



Powering Livelihoods Globally through Clean Energy

ABHISHEK JAIN, ARUNABHA GHOSH, SANJANA CHHABRA

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Jain, Abhishek, Arunabha Ghosh, and Sanjana Chhabra. 2021. *Powering Livelihoods Globally through Clean Energy*. A GCF-CEEW Report. Stockholm: Global Challenges Foundation.

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Cover photo: A micro-entrepreneur in Rajkot, western India, processing sesame seeds to make value-added products using a solar-powered mill.

Image credit: Wase Khalid/CEEW

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ABOUT THE AUTHORS

Abhishek Jain

As a Fellow at The Council on Energy, Environment and Water (CEEW), Abhishek built and leads its practices on energy access, rural livelihoods, and sustainable food systems. He also directs 'Powering Livelihoods', a \$3 million initiative to mainstream clean energy for the rural economy. He co-conceptualised and leads CEEW's flagship research, Access to Clean Cooking energy and Electricity—Survey of States. He regularly publishes in leading international journals, writes in major Indian dailies and advises senior government officials. With more than ten years of experience, Abhishek has worked on multiple issues at the confluence of energy, development, and the environment. He is a Chevening Fellow and an alumnus of the University of Cambridge and IIT Roorkee.



Dr Arunabha Ghosh

Dr Arunabha Ghosh is the founder-CEO of the Council on Energy, Environment and Water (CEEW) since 2010, and a public policy professional, adviser, author, columnist and institution builder. He has published widely and advised on COP-21 and other multilateral and bilateral negotiations. He was involved in conceptualising and designing the International Solar Alliance. He co-founded the Clean Energy Access Network. The UN Secretary-General nominated him to the UN Committee for Development Policy in 2018. He co-chaired the energy, environment and climate track for India's Science, Technology and Innovation Policy 2020. He is co-Chair of the World Economic Forum's Global Future Council on Clean Air and is a member of the international high-level panel of the Environment of Peace initiative.



Sanjana Chhabra

Sanjana Chhabra is a Research Analyst in the CEO's Foresight team, at CEEW. Her current research includes work on hydrogen, energy access and the energy transition. She was earlier a researcher with the ICF and the National Council of Applied Economic Research. As a sports person she has represented India in many international shooting events.





Summary

The planet is on an unsustainable pathway, staring at a climate catastrophe. But 770 million people still do not have access to electricity. Energy poverty remains one of the key barriers to sustainable development. International efforts on climate action and reducing energy poverty are not yet strategically aligned. Climate action cannot be effective until the energy-poor see a future in which there is a pathway to meeting their legitimately rising energy demand. There is an opportunity for emerging markets to meet nearly all new electricity demand from renewable energy, a potential for a “double leapfrog” to energy access and clean energy.

Distributed renewable energy (DRE) is an effective and established solution for energy access. In many underserved parts of the world, DRE systems can provide energy access at far lower costs than extending existing grids. They can also support more local jobs, tap into clean energy resources which tend to be more distributed, and increase the resilience of the electricity system. Even if households got subsidised connections to the grid, governments would continue to face the challenge of subsidising the recurring costs of these additional connections. Instead, DRE systems could cost less over the longer term. But their high upfront costs are a deterrent.

The missing link is the productive uses of DRE technologies, which provides several systemic advantages. Productive uses of DRE increase livelihood opportunities, increase incomes and thereby also the ability and willingness to pay for clean electricity solutions. They unlock incomes in hitherto energy-starved areas. Due to their resilience, these systems can also help communities in climate-vulnerable areas to continue their livelihood activities. At scale, DRE systems offer a new investment category and a market opportunity for direct selling vendors and indirect enterprises in the supply chain. Finally, these solutions can create many more micro-entrepreneurs in rural and peri-urban areas, making them stakeholders in a rapid transition to clean energy.

The market potential is in the tens of billions. In India, there is an estimated USD 53 billion market in using clean energy for productive enterprises in rural areas such as cold storage, looms, rice mills, sewing machines, and many others. In Sub-Saharan Africa, an investment of USD 11.3 billion could support efficient solar-based appliances to provide various services such as irrigation, cooling and crop processing to 12 million farms.

