

FINANCING DECENTRALIZED RENEWABLE ENERGY FOR THE LAST MILE

*What funding sources
and instruments can be applied?*

BRIEFING PAPER

OVERVIEW

One of the key barriers to delivering energy solutions for the rural and urban poor is the limited access to finance at the local and national levels and insufficient targeted finance flows at the international level. The amount and type of finance needed will change based on changes in the expectations of end users (tiers and consumption levels), appliance efficiency and the possibilities of powering more appliances to bring about larger development benefits beyond the household.

Enabling electricity access by connecting dispersed users to the national grid is expensive and is often prohibitively high for distribution companies in many countries faced with the electricity access challenge¹. The alternative is to increase the deployment of Decentralized Renewable Energy (DRE)¹ solutions. The International Energy Agency (IEA) estimates that 70% of sub-Saharan Africa will be electrified through distributed energy solutions, while other research suggests that decentralized electricity solutions would be the least cost solution for the large majority of unconnected populations across countries such as Bangladesh, Kenya, and Togoⁱⁱ. Having recognized this, there is increasing attention and interest amongst some stakeholders in the energy access sector to undertake investments in energy access through DRE solutions. However, the specific options and mechanisms to be used in varying contexts are yet to be clearly defined, particularly in trying to reach the 'last mile'.

THE CHALLENGE

Despite commitments from international development organizations², Development Finance Institutions (DFIs)³ and investors, there are specific challenges that hinder the deployment of finance for the 'last mile':

- High transaction costs incurred by DFIs and International development organizations in financing smaller volumes or smaller ticket sizesⁱⁱⁱ
- Mismatched expectations of what constitute acceptable and realistic returns on investments in energy enterprises focused on reaching the 'last mile'^{iv}; accompanied by a reliance on pure market-based approaches to address energy poverty

- Siloed perspectives of national governments and international organizations, preventing a more integrated approach where energy interventions are financed as part of other development projects
- Low risk appetite amongst national banks, local financial institutions to lend to the 'last mile', which may also be a consequence of limited understanding among local financiers of DRE financing and risk mitigation mechanisms^{v vi}

DEFINING THE 'LAST MILE'

To arrive at some common understanding of the term for the purposes of this paper, it is worth reviewing the characteristics of 'last mile' communities^{vii viii}:

- Geography- areas beyond the reach of the grid or areas that are under-served
- Socio-economic characteristics of the community- including low income, high vulnerability, exclusion
- Scarcity of resources- including low levels of energy consumption

The 'last mile' does not constitute a homogenous group but rather consists of sub-groups with varying socio-cultural characteristics, levels of willingness and ability to pay for energy access. Additional work is required to characterize sub-groups within the 'last mile', to develop customized financing options for each taking note of accessibility to and affordability of credit.

NEEDS

Investments in energy access for the 'last mile' would require support for three main categories of stakeholders: energy end-users, energy providers (such as enterprises) and ecosystem developers or organizations involved in strengthening the ecosystem (such as Civil Society Organizations (CSOs), technology and system innovators, financiers, local government agencies and so on). An overview of their needs for finance are summarized in Table 1 below^{ix}.

¹ "Decentralized renewable energy is recognized as renewable energy (solar, wind, small hydro) distributed... through mini-grids and off-grid installations". For the purposes of this paper, it also includes systems that can be integrated with the grid in the future. Modified based on the definition in the SDG7 Policy brief, submitted at the HLPF 2018, available here: <https://sustainabledevelopment.un.org/content/documents/17589PB24.pdf>.

² For the purposes of this paper, International development organizations includes the list of bilateral and multilateral organizations (for example: UN agencies, European Union, GIZ, DfID, DANIDA, USAID and so on) involved in channelling development aid and Official Development Assistance (ODA). It does not, however, include Non-Governmental Organizations.

