GET.invest
Mobilising Renewable Energy Investments

Financing and Scaling Productive Use of Energy

Challenges and opportunities for catalytic growth

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1 Introduction

Productive use of (renewable) energy (PUE) is commonly recognised as a potential contributor to economic development, particularly in food value chains. PUE directly contributes to productivity enhancement and increased value capture early on in value chains. Thus, it is most commonly seen in the context of rural off-grid and peri-urban grid-connected electricity users. However, most industrial and commercial processes in developing countries can be considered as deployment opportunities for PUE, particularly where primary or backup power is provided by diesel generators.

Renewable productive use technologies are increasingly economically viable to deploy, especially as entrepreneurs are identifying new permutations and combinations of existing technologies to develop context-appropriate productive use appliances and tools. This is partly due to substantial cost reductions achieved over the last decade because of increasing digitalisation that enables cost-effective operations – both on a technical and financial level. An example of the enhanced use of digital tools is provided by the Pay-as-You-Go (PAYG) modality, allowing the reduction of the users' upfront investment costs of the technology (e.g. a solar powered irrigation pump) and enabling spreading the payment of the asset over a prolonged time. This, combined with advancements in generation equipment, energy storage solutions and other technical developments, has sparked a hotbed of innovation in the realm of productive use.

Matching innovation on the side of financiers and donors interested in private sector-led deployment of PUE, however, has not developed at the same pace. Part of this delay was expected: financing solutions are often crafted in response to increasing demand from a viable client base. This in the case of PUE is only just materialising at volumes sufficient to drive demand. However, impact investors and other results-oriented financiers would do well to anticipate the increasing and potentially massive demand for PUE financing instruments anticipated in the next few years. As such, this paper seeks to shine a light on the current challenges to PUE financing and offer some insights to better adapt financing solutions for this unique technical and operational approach to energy access. The top five recommendations arising from this report are as follows:

1) **Deliver capital**, preferably in the form of patient equity or concessional loans with interest rates less than normal risk priced interest rates or with extended tenors. Such loans should be provided directly to the manufacturers, operators and distributors (or their local [micro]financing counterparts) of PUE products and services to facilitate supplier finance for end user acquisition, since they know their client base best.
2) **Build local [micro]financial institution capacity** around PUE lending and adapt microfinance instruments from agriculture lending, like equipment leasing and *Ijara*, to the PUE context.
3) **Provide ongoing support for capital raising** by building the credit capacity of and facilitating established PUE delivery organizations to build receivables financing tools.

4) **Provide risk mitigation to local financial institutions**, especially MFIs, and PUE-specialized financiers to deal with currency and key commercial risks that arise from newly established and growing client portfolios.
5) **Aggregate end-user credit data**, ideally through direct risk participation at the end-user finance level.

1.1 Context and scope

GET.invest is a European programme that aims at mobilising investments in decentralised renewable energy projects. It is supported by the European Union, Germany, Sweden, the Netherlands, and Austria, hosted on the multi-donor platform GET.pro and implemented by GIZ, and. At the heart of the programme is an advisory facility, the GET.invest Finance Catalyst, that links renewable energy projects and companies with finance opportunities and vice versa, targeting small- and medium-scale renewable energy opportunities.

Since its inception in 2016 under GET.invest's predecessor, the Renewable Energy Cooperation Programme (RECP), the GET.invest Finance Catalyst has supported more than 200 renewable energy projects and companies across sub-Saharan Africa and the Caribbean. Through this experience, the team has gained substantial insight into the challenges facing, and successes celebrated by companies, that are trying to deploy assets and services. In addition to experiencing the challenges alongside these developers, the GET.invest Finance Catalyst's cross-cutting exposure has also highlighted common problems and potential solutions for addressing these challenges.

A recent paper published by GET.transform - Energy for Rural Industrialisation: Productive Use of Energy 2.0 - was the analytical product of the same body of research as this paper, hence there is some overlap in analytical approach and findings, particularly related to the gap analysis. The GET.transform paper focused on PUE specifically as a development programme to enable rural industrialisation. This paper, in contrast, focuses on the wider context of how to structure, scale and finance PUE as a sustainable (i.e. at the least operating to breakeven, if not profitable) business model.

