. The company was established in 2013 and has presence in several African countries. They have sold more than 60.000 units since the inception.

The company is looking for 5-10 MUSD in long-term debt financing to scale their paygo operations. This process started later than SV's process above, however based on earlier financing rounds and ongoing banking relations, the company has so far concluded that it is very hard to get business loans from local banks.

- 1) The company has up until now been financed by grant funding, initial investments from Differ & founders and short/medium-term crowdfunding debt. Crowd funding become more restricted as Covid-19 struck. The company is now looking for a more permanent/longer term financing mix.
- 2) The company has had success attracting shorter-term debt through crowdfunding platforms such as Trine and Lendahand plus a few others, but this is relatively expensive and too short-term to rely on in the long run
 - a. This has been loans with a tenure around 1 year
 - b. Interest rates are relatively high
 - c. This has been possible to finance provided that the company can show sufficient equity to take economic risk/increased cost of operation out of the equation.
 - d. Covid-19 (at least almost) shut this door, and made refinancing harder
- 3) The company has not secured local financing in the past but are attempting another round now through AGF.

As a second example, Differ is shareholder in two companies producing SHS equipment for use in off-grid locations. The two combined cover the range from 2W torches and SHSes to hospital systems up to 75kW. These companies are EU based. While these companies have access to financing sources for their own operations, including covid19-directed loans in Europe, they experience similar challenges as Bright whereas funding of paygos and companies on the ground is generally limited and cumbersome.

As a note, Differ's subsidiary Brighterlite was able to secure both equity and debt with guarantee for their scale-up a few years back. Brighterlite spent considerable equity resources developing a solid internal system with tracking of customers, linked to their built-in shutdown mechanisms, and sold enough systems to create proper payment statistics to back up volume and counterparty assumptions. In addition, the company was well-organised and based in Norway. While the financing was required by the distribution companies on the ground in Pakistan and Myanmar, the financial transaction had to be tied back to the Norwegian company and backed up by collateral and guarantees from its owners (A wider

investor group than Differ itself), to enable both a Norwegian transaction lead and a Pakistani bank to participate. While this was doable for Brighterlite at a time window, it is a case that is not easily replicable. Due to regulatory and political incidents Brighterlite decided discontinue/sell the business, so neither loan nor guarantee were ever utilised.

3.4 Sunami

Sunami is a Norwegian company founded in 2016. The company assembles and sells solar home systems for productive use in Kenya. The company uses the paygo model. Systems are normally sold on credit sale, and the credit period is up to three years. Sunami is steadily growing and will be needing growth capital/working capital to enable this growth.

Kommentert [AS1]: Øyvind: Her har du best oversikt selv.

4 Support to grid electricity vs distributed energy

What is the nature of the support schemes set up to catalyse investments in power in Africa? Below is a brief outline of some schemes and ideas that have been tried.

4.1 Large-scale power support focuses on bankability

It is not easy to obtain financing for power plants in Sub-Saharan Africa. However, over the past years, this market has been able to get both solar and wind parks funded, using a mix of financial tools. Below are some structures that have been used. Since these are large development projects, they need financing upfront. Support therefore addresses bankability relatively directly.

4.1.1 GetFit: Programme to make power plants bankable

GET FIT is one interesting support example designed to make grid power investable. Several countries (including Norway) have contributed to schemes like [GET FIT](#), a support programme for investments in energy supply in Uganda and Zambia. This scheme provides power supply projects with a premium on top of the negotiated feed-in tariff/power purchase agreement (PPA), a World Bank-backed guarantee for the rest of the tariff payment, and technical assistance. This structure helps to create a ring-fencing of the power plant incomes and limit the risk in a way that makes investments happen, which is very good. This in turn makes it possible to secure both equity and debt financing for power investments.

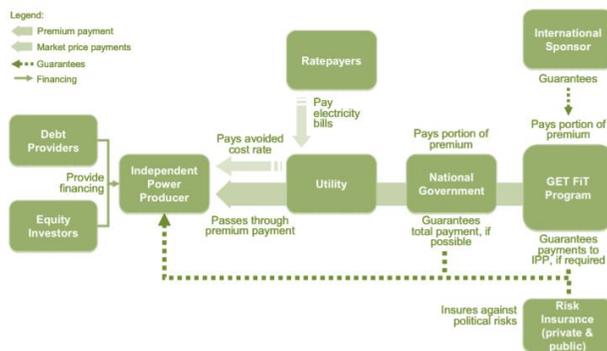


Figure 7: GET FIT overview

There are other relevant schemes. The Asian Development Bank (ADB) Renewable Energy Programme provides partial risk guarantees, direct loans, letters of credit and technical assistance to power projects in Pacific islands.