³ Development Finance institutions: According to the OECD (Organization for Economic Cooperation and Development), national and international development finance institutions (DFIs) are specialised development banks or subsidiaries set up to support private sector development in developing countries. (For example: World Bank, African Development Bank, Asian Development Bank, European Investment Bank, KfW (Germany), AFD (France) and so on).

TABLE 1
FINANCING NEEDS OF KEY STAKEHOLDERS ⁴

TARGET GROUP AND STAKEHOLDERS	INDICATIVE LIST OF TYPICAL FINANCING NEEDS
ENERGY END-USERS EXAMPLES	
<ul style="list-style-type: none"> Households Small enterprises and local livelihoods (including agriculture) Health, Education and community institutions 	<ul style="list-style-type: none"> One-time down payment for energy system (margin money/ deposit for loan; connection fee) Ongoing payments for energy system (loan instalments or tariff) Annual maintenance fee and service payments Purchase of efficient appliances/equipment (particularly in the case of small enterprises, local livelihoods and health, education and community institutions) Replacement of batteries or specific components post the warranty period (within the lifetime of the larger asset) Upgrading energy system (higher tariff, electricity bill or loan for additional generation capacity) Start-up capital for livelihoods/ enterprises resulting from energy access (productive use of energy)
ENERGY PROVIDERS	
<ul style="list-style-type: none"> For-profit enterprises- micro, medium and small-sized NGOs engaged in service delivery 	<ul style="list-style-type: none"> Seed capital for early stage innovation and R&D on product-service-systems Pilots and demonstration projects to prove the service model Working capital for operations Consumer finance/ credit to address affordability gap of end-users Internal capacity building and training Credit for growth and expansion Capital for diversification of products and solutions and upgrading technology to meet consumer needs Credit or fee to enable servicing in distant/ remote areas
ECOSYSTEM/ ENABLING ACTORS	
<ul style="list-style-type: none"> Financial institutions and intermediaries including local banks, MFIs, organizations/platforms involved in aggregation National government NGOs and CSOs (including actors working on nexus development issues) 	<ul style="list-style-type: none"> Concessional finance to extend credit to energy end-users and producers Capacity building and training (of technical, financial and operational actors) Technical assistance, field-based innovation and incentives to support energy providers in meeting needs of end-users Market development (feasibility studies, resource mapping etc.) Policy and regulatory arrangements (reforming policy, designing and implementing laws for product standards, regulating electricity tariffs etc.)

⁴ Modified based on the table summarizing financing needs presented in Kajjage, E., Nyagawa, S., Best, S., Cosmas, R., Temba, S., Mtwanga, B., Mahanga, N. (2017) Money is Power: Tracking finance flows for decentralised energy access in Tanzania. IIED Working Paper. IIED, London.

POTENTIAL FINANCING INSTRUMENTS AND MECHANISMS⁵

While the financing needs vary for the different stakeholders, common elements exist. Access to affordable, low-cost financing under favourable terms is found to be critical for all. Public finance plays a crucial role in delivering such financing, however it is limited in nature given the magnitude of the investments needed to reach universal access.

Public financing instruments that maximise efficiency and effectiveness, while also catalysing private capital (when possible) are critical to meet the needs of different stakeholders. Examples of use of such instruments, including revolving funds, credit enhancement schemes, subsidies and aggregation exist and if deployed in the right contexts, have the potential to meet some of the needs of key stakeholders discussed in Table 1. While many of these may not have been tried at scale, these instruments and mechanisms provide an opportunity to impact the 'last mile', through infusion of soft funding and blending various forms of capital.

a. Revolving Funds:

A revolving fund can be created to address small and large credit needs (for energy end users or energy enterprises). It is particularly relevant in communities and contexts with limited access to formal financial institutions owing to the users' lack of credit history and/or with inadequate credit flowing through their informal savings-credit channels^x. By using grant capital (or extremely low-cost loans) routed through local institutions and providing loans at low interest rates and longer tenures, in comparison to Micro Finance Institutions (MFIs) or banks, a revolving fund can provide access to credit while taking into account the affordability constraints of energy users. A percentage of the interest payment would be used to cover the administrative expenses of the fund or the institution managing it.