The potential for DRE for livelihoods remains unfulfilled. First, the productive use of DRE is not a mere extension of prevailing energy access programmes. It means going beyond energy provision and focusing on the end-user: their skilling, equipment financing, market linkages for the products being produced by end-users and so on. It needs a convergence across multiple actors in the energy and livelihood domain. The Indian government, for example, has leveraged the convergence approach in its recently published draft policy to facilitate large-scale adoption of distributed renewables for “livelihood applications”, a first of its kind in the world. Secondly, unless enterprises have access to concessional capital, they are unable to demonstrate if their innovations can cross the commercial “valley of death”. Thirdly, most DRE entrepreneurs do not have access to incubators and accelerators to convert a lab-based promising technology into a market-proven commercial product. Fourthly, mutually beneficial partnerships that can transform this massive latent opportunity do not exist across geographies to support cross-learning and replication. **Out of 36 DRE-focused multi-country/ multilateral initiatives analysed for this paper, only three were found to be explicitly focused on promoting livelihoods.**



We propose a multilateral and multi-stakeholder platform to drive large-scale adoption of productive uses of clean energy to stimulate jobs and growth in rural economies globally. The platform would catalyse local innovation and entrepreneurship to deploy sustainable technologies for livelihoods — such as green cold storages, agro-processing machinery, textile processing — at scale. The proposed platform is envisioned as one in which the private sector takes the lead with support from civil society, philanthropy and DFIs, and buy-in from the public sector.

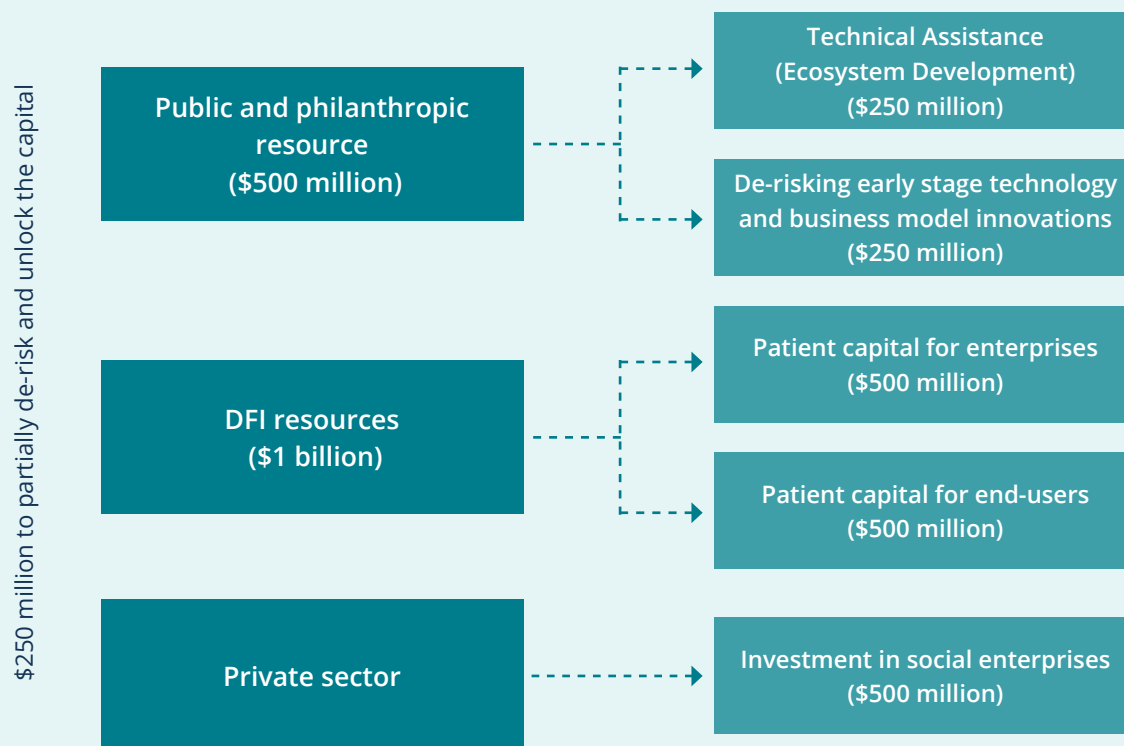
Such a platform would be designed to solve for the specific barriers, which, if removed, can catalyse a DRE-based productive use market at scale.