4.1.2 Norad's grid support: Making a power plant investment feasible

Norad has contributed to developing infrastructure in several less viable electricity sectors by supporting grid and power plant rehabilitation, and in some cases, providing infrastructure. One such example is in Mozambique, where Norad donated a substation outside the Mocuba power plant, a ringfenced Scatec project with DFI and public investors. Adding a substation cost to the business case would make the investment much more difficult.

4.1.3 State financing support: Providing concessional capital

Scatec's CEO Raymond Carlsen³ said that they have been offered to secure loans at a subsidised rate at under 2% for their recent projects in Tunisia. While this is an exception, it also shows what can be done if there is a will. Carlsen also outlined the need for proper guarantees in Africa to reduce the enormous premiums (up to 6%) on debt financing in countries in SSA.

Concessional financing has been provided for large-scale power also in SSA, for example in Mozambique.

African markets still require enormous investments in grid electricity. There is still country risk and projects take time and a lot of effort to complete.

4.1.4 State promises and guarantees

The buyer of grid power is the state utility. Permits and PPAs of 10-15-year duration shows government commitment and takes out the price risk from large power investments. It has been difficult for SSA governments to issue sufficiently strong sovereign guarantees to back the PPAs. However, they can issue letters of support or letters of comfort. The guarantee role has been filled by institutions like MIGA (A World Bank guarantee facility). MIGA has provided guarantees against *breach of contract and transfer restrictions and convertibility* for solar plants and other energy infrastructure in Africa and can do so if the PPA is sufficiently strong and backed by a sovereign letter of support.

Africa GreenCo is a private facility that can assist with guarantees for independent power plants (IPPs) in the Southern African Power Pool. [IRENA](#) provides a good overview of approaches to sovereign guarantees.

4.1.5 Summing up

It is still not easy to obtain financing for grid electricity, but the support structures present address financing hurdles. A combination of several of the above efforts of state commitment, long term PPAs, concessional funding and the occasional aid support has enabled both equity and debt to flow into African grid power. This has helped removing risk and adding predictability to enable financial commitment.

DFIs like Norfund have even been able to include funds like KLP into investments in grid connected energy supply. These investments can be put forward as financially sound, with large impact, and with an acceptable risk, and get financing (concessional or commercial). We believe that some of the same structures could also boost the off-grid sector to become equally sound, with more impact.

³ Zero conference 2020 interview. <https://zerokonferansen.no/>

4.2 Most off-grid support is short in duration, and focusses on helping companies in early stages

There is also support for the off-grid sector, both from Western governments and in African countries.

The most common support schemes are the grant programmes listed in section 3 of this report. Many of these grant programmes support start-up and early phases of companies, and to a more limited extent cover mid- to long-term financing. Grants typically come with a co-financing requirement (i.e. requiring the company to cover a percentage themselves), commonly from 30% to 60%. Most of these are awarded in lot sizes up to a few hundred thousand dollars and are directed towards start-ups or programmes.

In addition, there are several result-based financing schemes. The largest programme is the Energising Development (EnDev) programme, that provides result-based financing to select energy programmes in Asia and Africa. Norad and the Norwegian ministry of foreign affairs are amongst the donors. Another interesting mention is the CLASP programme, providing RBF for distribution of high-efficient appliances (TVs, refrigerators, fans) to the off-grid markets. These programmes are very good approaches to direct premium payments towards desired development, i.e. pay distributors to deliver products to the right target groups, and have in many cases led to good progress. However, the temporary nature, size and geographic limitations make them hard to bank on.

Many SSA countries have tight budgets and limited financial freedom. However, quite a few of these have created incentives to remove VAT, import taxes and duties to boost off-grid energy. However, Kenya, one of the more advanced countries in SHS and paygo, just announced it will remove the VAT exemption (again⁴) illustrating that there is limited foresight in this. Countries like Togo, on the other hand, have made public services like the postal service available to off-grid developers to facilitate roll-out and help off-grid energy.

Sida's support in the guarantee segment is a significant contribution to getting financing in place for desired renewable energy projects in SSA. This has been an important driver to establish the crowdfunding segment, which has been the main lending segment for small-scale renewable energy distribution.

On a positive note, the Uganda Energy Credit Capitalisation Company (UECCC) extended their services to a working capital facility for solar home system companies in 2018. UECCC has issued partial risk guarantees (PRGs) for power projects and has done so for several micro hydro power projects and solar parks. While the working capital facility now seems operative, we have not been able to verify how efficient this working capital facility. However, we know that it struggled significantly with approving SHS companies in 2019 and had to restart the process as no companies were certified. It now has 13 prequalified companies. It does not seem like the UECCC has issued any PRGs have been issued to distributed energy companies.