Value add: The transactions through a revolving fund can support the development of a credit history and sensitize users on borrowing and lending practices, enabling them to become 'bankable' in the long term⁶. It supports local communities in building a corpus to support further financing (of DRE systems or related appliances and capacity). It also helps prove the model to local financiers, emphasizing the viability of investing in DRE solutions.

b. Concessional debt and credit enhancement options (guarantees) through financial institutions:

Accessing credit at concessional rates can address affordability challenges faced by households and small businesses in accessing DRE solutions. Concessional debt is also required by energy enterprises and providers to expand to new areas and begin operations. Strong local financing institutions are a prerequisite to accessing concessional finance as they can improve the delivery of credit to the 'last mile'. Concessions may be in the form of interest subsidies, waivers on the deposit and/or longer repayment periods to make the loan more affordable and accessible. Or it could take the form of credit guarantees or first-loss guarantees mitigating the risk of payment defaults for lenders. These guarantees are parked with the financial institution or used as collateral to enable borrowing by the end-user or energy enterprise.

Typically, the guarantee covers a percentage of the loan amount. For example, when there is a guarantee covering 50% of the loan amount, in the instance of a default, this amount is used to cover a portion of the lender's losses and thereby reduce their exposure.

Such finance has been used for large scale projects by DFIs and ODA. But there is an opportunity to also use it for smaller ticket size financing for 'last mile' households and enterprises. However, a key aspect to address here is the transaction costs involved in facilitating concessional debt, which may well need to be covered through soft-funding sources, including from private foundations and allocations within the project budget of DFIs and international development organizations.

Value add: Concessions such as lower interest rates, waivers on the down-payments or deposits on loans and longer repayment periods make loans more accessible and affordable on a monthly basis. Credit guarantees reduce the risk and exposure of lenders to losses, thereby increasing their confidence in investing or lending. These instruments also enhance access to capital for energy providers and users who lack credit histories.

c. Subsidies on DRE systems and tariffs:

A significant share of total expenditure of the poor constitutes energy payments, often on low quality and expensive energy options including kerosene, dry cell batteries, diesel, and charcoal and so on^{xixii}. This despite the fact that grid connected electricity as well as more

⁵ While there are subtle differences between the terms 'instruments' and 'mechanisms' for financing, this briefing paper uses them interchangeably.

⁶ With communities becoming 'bankable', strong precautions must be taken to avoid burdening individual households or enterprises with multiple loans which could land them in a debt trap. It is important to keep in mind the lessons from the MFI crisis while designing and providing loans for the poor.

traditional sources such as kerosene and diesel benefit from overt as well as hidden subsidies, in comparison to DRE systems. While the introduction and removal of subsidies is controversial and motivated by a number of social and political factors, there is now some interest in finding the right ways to design and implement subsidies for DRE systems. Criteria such as the quantity of energy consumed, type of energy source, location of recipients, and socio-economic background of recipients need to be considered in building energy safety nets^{xiii}.

Subsidies could take the form of Direct Benefits Transfer (DBT) and vouchers that provide customers the option to choose their preferred energy solutions. They could also be channelled through local financial institutions as concessional credit to make DRE solutions more affordable. In the case of mini-grids, the connection costs or electricity tariffs could be subsidized. It is critical to ensure that subsidies are well-targeted, implemented with clear timelines, indicating how long they are available for and process by which they will be phased-out.