Further, while the sister volume focuses on capturing the trends and explaining the mechanics of the rural PUE subsector primarily from a development intervention perspective, this paper focuses specifically on the underlying financing challenges for PUE projects and companies in all application contexts (urban, rural, industrial, food value chain, etc.). Emphasising the opportunity to build sustainable financing approaches to promote PUE in a broader context beyond rural industrialisation, it presents recommendations that may be integrated in financiers' and investors' approaches to PUE to better support the growth and financial sustainability of the PUE sector. More than 35 current investors, lenders and capacity building providers were interviewed to complement the GET.invest Finance Catalyst's own experience in PUE technical advisory as part of the research for this paper.

Further, this study assesses the financial challenges and opportunities that inhibit the large-scale deployment of PUE support/promotion, with an emphasis on off-grid measures and applications. It seeks to address issues that centre around the mismatch between supply of and demand for capital in the PUE context and how to scale up capital flows to PUE in line with SDG 7 and the Just Transition. The following main questions are central to this study:

1) What are the main inhibitors hampering access to capital for PUE business and entrepreneurs?
2) Which types of financial instruments can best facilitate PUE growth?

This study assesses what it takes to (a) enhance the uptake of PUE finance by potential customers (e.g. hardware and service providers, individual entrepreneurs, farmers and coops), (b) accelerate the market for PUE technology and solutions, and (c) scale up the impact from deployment of PUE solutions.

2 Current state of PUE finance

This section outlines our observations of capital flows to the PUE sector over recent years. This section first outlines the general context for PUE used in this paper and then provides a segmentation of the PUE sector that aligns most readily with how investors and lenders interviewed for this paper consider PUE. This section then qualitatively examines underlying challenges that inhibit higher levels of investment in PUE.

2.1 General context

Most of the finance available to value-added agricultural, industrial or commercial activities in developing economies, particularly in Sub-Saharan Africa (SSA), is tailored to the needs of the user or the technology/solution provider. Particularly in food value chains, the most common source of finance for rural development is tied to the production of agricultural outputs. Facilitating more efficient food production (i.e. solar irrigation systems) and value-added processing (i.e. solar milling and cold storage) in a way that is not dependent on the high cost of diesel are among the most relevant contexts for PUE growth in SSA, especially given the proportion of the population whose livelihoods are anchored in agricultural activities.

Most often, traditional (agri-)finance is geared towards providing direct financial support to entrepreneurs. This finance can be provided by a DFI, a commercial bank (including MFIs) or through informal mechanisms like financial cooperatives. However, indirectly supporting entrepreneurs through providing finance directly to their technology or service suppliers (these may include, for example (D)ESCOs, solar system providers, e-mobility operators/lessors or cold chain companies) provides a great opportunity to effectively reach out to various actors in the respective value chain. These technology and solution providers already demonstrate a high level of innovativeness and risk appetite in deploying finance structures and business models to effectively reach out to their clients.

Examples of providing corporate finance to technology and energy providers can be seen in the solar sector where finance is extended through a PAYG modality to agri-businesses for investing in solar powered irrigation pumps. In the cold chain sector, companies like Koolboks and Inspirafarm are experimenting with PAYG concepts to farmers. In 2020, solar irrigation company SunCulture secured a USD 11m syndicated loan for expanding its operations in Africa. Under its CleanStart programme in Uganda, UNCDF partners with companies Power Trust (solar milling machines) and Axel (hammer mills) to deploy PUE solutions to farmers, cooperatives and agri-businesses.

Apart from a handful of recent successes to deploy PUE in food value chains, there are no examples of successful financing mechanisms that can scale the promotion of PUE and contribute to accelerating the market for PUE appliances. However, new trends are materializing in the space of PUE activity between the end-users and promoters, which suggest that opportunities for scaling up exist in a more concrete sense than they have previously.