4.3 How does the difference between large-scale and small-scale pan out?

By and large, distributed energy has decent sources for grant funding for distributed energy in the starting phase, (semipermanent) tax levies and sporadically specific RBF support. However, off-grid energy seems to have fewer tools to support scaling capital. Grid electricity projects have to a larger degree been able to secure guarantees with sovereign backing, long-term PPAs to increase predictability, and concessional loans and in some cases long-term feed-in tariff premiums to improve project economics.

⁴ It was also removed for around a year around 2014

As a result, small-scale distributed energy grows slower than it could have done with more capital, concessional capital, and better guarantees.

5 How do financial institutions treat bankability?

All financial institutions protect their money by conducting a due diligence (DD) process before investing. This DD process shall answer all questions and concerns the investor has and create an understanding of how the company's business works. One important aspect in this process is to validate or create a financial model to understand whether the receivables generates sufficient cash flow to pay back debt and/or generate return to equity after other costs are covered. The process looks at investments in terms of key risk factors affecting the investment. This pans out differently depending on the investor and investee.

The FIs will desire to eliminate as many risks as possible. Consequently, they want to create an understanding of how the remaining risks impact their payback.

To look at how this plays out for a typical paygo, we have borrowed the risk framework from the GET FIT programme. This framework is used by the programme to categorise and describe risks for investments in power infrastructure in Uganda and Zambia. The approach is relatively generic, and looks at risk in terms of

The GET FIT programme is a set of mechanisms designed to leverage commercial investments in power plants in Uganda and Zambia. The programme provides time-constrained result-based subsidies [\$/MWh], risk mitigation tools [political guarantees, hard currency payments] and technical assistance to projects in their portfolio. The country and utility provide predictability through commitment, permits and PPAs. GET FIT enables public-private partnerships, without obtaining ownership in infrastructure.

- Development/Construction/Economic risk
 - o Government approval processes (Small for paygos)
 - o Economic development risk (cost of construction). We have broadened this category to include risk of increased cost of running paygo
- Revenue risk
 - o Price risk (Risk that sales prices drop)
 - o Counterparty risk (Risk that customer does not pay)
 - o Volume risk (Risk that company delivers/sells less)
- Currency risk
- Political risk

While these risks are generic, they are very useful for assessing where banks have or will have issues with a financing proposition.

5.1 Development/Construction/Economic risk

Paygos run with very limited permits and official licenses, so they are not particularly exposed to government transparency issues and **approval risks**. Some paygos have signed government MOUs for participation in state programmes.

A paygo is dependent on running an effective organisation and keeping cost down, but as the company grows, so does the cost of running the organisation. Hence increased incomes could be more than offset by increased cost. This poses a risk to the bank, who does not like that exposure to **economic risk/overhead/sales/etc** comes in addition to other risk.

A large-scale renewable power plant, on the other hand, will include most of this risk in terms of increased construction cost. After construction, it will have predictable running cost and a limited organisation.

5.2 Revenue risk

Paygos are exposed to **price risk** for future transactions (through increased competition and lowered margins). Like for a power plant PPA/tariff, they have limited or no exposure to price risk for signed contracts.

Paygos are highly exposed to **counterparty risk**, and rural customers' lack of credit history renders normal credit rating services useless. Many paygos have developed own frameworks to assess counterparty risk. One larger player in solar off-grid noted that credit assessments only work for larger customers with auditable accounts.

Volume risk concerns how much the company can deliver. For a power plant, this is the MWh delivered. For paygos it is a combination of the number of sales and the timing of customer payments.

5.3 Other risks

Currency risk is a major issue in SSA and is particularly difficult when loans are in hard currencies such as Euros or USD and incomes are in local currencies. One such example is the Zambian Kwacha. This has halved against both EUR and USD over the past two years, halving the hard currency value of the income generated. This is a large problem if the loan is in USD, but not if the loan is in Kwacha. These exposures are also prohibitively expensive to hedge against.

Political risk concerns the chance that country specific issues strike. This could be many things, including policy changes to impossibility of transferring money out of the country.

5.4 How is this framework applied in practise?

This framework is used to create the necessary understanding of a transaction and being able to eliminate or reduce some of the risks before committing capital. On one side, any financial investment has some sort of risk left. On the other, no Fi would want to commit anything to an investment with no risks covered.

This becomes a framework to assess risks, mitigate what is possible and handle the rest. Mitigation can be done using a long list of measures like MIGA guarantees, PPAs/feed-in tariffs, insurance, etc. Often, it is easiest to design a physically separated special purpose vehicle (SPV) that has sufficient revenue and fewer risks than the company from which it originated.