Value add: By reducing the cost of purchasing DRE solutions, subsidies make them economically competitive in comparison to existing unreliable options such as kerosene, diesel etc. Initial research also suggests that lowering tariffs on DRE mini-grids can increase electricity consumption, with communities using more appliances or for longer hours⁷.

d. Aggregation:

Aggregation pools investor money and can blend public and private financing to channel large volumes of funding into enterprises and end-users that have smaller financing needs, while also reducing risk by spreading investments across projects and portfolios^{xiv}.^{xv} Through this, local energy companies can access debt for projects. New investment products can be created, and new markets stimulated by aggregating small loans into more attractive, large investment opportunities and combining them with incentives such as results-based financing^{xvi}.

Value add: Aggregation helps to channel large DFI and development aid funding into many smaller ticket-size loans by which small energy providers are able to access capital at a reduced cost. This also reduces the transaction costs associated with doing business with many smaller projects or companies. The instrument uses intermediaries such as MFIs and NGOs, who are closer to the local community, thereby enabling doorstep financing. The process of aggregation can catalyse the development of product performance

standards that protect the interests of end users. It can also help identify and implement capacity building for smaller enterprises and communities, and act as a platform for sharing of learnings within the sector.

e. Results-based financing (RBF):

Some international development organizations, working with CSOs, have introduced RBF as a mechanism to overcome the challenges faced by energy providers in reaching a wider base of end users in rural areas^{xvii}. This includes overcoming challenges of high transaction costs in reaching the 'last mile' and limited access to working capital for energy providers. Payments are made after results have been achieved and verified. One RBF programme has spoken of specific incentives for (1) reaching certain types of communities or households and businesses with low income (2) After sales servicing (3) establishing local sales agents and resellers and so on^{xviii}. It is important to ensure the RBF programme is structured well, with the right conditions about the target end-user and expected outcomes.

Value add: RBF financially incentivises implementers to focus resources on activities that ensure inclusivity and maximize the impact of DRE provision in vulnerable or geographically remote communities⁸. Learnings from previous RBF programmes suggest that it could be expanded to include incentives to financial institutions to also provide credit for households to purchase DRE solutions⁹. Through RBF, there is potential to ensure reliable access to servicing and maintenance of DRE systems (through support for training and creation of local agents).

f. Patient equity:

In this discussion on instruments, it is important to speak of equity. While equity, more broadly, is a critical instrument for enterprises in any sector, a large infusion of patient equity is particularly important to enabling 'last mile' energy access. Given the nature of the market and the nascent energy ecosystem, energy providers and enterprises need to undertake a number of non-revenue generating activities as part of energy provision^{xix}.

Value add: Patient equity has characteristics such as longer-time horizons, lower expectations of Internal Rates of Return (IRR), higher tolerance for risk and the larger goal of maximizing social rather than financial returns^{xx, xxi}. Patient capital, and patient equity in particular, is required at various stages in the growth of an energy enterprise from the initial planning stage, through testing and refining the business model to scaling up the enterprise.

⁷ Research from Crossboundary Mini Grid Innovation Lab. Additional details available here: <https://www.energy4impact.org/news/reducing-tariffs-unlocks-electricity-demand-rural-mini-grid-customers-new-research-finds>

⁸ Based on learnings in the development sector and articulated in this blogpost: <https://nextbillion.net/when-and-how-results-based-financing/>

⁹ Lessons learned on RBF financing in energy access, available here: <https://storage.googleapis.com/e4a-website-assets/Lessons-Learned-Results-based-Financing-for-Energy-Access.pdf>

SOURCES: OPPORTUNITIES TO UNLOCK EXISTING FINANCING SOURCES

To unlock and deploy finance, it is important to review the potential set of financing sources available and to capitalize on the opportunities they provide.