2.2 Working definition of PUE

Many definitions of PUE have been used in the last decade, and various actors have engaged with the topic differently. National grid operators usually think of PUE as a measure that ensures that their distribution lines connect industrial and commercial customers. Solar home system companies' PUE approach focuses strongly on the tools and appliances that can be connected to their (often DC) systems. Mini-grid operators might think more in terms of promoting commercial productivity amongst their customers. While a rural electrification agency, broadly speaking, might look more openly upon the impacts of all forms of electrification, and think of PUE as the activities that customers undertake with the power they are supplied, with the hope that this electricity use improves either the standard of living or the economic situation of the user/community.

We also observe that the term PUE is commonplace to rural electrification practitioners, but somewhat confusing or 'cross-cutting', say for agriculture actors or the finance industry. In SSA, we observe strong interest from policymakers in 'rural industrialisation' and 'industrial hubs' when it comes to the discussion of impact in the energy access dialogue, and we feel it is important to use language whereby it is clear what is meant. The ultimate aim of a PUE measure is that electricity is used in an effective or 'impactful' manner, so that electricity supply has the intended outcome of contributing to the economic development of the area electrified.

While PUE as a concept initially stemmed from the realm of actors who provide, plan, finance or support energy access, it is thankfully gaining importance in the private sector, particularly by companies who provide concrete technical (and financial) supply or provision of PUE. As such, we increasingly see definitions of PUE that revolve around appliances and their applications. We are also beginning to observe 'PUE' referring to a certain *segment*, within the energy access market.

For our purposes, PUE refers to **agricultural, commercial and industrial activities involving renewably sourced energy as an integrated input to value-added processing or provision of services**. As such, this paper focuses on income generation and enhancing productivity only where productive use is explicitly integrated in the design of the project or product. While the emphasis is put on off-grid technologies and applications, captive power in the commercial and industrial (C&I) segment is also considered in cases where the provision of renewable energy is directly linked to a specific process. However, this definition of PUE excludes systems and technologies which are designed primarily for consumptive and community use that may have incidental productive use applications but are not explicitly part of the design. Hence, a solar home system or rooftop panel that generates power is not considered in itself a PUE application.

2.3 PUE segments distinguished by financiers

Within the overall definition provided above, there are two segments that frame how financiers and investors approach PUE. These two segments, referred to in the paper as **project-level** and **product-level**, are sufficiently distinct in deployment, financing structure and business function to warrant separate discussion and, to some extent, distinct recommendations. More detail on this distinction and specific definitions for the two segments are provided in **Table 1**.

TABLE 1. PUE segments, descriptions, examples and details on business structure

SEGMENT	DESCRIPTION	EXAMPLES	BUSINESS STRUCTURE	DELIVERY MODEL
Project-level PUE	…encompasses construction and commissioning of renewable energy **generation** specifically (and typically exclusively) to power a commercial or industrial process as a standalone project or bundle of projects; functionally similar to C&I financing, and which may or may not be grid connected	— Solar irrigation & pumping — Fixed solar refrigeration units (e.g. containerized) — Solar drying and dehydrating — Solar mills and crushers — Cogeneration for on-site processing or heating — Renewably powered water desalinization or purification — Renewably powered rail, cable car, boats, etc.	Most often structured as C&I or as isolated, with own generation. Less commonly as “anchor client” in a mini-grid with other users	Almost always direct to user, with supplier finance required Often structured on service provider basis to reduce end-user CAPEX burden
Product-level PUE	…encompasses construction, sales and maintenance of efficient value-adding appliances and tools which “plug-and-play” with available power sources (regular grid connection, mini-grid connection, solar home systems, etc.) but typically does not include the generation of energy as a feature of the product being sold (though energy companies may engage in the sale of such products as a separate business line)	— Efficient electric cooking & food preparation — Mobile refrigeration — High efficiency appliances — High efficiency power tools — Agricultural value-added tools (i.e. OVO solar egg incubator) — Lighting & entertainment systems — High efficiency & low voltage healthcare systems	In most cases, may function as isolated/self-generation with built in solar PV Less commonly as plug-and-play devices for use on lower wattage systems (i.e. mini-grids)	Most often through distributors, with some direct-to-consumer sales in limited cases Often offered on PAYGO/ service-based terms, even by distributors and third-party financiers

3 Financial challenges to scaling PUE

Interviewed stakeholders mentioned various specific challenges to scaling PUE measures, which can be categorised into general challenges for the entire sector and challenges specific to each of the two segments outlined above.