- 1. Demand-centric, not supply-driven, governance:** The platform would extend bespoke technical assistance for demand-side ecosystem development converging skilling, financing, market linkage support for microenterprises across a range of high-priority countries. Over time, in-country “market accelerators”, catalysed by the platform, would be well-established to continue building the market for DRE productive use in each geography.
- 2. Catalysing innovation, from lab to market:** By extending risk capital from strategic philanthropic organisations, the facility could de-risk early-stage technology and business model innovations, attracting more innovators and entrepreneurs to the sector. It would leverage a network of technology and business incubators and key civil society organisations.
- 3. Solving for value, not volume:** The value-focused productive use market needs investors and financiers who are not looking at the scale in volume terms alone. It needs investors who understand the impact and revenue metrics commensurate to a medium-scale enterprise. Compared to traditional energy access endeavours, productive use initiatives need larger capital support to impart impact by catalysing sustainable livelihoods.
- 4. Enabling partnership of equals, by design:** The facility and a national government could make an equal contribution to unlocking support. Such a structuring would ensure that the facility works in true partnership spirit with national participants, responding to their needs and aspirations.
- 5. Leveraging the power of the collective via pooled resources:** The facility would ensure that knowledge sharing and feedback from stakeholders become key prerequisites to decision-making at various governance levels. The facility’s presence across geographies would help enable rapid knowledge sharing and a global body of evidence and knowledge for the sector.

The figure below offers a schematic representation outlining the major funding sources and the main use of funds for an illustrative example of a USD 2 billion catalytic facility impacting 10 million lives with a ten-fold impact return.



Figure 1. Overview of the funding resources and fund-use for the catalytic facility



Source: Author's Analysis



1. Introduction

A global energy transition is incomplete without universal energy access.

Energy poverty is one of the major barriers to sustainable development. Enabling access to modern energy is a key lever to increasing access to education, better healthcare facilities, powering farms and enterprises, creating jobs.

With less than a decade to go before the 2030 Sustainable Development Goals deadline, about 770 million people still lack access to electricity worldwide. Many of those with a connection cannot be sure that electrons will flow regularly through the wire. The International Energy Agency (IEA) estimates that three-quarters of those without electricity access live in Sub-Saharan Africa, and on current trends, about 560 million of them would still lack access in 2030 (IEA, 2020).

Providing grid-based electricity to the unconnected population by 2030 would cost USD 490 billion. But the World Bank estimates that if distributed renewable energy (DRE) was used instead, the cost would drop to less than half — USD 220 billion (Energy Sector Management Assistance Program, 2019). Even so, the ability and willingness of households to pay for electricity depend on whether the electricity only lights up homes or whether it also powers their livelihoods. Further, higher incomes from access to electricity can drive growing demand for clean, reliable and affordable electricity.

The Covid-19 pandemic has, however, slowed down the pace of increasing electricity access. It also threatens to push more than 100 million people back into extreme poverty. The response to the pandemic and the race to 2030 both go through the milestones of energy access. While it would be ideal that expanding energy access must be green energy, the world's energy-poor are not responsible for the climate crisis. Mitigating their energy poverty will not substantially add to the burden of emissions. That said, there is an opportunity for nearly all new electricity demand from emerging markets to be met from clean energy, a potential for a “double leapfrog” to energy access and clean energy (Bond, et al., 2021). If the economic recovery has to put people at the centre, then increasing access to clean energy not for households alone but also for productive purposes must become a priority. The expansion of energy access should keep a DRE-first approach to not just reduce the upfront public investments but also avoid locking into carbon-intensive electrification pathways.

This paper discusses the potential for distributed renewables to power enterprises and support livelihoods across the developing world. It highlights how most regional or global initiatives that have sought to increase energy access have — to date — failed to tap into the potential for scaling the productive uses of distributed energy. It argues that the international community is yet to internalise the vital connections between the imperative global green energy transition, the universal energy access, and the need to focus on creating sustainable livelihoods on a bold new scale. To address the gap, it calls for a multilateral platform to enable change at the required global scale.



2. Role of distributed clean energy

Over the years, many countries have introduced various policies to achieve universal access by 2030. India, for instance, launched the Saubhagya Scheme in 2017 and by 2019 claimed that more than 99 per cent of the population had gained access to electricity. Independent surveys — the India Residential Energy Survey (2020) conducted by CEEW — conclude that the number is slightly lower (96.7 per cent of households are connected to the grid, with another 0.33 per cent relying on off-grid electricity sources) (Agrawal, et al., 2020). But many households continue to be in the bottom tier of electricity access, an indication that mere connections are not enough. Despite India making remarkable progress in electrifying tens of millions of households within three years, its challenges remain. These include poor financial health of power distribution companies, difficulties in billing and metering of consumers, transmission losses, and commercial theft amounting to billions of dollars.