The sources of finance are broadly categorized in the table below¹⁰:

TABLE 2
CATEGORIZATION OF SOURCES OF FINANCE

	DOMESTIC	INTERNATIONAL
PUBLIC	<ul style="list-style-type: none"> National and sub-national governments-energy departments (budgets, including subsidies and taxation) Nexus ministries and departments – Budget allocations and funds available for Health, Education, Agriculture, Local level planning, Youth and Women empowerment etc. National public banks 	<ul style="list-style-type: none"> Bilateral and multilateral development aid organizations (International development organizations) Development Finance Institutions (DFIs) (including climate finance providers and those financing other development needs)
PRIVATE	<ul style="list-style-type: none"> Commercial banks and Cooperative banks Household savings Capital invested directly by entrepreneurs 	<ul style="list-style-type: none"> Private foundations and philanthropies¹¹
	<ul style="list-style-type: none"> Impact investors Corporates and project developers Venture capital Crowdfunding sources 	

In order to meet the energy financing needs outlined earlier, it is worth focusing on specific opportunities and ways to utilize the financing sources available.

1. Utilize funds available for nexus interventions

Budget allocations, subsidies and programmes at national and international level on education, healthcare, agriculture, etc. can be better designed by integrating sustainable energy interventions into the solution or programme. Some clear linkages include:

- Improving service provision across health facilities and educational institutions by ensuring access to reliable electricity to run critical healthcare appliances, lighting and audio-visual aids in schools
- Addressing climate change implications on irrigation and agriculture by combining DRE

solutions with drip irrigation systems and conservation measures

- Providing opportunities for increasing local value-added for farm products by powering post-harvest processing with DRE solutions
- Promoting SME development and job creation by enabling Productive uses of Energy (PuE)
- Developing technician training courses on DRE systems that can be disseminated through vocational training centres, thereby building the local human resource capacity for long-term maintenance.

This requires that departments within government, international aid organizations, DFIs as well as development NGOs step out of their siloes and take a

¹⁰ Modified based on the categorization from Sustainable Energy for All (SEforALL) and the Climate Policy Initiative (CPI) (2018). Understanding the Landscape – Tracking Finance for Electricity and Clean Cooking Access in High-Impact Countries. License: NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0). Accessible at: <https://www.seforall.org/sites/default/files/EF-2018-UL-SEforALL.pdf>

¹¹ While there are domestic private foundations that invest in energy access projects in-country, a mapping of foundation funding by SHINE in 2018 indicated that most private foundations and philanthropies are based outside of the country where the energy access project is developed or constructed.

more integrated approach to budgeting, planning and programme design.

2. Strengthen mechanisms for financial inclusion and capitalize on them to extend credit for energy

Financial inclusion aims to create inclusive growth by bringing households in remote and rural communities into the fold of formal banking or savings-credit institutions^{xxii}. Financial inclusion programmes run by national governments and international organizations can stimulate DRE provision in the following ways: (1) borrowing for energy solutions can lead to actual utilization of savings and credit facilities (2) households can benefit from subsidies or concessionary terms afforded to account holders, first-time borrowers or borrowers below a certain income level (3) reaching out to the 'last mile', including identification of potential end-users, collection of payments and servicing can be built by leveraging the existing financial agent networks. This requires DFIs, governments and local banks to embed energy financing into financial inclusion programmes, including through appropriate metrics and indicators.

3. Increase accessibility of International development and DFI funding

Funding from international development organizations and DFIs needs to be more accessible locally through loans, concessional credit and investments to 'last mile' enterprises and local financial institutions. This may mean using soft funding sources to cover the transaction costs involved in lending for small ticket sizes or designing programmes with higher transaction costs built in. Investing in aggregation platforms and revolving funds or cooperating with larger NGOs and CSOs that have existing relationships with local energy entrepreneurs could also increase resource availability for smaller ticket sizes, while reducing the management and monitoring overheads for the DFI.

This should ideally be combined with internal capacity building on investing in DRE solutions for the 'last mile' and the financial implications, i.e. lower returns on investment. There is also a need to revisit the design of lending programmes and their success metrics to incentivise allocations for 'last mile' DRE.