Assessing all these risks is hard and requires local expertise. FIs therefore often require that the transaction uses a local FI to understand a company in its local market and regulatory framework, as it is quite hard to assess these risks from far away. If a local institution would like to provide some of the financing, then a larger foreign entity can join. The local FI most likely also sees larger value in the pledged collateral than a foreign entity, at least for smaller deals.

GIEK/EK demands a local transaction partner, while institutions like SunFunder can do transactions in "foreign" countries and send DD teams to assess. Most Norwegian banks would probably also demand a local partner.

5.4.1 How this works for a power plant under the GET FiT programme

GET FIT have produced the below overview of who covers risks in a typical power plant investment. Any larger investment looking for funding would need to mitigate or control these risks, so this is not unique

to GET FiT. However, it is useful to see what this programme deemed as necessary to attract commercial funding.

Table 2: GET FiT risk and roles

Risk/Barrier	Mitigation Strategy	GET FiT Program	Partner country	Utility	Int'l. Sponsor of GET FiT	Third parties
Development risk	Transparent approval processes	(indirect)	●	◐	○	○
	Equity investor carries economic risk	○	○	○	○	○
Construction risk	Transparent approval processes	(indirect)	●	◐	○	○
	Equity investor carries economic risk	○	○	○	○	○
Revenue risk	FIT mitigates price risk	●	●	◐	◐	○
	Guarantees mitigate counterparty risk	●	●	○	○	○
	Equity investor carries volume risk	○	○	○	○	○
Currency risk	Hard currency GET FiT premium	●	○	○	○	○
Political risk	Political risk guarantees	○	○	○	○	●

● = Primary role ◐ = Secondary or optional role ○ = No role

Essentially, the owners/equity investor cover risk of increased development/construction cost and volume (fewer MWh delivered). For a renewable energy power plant, O&M is predictable and marginal cost is zero, hence normal operations are easy to predict. The other risks are reduced or mitigated and not part of the deal the power company takes to the bank and guarantee facility. If the power company can create sufficient certainty regarding development/construction cost, a power plant investment is essentially an investment in a SPV producing MWh against a PPA. This is a deal that is simple enough to take to an FI.

Volume risk remains uncovered but should be predictably small. In addition, while the GET FiT programme claims it is covering currency risk, this is only for the GET FiT premium and not the tariff negotiated with the local utility. This risk is reduced rather than mitigated, and currency risk is implicitly remaining in all non-hard currency PPAs.

This is possible to set up also without GET FiT. We chose to use this as illustration as it shows what mechanisms GET FiT deemed as necessary/missing for power plants to invoke commercial capital.

5.4.2 What does a paygo risk profile look like?

The overall framework works quite well to describe corporate finance of paygos.

The main adaptation that is required is to include economic risk of increased overhead/organisational cost into the equation, and lowering focus on development/construction risk, as this is smaller for an organically growing company of distributed assets.

The paygo's job with the FI is to create an investment where sufficient risk is taken out of the FI's equation. In this respect, the paygo would have to understand what risk the bank is taking and what risk the investment has.

Elements that are often presented are

- Currency risk is not handled or too expensive to handle. Loan can only be provided in hard currency; income is in soft currency. Hedging is prohibitively expensive.
- Investment has too much economic risk: risk that predicted and necessary income increase is simply offset by increased overhead resulting in insufficient cash flow. The FI looks for higher certainty in cost or simply larger incomes to offset the cost by a margin sufficient to rule this out as a risk.
- Country/political risk too high/cannot finance operations in given country
- Volume/counterparty risk too high compared to revenues/too low payment rates

Although not explicitly commented, one can also argue that

- There is no guarantee to back up payments from customers in a form that a PPA with MIGA guarantees and/or a GET FIT guarantee can provide. There can be a guarantee on the shorter-term loan current receivables, but this requires a transaction lead.
- Political guarantees are probably not achievable for a paygo.
- The certainty in paygo revenues is limited to the length of current contracts, which are typically 1-3 years in duration. Power plant PPAs are typically 10+ years.

All in all, the paygo will have to work to reduce the risks or show that the revenues are large enough to defend the uncertainty. However, like the power plant investment, the paygo is likely still dependent on taking away some of the uncertainty or add equity to secure debt.

5.4.3 Taking paygo receivables off balance sheet

This is a clever approach to remove unwanted risks from a deal. The paygo “sells” a set of homogeneous contracts (in both duration and other terms) to a legally separate special purpose vehicle (SPV), usually after the initial instalment has been paid. This vehicle has no economic risk (no unpredictable overhead/corporate) and no price risk (fixed contracts). There are no pending approval processes. With sufficient receivables in the pool of customers, it is possible to argue that sufficient money will flow back into the portfolio.