3.1 Challenges to all forms of PUE

Mismatch of investor risk-return and ticket size appetite and sector capital needs

Challenges around scaling of financing PUE investments across both segments to a large extent originate from a mismatch between financier requirements and the business structure of PUE initiatives.[1] Common challenges noted from interviews around PUE finance relate to the following:

- **Supply side**: Limited availability of local (debt) capital from either banks or other financiers like microfinance institutions (MFIs) and Village Savings and Loan Association (VSLAs); what little local currency (LCY) debt is available features high interest rates; hardly any long-term financing and project financing is offered; subsidy and debt instruments often do not match the financing needs of the entrepreneur (e.g. liquidity cycles of a farmer), etc.
- **Demand side**: The newly emerging PUE 'sector' seems to be project-driven by often non-bankable agriculture associations or companies; the individual size and total number of potentially bankable off-grid projects in the PUE sector is too low for financiers and/or investors to consider investing in (portfolios of bankable projects are needed to reduce financial transaction costs); many agriculture project-level PUE projects are characterised by income seasonality, hence irregular repayment schedules; business proponents often lack equity (thus creating increased dependency on project finance); there is a large diversity in PUE business types/models, etc.

PUE is not central in discussions on financing energy access

The overall financing requirement to meet SDG 7 – across renewable energy, energy efficiency and universal access – is estimated at approx. USD 1.1 to 1.3 trillion per year until 2030.[2] With current annual financing levels still below this target, there is virtually no dedicated PUE (grant or hybrid) funding available. Offering PUE finance is associated with logistical and financial risks by potential lenders. Catalytic capital like grant or hybrid funding is needed to accept the disproportionate risks associated with PUE investments. So far, the closest analogue are the efforts to establish large funds to support dissemination of solar irrigation equipment and gradually also milling and refrigeration.

[1] A conducive enabling framework also contributes to scaling of PUE finance; however, this topic is outside the scope of this study.

[2] Financing SDG7, Policy Brief #5, UNDP and UN Environment, 2018.

However, these instruments are quite grant-driven and technology-specific, leaving gaps in terms of the types of PUE appliances needed to advance economic empowerment and link energy access with expanded economic opportunity. Furthermore, such initiatives miss the opportunity to work with banks, who are naturally better placed to disburse financial support for PUE endeavours. A more sustainable, flexible and future-proof use of grants could thus be realised by establishing an instrument blending grants with access to debt (and technical assistance). Such capital could be used to accept concessionary returns on an investment, relevant in those pilot cases where individual entrepreneurs (e.g. a tomato farmer in need of cold storage) may demonstrate low viability of the investment due to low utilisation rates.

Scale constraints for policy-driven lenders (e.g. DFIs)

One of the main hurdles, particularly also for the agencies trying to promote PUE, is the relationship between the size of these financing facilities against the effort it takes to identify, appraise and monitor loans and equity investments.

ElectriFI is EU's blended impact facility supporting different types of off-/on-grid energy investments. It contributes a minimum of € 0.5m as minority shareholder – hence the minimum ticket size for a productive use investment would be € 1.0m. This would require bundling of investments.

There are some signs that PUE ticket sizes are getting larger, as companies in both segments are consolidating portfolios and making acquisitions to grow. This is increasing the overall volume of capital an individual debtor would require, better suiting international lending operations. However, growth has proven to be relatively slow and fragmented across a wide range of small (though increased number of) market entrants, and even the largest bundled portfolios of bespoke or project-level PUE barely meet minimum lending thresholds for most DFIs.