The situation in poorer economies is far worse. In Ghana, for instance, only 67.2% of the rural population has electricity access (Energy Commission, 2019). Kenya has less than 70% of its population with energy access (The World Bank, 2021). The electricity access rate is merely 41.3% in Uganda as of 2019 (The World Bank, 2021). A common challenge, country after country, is that most of the unelectrified population is in rural areas, often in remote and sparsely populated settlements. The distance from the existing electricity infrastructure and low population density make the traditional electrification approaches exorbitantly costly for developing countries. Only two out of 39 power utilities in Sub-Saharan Africa (Seychelles and Uganda) have been able to break even (Kojima & Trimble, 2016).

DRE is an effective and established solution for electricity access in rural and low population density areas – essentially where most of the remaining unelectrified population is. A DRE system is a renewable energy-based system that can generate and distribute energy independent of a centralised electricity grid and provides a wide range of services, including lighting, cooking, space heating, consumer and productive appliances and cooling in both rural and urban areas. DRE solutions benefited about 150 million people around the world in 2019 alone by providing new energy access (REN21, 2020). Moreover, DRE enhances the resilience of the electricity system due to its ability to run in isolation from the central grid, as needed.

Decentralised solutions could be the least costly way to provide power to more than half of the global population that is likely to gain access this decade. Meanwhile, DRE systems have various social, economic and environmental benefits. These include reduced chronic and acute health effects, improved lighting quality, reduced negative impacts on forests, improved delivery of public services like health care and education. Additionally, the DRE sector is a significant employer in emerging economies and has positively impacted job creation in many countries. In Kenya, DRE systems have created 10,000 formal jobs (REN21, 2020).

A 2017 survey of DRE companies in India revealed that the sector provided direct employment to about 309,000 people in formal and informal jobs (Power For All, Schneider Foundation, The Rockefeller Foundation, and Council on Energy, Environment and Water, 2019). In addition, the sector has also induced jobs for another 470,000 people, particularly in end-user communities that have



benefited from improved electricity access (Kuldeep & Ghosh, 2020). More than 20 GW of small- and large-scale micro-grids can create around 110,000 jobs for both skilled and unskilled workers in India (Ghosh & Raha, 2020).

In the past few years, the governments of various countries have prioritised adopting policy and regulatory frameworks to promote the uptake of DRE systems. Several governments across Asia, Africa, and Latin America announced expanding existing targets and policies for DRE systems or creating new ones. India has introduced schemes for DRE deployment with specific targets for off-grid technologies like solar street lights, solar PV pumps and others. By the end of 2019, Ethiopia, Kenya, Myanmar, Nepal and Togo had adopted integrated electrification plans that incorporate approaches and policies that support energy access using grid-based, mini-grid and off-grid solutions. Recently, several countries took steps to enhance their policy frameworks around product quality to accelerate the DRE deployments (REN21, 2020).



3. Energy access beyond energy access

Despite these targets and programmes, policymakers and investors have not fully internalised the insight that access to distributed clean energy is also a route to energising small businesses in rural and urban settings.

For instance, consider Kenya, the third-largest economy in Sub-Saharan Africa. Close to 40% of the electricity consumers (2.6 million of the 6.7 million customers) demand no more than 10 kWh per month, primarily because the energy is not being used for productive activities (Mutege, 2020). Poor quality of power means an inability to use such unreliable power for productive use, correlated with lower incomes, a lower ability to pay for the power, and therefore poor revenue for the utility company and poor quality of supply – locking populations in a constrained equilibrium. One essential way to convert the vicious cycle into a virtuous one is to focus on the productive use of energy, therefore improving livelihoods and incomes for the communities. Productive use of power helps to improve incomes, but it also improves the viability of distributed renewables by improving asset utilisation and garnering higher revenues from economically thriving and resilient communities.