There will still be currency risk the loan and receivables are in different currencies. Also, there will be some country/political risk. It seems like it is easier to set this up per country so that this exposure is relatively simple (exposure to one country) rather than taking an overall approach.

Several of the larger paygos have taken receivables off the balance sheet to be able to obtain financing. Examples include d-Light, BBOX and SolarNow (loans, not paygo), but there are probably more.

The main disadvantage of this structure is that it is expensive to set up the SPV in a way that make it investable, and it is therefore hard to defend the cost for small portfolios. Since contracts should be homogeneous, it is even harder to pull together enough contracts to make it work. However, once this is done properly, portfolios seem to be investable. As a rule of thumb, this is a useful structure for batches of 10.000+ SHS.

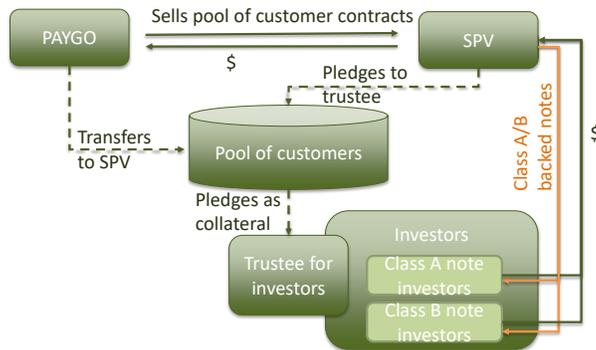


Figure 8: Special Purpose Vehicle (SPV) for paygo finance

This structure resembles a power plant investment in that the remaining risk is in the volume delivery, with some currency/country risk. However, the power plant would have longer income certainty (10+ years), hence the paygo should still expect to refinance more often (every 1-3 years). This means more financing work, but it will likely also open up to more local banks that can only offer shorter terms.

5.5 How does the risk vary across the different setups?

The below table attempts to summarise the different setups in terms of risk. As is seen, a GET FIT power investment can reduce the uncertainty to volume risk in delivery and some construction cost uncertainty. A power plant is often set up as a separate company/SPV from the power company's side to shield the investment from other noise. The paygo SPV is relatively similar, and since the transfer happens post-installation, the SPV mainly contains the volume and currency risk.

Table 3: Risk comparison

Item	Large scale grid power Adopted from GET FIT	Corporate paygo debt	Paygo SPV debt	Crowdfunding
Dev & constr. risk	Approvals / state involvement Equity investor (Infrastructure support)	MOUs?	N/A	N/A
Revenue risk	Economic risk Feed-in tariff	Equity investor, RBFs?	Moved out if SPV	Sufficient equity + short term=OK
Volume risk	Price risk State guarantee	New customer contracts Diversification, track record, guarantee?	Fixed customer contracts Div. + TR + guarantee	In practise fixed customer contracts Div. + TR + SIDA guarantee
Currency risk	Counterparty Equity investor	Equity investor?	Known profile SPVs/tranching	Known profile, sufficient receivables
Political risk	** (Hard currency payments?) ** (Political risk guarantee)	Local bank?	Hedge? Equity investor? Local bank?	Lower exposure on short-term loans

The power plant model also includes a few GET FIT features that are useful for attracting finance. First,

the premium is paid in hard currency. For hard currency loans, this lowers risk. The tariff might still be paid in local currency. Also, GET FIT can invoke MIGA to provide political risk guarantee. We are not aware of this facility being invoked in the paygo market.

Securing corporate debt for a paygo is possible and has been done. However, it is likely to require good and significant track record to create confidence in the numbers. It is therefore likely difficult to attract. To the very least, it requires good engagement with the FI and its modelling team.

Finally, relatively short-term crowd funding debt resembles the SPV if one can show there is sufficient equity to cover economic risk, and sufficient contracts in the receivables portfolio to get money back. In the longer term, also the crowd funder would have to consider taking assets off the balance sheet or assess the economic risk of the corporation. Since Sida backs crowd funding for renewable energy, it has been relatively straight-forward to include this guarantee. This has undoubtedly added funding in the off-grid energy market.

5.5.1 Does the market have relevant guarantees to take out counterparty risk?

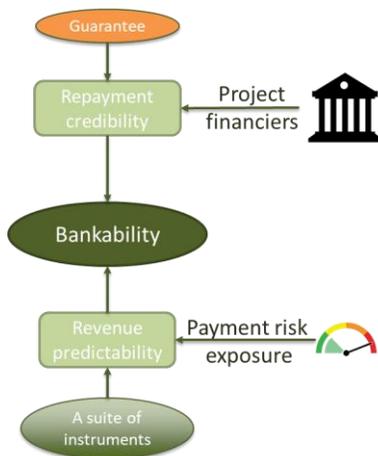


Figure 9: Bankability

As a bank or other financial institution assess whether or not to provide debt, guarantees can provide the necessary comfort for the bank to go ahead.