Low perceived profitability and key risks inhibit commercial lending

Local banks who might otherwise be able to provide these smaller loans are generally less keen because of the underlying risk and relatively low profit margin of PUE. This hesitation is compounded by the underlying challenge of assessing the creditworthiness and reliability of the end-client of PUE projects, especially for local banks that generally do not invest in such capacity. For project-level PUE, the end-users are most commonly farmer groups, agricultural cooperatives, or distribution networks; the seasonality of their income among other factors makes them potentially high risk in terms of debt service capacity. Appliance sales, especially when consumer electricity use is either limited by system capacity (SHS) or only expected to increase with the provision of unproven applications (mini-grids), are equally challenging to underwrite as a credit risk, especially when a new technical configuration or entirely new technology is involved.

Insufficient access to appropriate risk mitigation instruments

Risk mitigation instruments are well understood in impact investing and development finance. They are used to segment and re-allocate transfer risk exposure, either on commercial or concessional terms. This is an often-used approach in development finance to isolate some part of key risks (especially exogenous factors like country and currency risks), as a means to catalyse private finance in critical projects, like grid-connected renewable energy. However, these instruments are not widely available, if at all, to PUE projects because of a combination of factors, including scale and data availability, among others.

Syndication and blending. Kenya-based off-grid solar technology company SunCulture, selling solar irrigation pumps on a "pay-as-you-grow" concept, attracted a USD 11m syndicated debt facility (from Sunfunder, Triodos Investment Management, Nordic Development Fund, AlphaMundi and AfDB fund FEI-OGEF) to scale operations. The syndication is used as risk-sharing mechanism by the funders. SunCulture is achieving scale through a finance construction which is similar to securitised receivables financing, based on which SunCulture can draw more debt in case their asset base grows.

The **table below** presents risk mitigation instruments which can address key risks in a normal business context. However, research indicates that almost none of these instruments are readily available to PUE operators at both project- and product-levels. For PUE broadly, the most critical risks where mitigation instruments would be catalytic are currency risk (hardware is acquired in hard currency but revenues are almost always in local currency), operation risk and off-take risk (in terms of payment processing from end-users).

TABLE 2. General types of risk mitigation instruments

INSTRUMENTS \ RISKS	MACRO		CREDIT / COMMERCIAL			TECHNICAL		FINANCE	INFRA SPECIFIC	
	Political/ country risk	Currency risk	Credit risk	Liquidity risk	Demand risk	Construction risk	Operation risk	Access to capital	Lack of pipeline	Off-take risk
1. Guarantees			■	■		■	■	■		
2. Insurance	■			■		■	■	■		
3. Hedging		■			■					
4. Junior/ subordinated cap			■	■		■	■	■	■	
5. Securitisation			■	■						
6. Contractual mechanisms					■					■
7. Results-based incentives							■			
4. Grants								■	■	

Source: "Better Finance Better World" The Blended Finance Taskforce, in partnership with the Business & Sustainable Development Commission and SYSTEMIC, 2018.

Local currency and exchange risk

Broadly, PUE proponents are financed in foreign currency (often USD or EUR) because hardware is sourced internationally. However, revenue is generated almost entirely in local currency. Without any other backstopping or guarantees, PUE companies therefore bear 100% of FX risk as part of their core operations. The risk of currency shocks or depreciation in emerging markets is perceived as high. History shows that each year, one out of eight developing countries experiences an absolute depreciation of over 20% and one out of twenty countries sees its currency drop by more than 50%.

Insufficient assets and immature companies face collateralization challenges

Traditional approaches to collateralization by financiers do not work for most PUE proponents. In the case of (distributed) energy service companies ((D)ESCOs) shifting to appliance sales, assets are typically already collateralized to secure debt for the main line of business, provision of energy. In the case of project-level PUE, there may not be any assets besides those which are to be acquired by the loan itself. Because project finance is not typically available to small projects, non-recourse models (where only the project assets serve as security for the loan) are not available and additional collateral is almost always required. This is further compounded by the components in project-level PUE to be relatively low value on the secondary market and challenging to collect in the case of default, both in political terms and practically because of their usual remote placement.