4. Promote incentives linked to taxation and subsidies

While it is clear that the introduction of taxes and subsidies is influenced by a number of political factors, governments need to take a stronger stance on reducing taxes and import duties on clean energy systems and components. Doing away with Value Added Tax (VAT) and import duties on DRE solutions can reduce the cost of DRE systems for the poor and increase their affordability for individuals and

communities. However, care must be taken to ensure that the benefits of reduced taxation accrue to the end user and that stringent quality standards are maintained for the subsidized DRE systems.

The efforts of Civil Society Organizations (CSOs) and industry bodies in monitoring and evaluating progress on energy access can help in maintaining checks on energy enterprises. It is also important to actively tap into environmental tax revenue (in countries where such taxes exist) and divert subsidies for fossil-fuels to innovate on and deliver DRE solutions for the last mile.

5. Fund innovation and leverage

Soft funding is critical to expanding DRE access, particularly for the 'last mile', and this would mean capitalizing on all possible sources of grant funding. Broader development sector funding needs to be unlocked to complement energy access funding. Grant funding should be used strategically through mechanisms such as results-based financing, concessional finance and leverage and on-ground innovation. On ground innovation includes the technological, social, financial and operational aspects of new interventions- energy systems for refugee communities; piloting productive use appliances, solutions for healthcare and education, innovative models to make household energy more affordable etc.

In all the opportunities laid out above, soft funding sources particularly grants and subsidies play an important role in bridging the energy access gap. Substantial increases are needed in these sources of public funding to leverage commercial investment and to ensure that those in the 'last mile' are reached¹².

OVERARCHING RECOMMENDATIONS

In addition to specific measures and opportunities to utilize the various funding sources listed above, there is a need to strengthen the energy ecosystem as a whole including the capacity of financiers and key stakeholders. Towards this end, given below are a few overarching recommendations:

1. Understand affordability amongst sub-groups within the 'last mile' and improve metrics for impact measurement; go beyond the economic return on investment and prevent unbalanced credit burden on poor energy users.
2. Invest in strengthening local financial institutions and building the capacity of financiers at various levels to understand the specific needs of key stakeholders in the energy access sector- end users, providers and ecosystem actors
3. Invest in strengthening the links with productive uses of energy, by incubating local enterprises and

¹² The Poor People's Energy Outlook 2017 estimates that ~75% of energy access investment will need to be from grants/subsidies.

SMEs, addressing their energy needs and building technical and operational capacity on the ground to manage energy solutions

4. Increase government commitments to DRE as part of energy programmes and mobilize additional funding for energy access
5. Rethink and restructure impact investing in a manner that increases the availability of patient equity, while also changing investor expectations around returns. Support for social entrepreneurship in the sector should include soft funding for energy providers to undertake non-revenue generating activities that help build the ecosystem.
6. Enhance the role of grants and subsidies in meeting the needs of the 'last mile', while ensuring their efficient and effective disbursement. Simply investing in commercial private sector initiatives will not provide energy for all and deliver SDG7

objectives. It will require significant volumes of soft funding in the form of grants and subsidies to support private players, not-for-profit organizations and government agencies to successfully deliver DRE to the 'last mile'.

Given the aim of achieving SDG7 by 2030, it is a crucial time to reflect on how untapped financing sources could accelerate progress towards SDG7 particularly for last mile communities, while also supporting the achievement of other SDGs. Some of the existing financial instruments, potential financing sources and opportunities to sustainably finance DRE solutions are laid out here. The overarching recommendations on building a strong local ecosystem and strengthening local financial institutions will play a critical role in ensuring that any financing that is accessed and deployed can result in providing energy solutions that are sustainable and improve the wellbeing, income and opportunities for communities in the last mile.

This briefing paper is based on a longer discussion paper that reviews the instruments, sources and opportunities in greater detail. You can access and download the Discussion paper here:

www.greeninclusiveenergy.org/publication/financing-decentralized-renewable-energy-for-the-last-mile/

NOTES

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