In principle, the guarantee is a tool the FI can use if it believes that the deal is sound, but the risk is too high. It ensures repayment credibility. This means that the FI believes that the company can carry the loan, but risk is too high and collateral from the lender is insufficient. If the FI cannot see how the company can pay back the debt, it will not approach a guarantist.

There are different guarantee facilities and products in the market. Both GIEK and the African Guarantee Fund (AGF) have mandates and provisions to assist renewable energy in SSA, and are able to guarantee up to 75% of a transaction for receivables debt (to take out counterparty risk). These both work with relevant ticket sizes for the paygo market.

AGF has a portfolio guarantee with several African banks where smaller amounts can be guaranteed with relatively little effort, and do individual guarantees for larger

amounts or repeated mid-sized amounts. GIEK also have relevant products. Both of these require a commercial FI to be the transaction lead. This is common practise. While the products are there, experience is that it has been very cumbersome to invoke these structures for paygos. One reason is that it takes time to establish a relationship between FI and guarantee facility. If this relationship does not exist, it is most likely a process requiring board approval at the bank. Second, African banks are slow and local. It can be hard to find a relevant contact point in the bank that understands the guarantees, and hard to push this internally. Third, the guarantist most likely needs to have a deal with the bank at a holding level, while African banks often operate through autonomous local branches. Fourth, bank ratings follow country ratings closely, effectively rating a lot of the African banks too low for most Western guarantee facilities. Finally, there might be a need to add insurance, etc to make the deal work. In sum, the guarantee work can be very slow or fail because of criteria that are hard to fulfil.

Having said that, GIEK/EK actually has a mandate to let the developing country part of its portfolio develop with lower return to allow more guarantees in these markets. However, since the transaction lead requirement remains, we do not believe this mandate is effectively triggered. This is not only a problem for paygos, but a general challenge for relevant investments in developing countries. There is a guarantee programme under development under the Norwegian MFA, to support some of these structures, but this is primarily directed towards large-scale structures.

It seems like this part of the market has seen relatively few deals, and could be a gap, or at least a part of the market that could work a lot better than it does. We also believe it would be beneficial for the paygo market work to carve out the first deals here to show that this can work. On the positive side, if a local transaction lead believes that revenue predictability is ensured and wants to have a guarantee, there seem to be relevant guarantee facilities.

6 Where are the gaps?

The assessment of the market, support from 3rd party reports and discussions with cluster companies, development organisations and financiers in the market has outlined some key challenges for financing of the off-grid energy space.

6.1 The leap from small-scale equity finance to large-scale debt finance is large in the solar paygo market.

It has been challenging for distributed renewable energy companies in Africa to access longer-term receivables financing.

There is a shortage of cases to pave the way

Most off-grid energy companies are new companies that do not have a long-standing well-functioning banking relation to rely on or financial strength to finance off-grid operations over own balance sheets. Banks want simple success cases to release the funds paygos need to produce simple success cases and see a market with many struggling companies they do not know, and few cash cows.

Smaller entities need scaling capital before turning profitable

Off-grid paygo companies likely need to build solid track records and shows larger incomes before attracting long-term debt, but this also requires capital and hampers growth. Since financing needs to be integral in products, the need for large-scale financing comes early.

Provisional inventory funding and crowd funding helps to attract working capital but eats heavily into profit. This funding structure makes it hard to finance over own books in a scaling phase. This limits growth and raises the bar for successful scaling.

Transaction cost sets the minimum deal size at 1-2 MUSD

Financiers want size to defend overhead and simplicity to limit risk and further overhead. This is easier to do in 10k tranches of equal contracts than in 2k tranches of mixed contracts. Larger paygos are increasingly capable of securing debt funding, but the companies are relatively few.

6.2 Smaller companies need to work on financeable structures

Companies need to develop structures that takes down risk for funders. This can be performance tracking software, streamlined contracts, etc. They should also consider what they can do to shield receivables

from other risk. This can be learnt from looking at the large paygos, but it is also present in other modern energy investments in Africa.

While this could be considered premature, it might be too late as companies enter the growth phase. Hence it should be worked into the growth strategy.

6.3 Institutions have capital, but are reluctant to take lead

There are financial institutions in place that could be used. DFIs and impact investors have provided both equity and debt. It still seems hard to attract ordinary commercial finance to reach beyond bellwethers. The sector seems to struggle with the terms set by commercial banks and guarantee facilities. It is very positive to see that organisations like Sida are developing the market by providing guarantees and investigating first-loss capital to catalyse the financial sector.