Few windfall opportunities for equity investors, aside from the most impact-minded

On the equity side, there is lack of raising post-pilot, early-growth capital, which itself usually features a large portion of grants from impact challenges and other sources. Only very impact-minded players are keen to invest in the PUE space because it simply fails to present a convincing equity windfall opportunity. As stated above, margins in all forms of PUE are quite thin as most end-users are at or near the base of the pyramid. PUE targets end-users that are already poorly, at best, or not at all connected to modern electricity. Hence, growth in end-user energy demand must be underpinned by a substantial change in end-user behaviour (to adopt new tools and methods) and a willingness/ability to pay for such access. PUE end-users are also typically remote and expensive to reach, engage and serve. From a commercial perspective, there are significantly better uses of equity considering risk-return.

In response, donors have relied heavily on results-based disbursement mechanisms. Although Results-based Financing (RBF) can help to overcome financial risks associated with greenfield or pilot investments, RBF does little to enable access to the up-front capital required to design and raise finance around a PUE investment. Most financiers will not underwrite potential revenue from RBF schemes as part of debt service capacity because of weak contractual mechanisms and low assurance about availability of RBF payments in the future, especially as other firms are competing for the same pool of resources.

3.2 Specific inhibitors to scaling project-level PUE investment

Downscaling C&I project finance is not typically suitable

In the case of project-level PUE (sometimes referred to as a PUE "pure play" by financiers), the financing structure often echoes traditional captive power projects (or Commercial and Industrial – C&I). Usually, this is through a senior, secured loan for a relatively long duration that finances construction of one or more productive use assets, such as solar water pumps for irrigation or solar drying/refrigeration for agricultural processing and storage. The loan must be structured on terms that allow for revenues from the asset's use to cover repayment of the loan. However, the size and scale of project-level PUE makes it relatively expensive (against the total amount lent and expected returns to the financier from interest) to go through the project finance cycle that is otherwise used for C&I, especially in the off-grid space.

Project PUE is an ancillary activity for most investors that falls through the gaps

Though some financing instruments facilitate individual PUE investment projects as part of an overarching investment strategy, most active investors do not explicitly pursue or prioritize PUE. Examples of funds that do include PUE as an ancillary or secondary dimension of their strategy include the Gaia Impact Fund, SunFunder, ElectriFI, the Africa Enterprise Challenge Fund (AECF), UNCDF Challenge Funds and the Energy and Environment Partnership (EEP) trust fund. However, there are no funds that primarily and/or exclusively support project PUE investments. Those that are active in PUE, on the other hand, make investments in PUE among many other opportunities and most commonly prefer other types of investment opportunities that are seen as more clearly scalable, lucrative or less risky. The absence of project PUE as a core part of any one investment strategy creates a situation where there is no clear champion for scaling project PUE.

Similarly, many debt providers do not adequately handle project-level PUE as a nexus investment; since they are both renewable energy and agriculture/industry projects, they do not receive adequate attention from investment officers skilled in both sectors. This is in part due to their relatively small size, but also the relative technical complexity of such projects. Falling through the cracks of sector-organized investment teams inhibits access to critical debt, especially blended/concessional finance that is principally controlled by DFIs and Multilateral Development Banks (MDBs).

3.3 Specific inhibitors to scaling product-level PUE investment

Plurality of business lines makes risk assessment challenging

The sale of efficient appliances conceptually aligns with the business model of off-grid energy companies (SHS and mini-grids), as they can directly increase the demand for power and presumably the revenue generated by the SHS distributor (through sale of more units or increased PAYG consumption) or by the mini-grid operator. However, these companies are already stretched and may not have available human, financial or technical resources to actually be able to move into new product lines like the sales, distribution and especially maintenance of efficient appliances.

Furthermore, potential investors see these technical and capacity risks and may be deterred by the potential for failed scale-up of sales because of apparent risks.