GIEK/EK probably works as intended, and even has favourable terms for Norwegian companies, if approached by a willing transaction lead. They also have funding to operate the development country portfolio at a loss. However, as long as it is far between willing transaction leads, Although EK has inexpensive working capital to grow this market, they remain relatively unexposed to off-grid energy in Africa.

Institutions like SunFunder is an exception. They have developed a layered/blended finance approach (without first-loss capital) that seems to also extend to smaller players. There is a need for more such funders. It would probably be very beneficial to include a portion first-loss capital.

6.3.1 Unless mandates change, African banks are likely key

The Norwegian Energy Cluster needs to build relations with African banks. An African bank as transaction lead would open for multiple opportunities, including opening for Norwegian export finance. Even with the most experienced banks in this field, there will be a need to work on the relationship for a while to create the comfort the bank needs to agree to a transaction. It would be of value to the group if companies could approach their African banking connections to see if they can carve out a deal. International paygos are probably good customers for the banks, but the paygo market is not what they traditionally cater for.

6.3.2 Changing GIEK/EK mandate could provide new way in, but is unlikely

One option could be to let Norwegian institutions like GIEK/EK take a more active and independent role, even as transaction lead. This would mean that they need to increase internal due diligence capacity but would allow them to take a more developing role. While projects with insufficient cash flow would still be unviable with GIEK/EK as lead, it is likely that there are good financing opportunities for GIEK/EK amongst the many scaling African off-grid energy companies.

This has been a hurdle also for other business. So far, there has been limited will to change this. It would require a policy change, and most likely the Solar Energy Cluster cannot make this happen alone.

6.4 There are generally few capital sources

We have chosen to focus on the debt side, as unlocking debt finance is what could truly accelerate the market and provide the working capital needed to accelerate companies in the growth phase. The debt in the paygo market comes from a few FIs, most of the capital is from DFIs. There is likely a need to expand this network to more FIs.

In many cases, there is a parallel process to attract equity to cover co-financing or collateral requirements or simply to strike a good financing balance. Looking at Gogla and identified funders, it is also clear that the equity market is populated by some of the same public players that provides debt. In addition, there

is a group of impact investors and is also relatively focussed. These contribute greatly. However, we believe the market is at a stage where one needs to get debt involved, particularly for companies with 4-5-year track record.

6.4.1 With a thin financial market, DFIs could distort competition

DFIs are active but cannot carry the entire market. They will naturally limit their individual exposure to a few companies where they also prefer larger transactions, because they do not have the capacity to handle many investment processes.

In a scarcely funded market, financing is probably the most important competitive edge an off-grid energy company has. If DFIs continue to feed large money into a few winners, it also distorts competition as other companies are either forced to use more expensive capital sources or forced entirely out of business. On the positive side, there seem to be possibilities for smaller players within ElectriFi/SunFunder.

A system where DFIs could be allowed simplified processes to finance and follow up smaller companies could have a large impact on the development of the market. However, we understand that this is not the direction it is going, partly because of human capacity, but also because also DFIs will manage their current portfolio needs.

6.5 Off-grid energy could use grid-style support to secure funding

Over the past years, public money from many nations have been spent or invested in the African energy sector. The distributed energy sector has received grant funding for activities, and there are time constrained RBF schemes in selected countries. These measures all help but are still small compared to some of the larger infrastructure support that is also supplied into non-market activities (grid extensions) and state/DFI support to larger power plants. The funding the power plant needs to be built is the same kind of funding the paygos need to scale.

While this support is very good, and in many cases, effective, the effects could be even larger on the off-grid market.

7 Possible tracks to follow

Below are some key takeaways and suggestions.

7.1 Work to get financial institutions to step up and become transaction leads

There is a need for someone to take lead and carve out the first few deals. There are structures in place, but progress requires concrete deals to be carved out. Both Differ and Solar Village are following financing tracks now but have yet to conclude. These include banks in Zambia (Zanaco), Malawi (FDH) and impact investors. We believe that there is an interest to the group to follow these processes, to learn what is possible, what is not, and what terms are finally negotiated. While these deals will be private in nature, some general terms, process and obstacles are probably possible to share. It would be highly interesting to also follow a process with Equity Bank, as this is most likely one of the most progressive banks in Africa w.r.t. solar products.

7.2 Work with local financiers

The financial sector wants local FI presence. The group should work on expanding its African banking network. This is a sector that is not well known to the members. The sector can be difficult to break through. It would be beneficial to collect names and contacts of key people to understand who can make

deals happen. This should be of common interest to the group. We can set up a common document where we can contribute.

7.3 Suggested new schemes/programmes

With support from both development budgets, DFIs and local governments, large on-grid investments are leading the way in making clean energy bankable. We believe some of these experiences can be used to develop similar support for off-grid energy. The following two suggestions can be considered as inspiration:

7.3.1 Improving cash flows and foresight would make companies fundable.

It would be of great benefit if there was a programme for small-scale renewable energy similar to the GET FiT scheme, for use with off-grid energy in Sub-Saharan Africa. This would ideally be a programme that provides a guaranteed per-unit support and a guarantee to cover lost income from rural customers. This will improve the predictable cash flows for renewable energy. If this is in place, we are confident that financial institutions should come to the table.

This structure is similar to an RBF, and could be organised as international development under EnDev, or by institutions like Norad. While it might be argued that this is not market based, the goal of providing RBF-like premiums is to make companies sustainable over time. The GET FiT programme for large-scale grid power is essentially subsidies provided to attract investments.

7.3.2 Provide more FIs with first-loss capital to provide long-term working capital to off-grid energy.

It is possible to develop Sida's idea further, to find a FI that can run a blended finance fund where Sida/Norad/Other development organisations provide first loss capital for investments in off-grid renewable energy. This is similar to how USAID gave CrossBoundary a \$1.3M first-loss recoverable grant to leverage another \$6M for investments in the sector.

This structure could be put in most financial institutions including Norfund or NEFCO, but also private impact funds. First-loss capital would come from government institutions.

7.3.3 Enable DFIs funds for smaller ticket sizes

While many markets will have a few large winners, we believe that DFI capital to the off-grid energy sector in Africa is too concentrated. With few financing alternatives, DFIs are implicitly making their bets the winners. One should ensure that DFIs can effectively provide debt financing also for ticket sizes in the range of \$1M to \$3M. This would in effect mean a need to lower overhead and transaction cost by making the due diligence process leaner and committing to less active ownership.

8 Summary

Equal to traditional electrification through grid electrification, electrification by distributed solar PV solutions is capital intensive. The paygo business model, financing a large number of small infrastructure investments for customers, has been proven as the main commercially viable way to penetrate the off-grid electricity market. However, this way of providing distributed solar PV solutions requires substantial inventory- and receivables financing. There is a working capital gap to cover this.

Requirements for bankability

The willingness of well-established financial institutions to finance a project or proposal at a reasonable interest rate requires a business proposition the financial institution understands and believes in. This means that the financial institution needs to see a transaction that contains

- **Revenue predictability** and sufficient cash flow to cover financing cost
- **De-risking** measures to increase predictability and leave as little uncertainty as possible
- **Guarantees** and collateral in case revenues falter
- A transaction **ticket size** that is large enough to defend the bank's overhead.
- Plus many more requirements depending on the bank
 - o GIEK and ECN requires that the transaction is presented by a financial institution with skin in the game as transaction lead. An involved financial institution in the recipient country should be part of the deal
 - o AGF requires local financial institution
 - o Country, currency and rating restrictions/requirements

Gaps and challenges for off-grid energy

- Despite being a much cheaper solution than grid for providing electricity to cater for most electricity demands in Africa, distributed PV has some characteristics that make it challenging to meet the requirement for bankability.
- Africa is still a hard to bank continent
 - o Local African banks are slow to get through and reluctant to take lead, even if they are only to provide partial financing. The market for distributed energy solutions has only been truly active for a decade and local banks are still unfamiliar with financing distributed assets.
 - o Non-African banks are reluctant to provide financing where they do not have operations, and where incomes are in soft currencies
 - o African banks are often rated too low for Western institutions
- It is hard to de-risk smaller companies
 - o Distributed solutions are not one large project easily ring-fenced
 - o There is limited potential for accurate customer credit assessments and collateral
 - o Currency risk is prohibitively expensive to hedge
 - o SPV bundling requires a large number of equal contracts
 - o Profitability requires scale, but banks require profitability before scaling
- The public sector involvements in the distributed energy sector do not target financing barriers as directly as the involvement in grid electricity does.

Potential solutions/opportunities:

- Delivering on SDG 7 will require substantial and flexible support to both grid and distributed solutions.
- The support mechanisms for grid are more comprehensive and more established, and directed towards attracting commercial capital
- Governments and financial enablers will need to adapt financing structures to better fit distributed business models and be willing to mitigate risk at similar levels as for grid-electricity. There are already some blended finance products in the market. A further blend with first-loss capital could be very promising. There might also be opportunities through the new guarantee facility with the Norwegian MFA although this does not primarily target distributed energy.
- Distributed energy companies must try to learn from existing experience to become bankable
- If financial institutions are able to take lead, relevant guarantee facilities and export finance have mandates to provide de-risking instruments and reasonably priced capital.

Distributed PV solutions can help achieve universal access at a reasonable price and at a high impact per subsidy dollar.