Working capital loans do not match all PUE business strategies

While SHS operators typically already rely on an inventory-based financing approach, such as working capital facilities, mini-grid operators are less likely to organize their finances in this manner. Thus, rolling out appliances is more of a pivot for mini-grids and their capital structure; in addition to the (often concessional) loans they secure to fund the construction and initial operation of a mini-grid, horizontal integration to sell appliances requires them to also take on working capital facilities to fund inventory. Both SHS and mini-grid operators selling appliances typically also have to extend credit to those households and small businesses interested in appliances, as these demographics typically do not have the cash on hand to pay in full for a productive appliance.

Third-party distributors of appliances, similar to SHS companies, are quite used to operating with working capital facilities. However, due to the concentration of grid-connected households and businesses with the cash to pay for appliances around urban areas, it is highly unlikely that such distributors on their own right would pursue business in more disperse, rural areas. Undoubtedly some do, but the operational costs of such a sales approach (especially if they also provide maintenance) would be prohibitive compared to an urban focused approach. Thus, financing that is cheaper than commercial but requires rural or “last mile” distribution may be the only way to incentivize standalone appliance distributors to expand their sales focus.

4 Recommendations and opportunities for catalytic financing to scale PUE

This section outlines the opportunities to scale up catalytic financing to the different PUE segments with an eye towards achieving scale.

4.1 Financing project-level investments

Promote and capitalize instruments that lower up-front cost for users

Increasingly, developers and some financiers are identifying leasing as a key opportunity in this space as an alternative to long-term loans. Leasing has two notable advantages. First, it allows a client to secure the renewable generation and productive use assets for use without requiring full payment up-front; rather, the lease terms ensure that the supplier (who may even be the financier) is repaid for the asset over time. Secondly, in some jurisdictions, developers have noted that structuring an asset leasing approach allows them to sidestep regulatory requirements that would otherwise require them to secure a generating license, thereby saving on permit costs.

However, the ability for a company to provide leasing depends on the availability of suitable financing to bolster its own ability to provide credit directly to its partners or in partnership with a financial institution. Overall, it is critical to make capital available to operators, producers and distributors of PUE so that they can offer more supplier/seller finance to end users, bringing down upfront costs and rather spreading costs out against operating revenue for end users.

Rent-to-Own model. Rent-to-Own (RTO) Africa is a company providing rent-to-own loans for productive assets and training services to small-scale entrepreneurs in rural areas in Zambia. The asset itself acts as a form of collateral "which helps reduce the client's chances of spiralling into debt and further poverty". It claims 96% repayment over the last 3 years.

Deepen available capital through concessional debt and investment grants

The most critically needed financial tool, as stated clearly through the interviews, is investment grants and subsidies to the PUE sector. It is a nascent segment based on the marriage of a relatively new technology with adapted processing technology or tools. Grants would also create further innovation and localization of existing technology. Complementing other impact-oriented funding, such as impact investors and crowdfunding platforms, grants could be a key area worth exploring. Overall, the cost of capital is too high for the narrow margins of PUE which arise from serving primarily rural, low-income client bases.

Provide hedging or access to local currency finance to mitigate currency risks

Increasing availability of local currency finance or providing affordable tools to manage FX exposure borne by companies is key to PUE sector growth. Mobilising local currency finance will take substantial technical and capacity investments in local banks, so FX guarantees may be the next best alternative. Currently, the best-known currency hedging solutions for renewables come from MFX and TCX.

However, scale, structure and pricing are all constraints with these two funds, as the primary modality for deployment offsets FX risk for lenders in structured finance projects for larger scale infrastructure. A more tailored approach for PUE operators is needed. The revenue sharing asset finance approach provided by Untapped Global is one example of a better tailored approach for PUE, where the financier provides up-front asset finance in hard currency and accepts revenue sharing in local currency. However, this is only available with certain currencies and for qualified companies now, and probably requires a blanket grant facility to underpin FX risk mitigation to grow in scale.

Bolster scale by providing finance direct to hardware suppliers focused on bespoke PUE

The hardware suppliers' model puts the distributor (or installer) of PUE equipment at the centre. The supplier establishes a direct relation with the end-user as client. The supplier may sell PUE equipment (on a credit or rent-to-own basis) or may offer a rental and/or fee-for-service scheme to the client. The distributor will need both asset finance and working capital which needs to be provided by a third-party lender.

4.2 Financing product-level investments

First-loss portfolio guarantees to PUE-oriented lenders

While different financial structures and deployment models exist, it is clear that there is a need for mitigating the financial and operational risk associated with the different mechanisms. This is particularly critical in achieving scale, as market feedback so far indicates that much of the capital supporting initial prototypes of the models above has been largely grant funded. As (micro) financial institutions are brought in with more risk mitigation capacity from third parties, there will likely still be need for grant resources to subsidize the underlying cost of that risk transfer, among other things.

Securitized receivables financing to achieve scale

Receivables financing may be considered for PUE equipment / solution providers who technically are able to scale (i.e. market potential identified) but face credit/liquidity challenges. Receivables financing is already in use by some leading SHS companies (e.g. SolarNow in Uganda) allowing them to scale up operations. In the PUE sector its use is still limited – SunCulture, on project-level PUE, being a positive exception to this. As other operators mature, they may also be sufficiently sophisticated to take a similar approach.

Bolster end-user credit availability through direct risk sharing with developers and manufacturers

More innovative forms of direct risk transfer, particularly structures that cover or reduce the end-user credit risk for a mini-grid or SHS operator to extend credit to existing clients for appliance purchase, might be better aligned with growth. While supporting the development of PUE-friendly local debt through first loss guarantees to financial institutions is key (see above), sharing risk directly with developers, distributors, operators and manufacturers of PUE is equally important. Using risk mitigants like borrower-side credit guarantees or price hedging instruments to address the risk of expansion into appliance sales for any "last mile" ESCO would likely spur high-impact growth.

Foster a more explicit strategy to support product-level PUE access through crowdfunding

As indicated before, availability of RBF does not cease the need for up-front capital required to implement an investment around PUE. With the increased availability of RBF for appliance delivery, working capital requirements could potentially be fulfilled by non-traditional financiers like crowdfunding agencies. Pursuing this route would require more exploration, however, on the priorities, terms and conditions put forward by crowdlending companies. This is of special importance in co-financing situations where due diligence and supervision of loan products need to be coordinated between different financiers.

Expand the role for MFIs in direct consumer finance to access PUE products

The MFI consumer financing model entails an active cooperation between the (M)FI and the distributor. Whereas the distributor remains responsible for delivery of equipment, installation and providing after-sales services, the MFI branch – availing of an existing client network – engages with potential customers in terms of promotion and order placement of the PUE equipment. The MFI also provides credit to these customers, who most likely will have a credit history with the MFI.

***Ijara* –** Islamic finance includes the *ijara*, an open lease which allows the lessor to opt to purchase the asset or not at the term of the contract. All costs are negotiated up front, and the instrument is underpinned by the partnership orientation of Sharia-compliant finance. For example, *ijara* is often used in Islamic microfinance to enable access to productive assets like tractors for farmers.

Equipment lease in cooperation with MFI. MFIs in Senegal take part in a risk sharing scheme with farmer groups and agriculture equipment lease companies. The farmer group or cooperative deposits 25% of the investment to the MFI. The MFI supplements this with another 25%, providing half of the total working capital needed to the lease company. The supplier takes 50% credit risk. The MFI will collect the remaining 75% of the payment due from the farmers during two harvest seasons – meaning that the supplier prefinances over a prolonged period of time. In this model, both the MFI and lease company show risk appetite. [*Source: Interview K. Kennedy, 12/03/21*]

The head office of the MFI (or alternatively, a separate financial institution which will establish a working relation with the MFI) will enter into a cooperation agreement with the distributor. This cooperation agreement will, apart from the credit terms and conditions, include topics around buying back of equipment, warrantee claims, etc. The FI or MFI Head Office extending loans to the MFI may be backed up by a credit risk mitigation tool (e.g. an FLPG).