Employing distributed renewables to energise businesses not only offers impact but significant investment and market opportunity as well. In India alone, there is an estimated USD 53 billion market in using clean energy for productive enterprises in rural areas such as cold storage, looms, rice mills, sewing machines and many others (Waray, et al., 2018). A single solution of using solar-power hydroponic stations to produce green fodder has a potential market of USD 4 billion in India (Khalid, et al., 2021). Distributed solar refrigeration for commercial applications offers a market of more than USD 20 billion in India alone (GOGLA, 2021). Similarly, in the textile sector, the second largest employer in India after agriculture, fabric and garments manufactured on solar-powered equipment offer a likely domestic market of USD 2.4 billion (Sahdev, et al., 2021).

In India, two institutions — CEEW, a think-tank, and Villgro, a social enterprise incubator — are running a USD 3 million programme providing capital and technical assistance to social enterprises deploying DRE-productive-use solutions to help them gain commercial scale. These enterprises manufacture a wide variety of solutions — from solar-powered multi-purpose food processors to silk reeling machines to solar dryers to waste-biomass-based farm-gate cold storages. The programme, Powering Livelihoods, is supported by the UK government and various European foundations. It has brought together more than 15 funders looking to extend equity, debt and grants to the sector. These include Acumen, the International Fund for Agricultural Development, Rabobank, Beyond Capital Fund, OikoCredit, Bill and Melinda Gates Foundation, etc. By enabling large-scale commercial deployments and generating impact and viability evidence, the programme is unlocking investments, financing, and policy support, not only for its enterprises but also for the DRE productive use sector as a whole.

Another initiative in India — Sustain Plus — pools USD 50-million in a partnership between IKEA Foundation, Tata Trusts and Selco Foundation to extend support for adopting DRE solutions for healthcare, education and productive uses.

Recognising the potential, India's Ministry of New and Renewable Energy recently published a draft policy framework to facilitate the large-scale adoption of distributed renewables for “livelihood applications” (MNRE, 2021). Once



formalised, India is likely to be the first country in the world with an explicit policy to leverage and scale DRE to boost incomes. The Indian government is already running one of the world's largest programmes on solar energy for farm power, which is poised to garner a total investment of USD 18 billion (Jain & Brent, 2021). The programme — PM-KUSUM — provides access to clean power for irrigation to many smallholder farmers and transforms farmers from net consumers to prosumers of electricity (MNRE, 2019).

The potential is vast in Sub-Saharan Africa as well. An investment of USD 11.3 billion could support efficient solar-based appliances to provide various services such as irrigation, cooling and crop processing to 12 million farms, thereby boosting incomes and transforming livelihoods (World Bank Group, Lighting Global, 2019).

In Ethiopia, for example, one study finds that a USD 380 million investment in productive appliances, on- or off-grid, could yield USD 4 billion in additional farm income over five years, a 10-fold return (Borgstein et al., 2020). A Power Africa study finds an immediate viable opportunity to initiate and scale the productive use of energy from Nigerian mini-grids by electrifying three prevalent agricultural processing activities: rice milling, grain flour milling, and cassava grating (Santana, et al., 2020).

In short, DRE solutions for livelihoods provide several systemic advantages. For one, they unlock incomes in hitherto energy-starved areas. Due to their resilience, these systems can also help communities in climate-vulnerable areas to continue their livelihood activities. At scale, DRE systems offer a new investment category and a market opportunity for direct selling vendors and indirect enterprises in the supply chain. Finally, these solutions can create many more micro-entrepreneurs in rural and peri-urban areas, making them stakeholders in a rapid transition to clean energy.



4. What lessons have we learned?

But the potential for DRE for livelihoods remains unfulfilled due to numerous challenges. Analysts and practitioners have learnt several lessons in trying to scale enterprises offering these solutions (Jain & Brent, 2021).

First, catalysing the productive-use market needs a focus on convergence. The lack of awareness about innovative DRE-based products creates the first-mover problem for both customers and financiers. Public investments are imperative to catalyse the market. Dedicated policies, like the one proposed in India, can also send signals to market participants about the potential in the sector. Often energy policy is de-linked from other economic ministries. If, like in India, cleantech and livelihood programmes could be converged across several departments, there would be greater buy-in across the policy spectrum. Once state and local governments follow, the opportunities deepen.

Secondly, attracting private investment to an early-stage sector is difficult. Investors rightly look for viable projects and want to see that there is a proven track record for new technologies and business models. For opportunities in rural areas, traditional venture capital financing might not be readily available. Unless enterprises have access to concessional capital, they are unable to demonstrate if their innovations can cross the commercial “valley of death”. This is why initiatives like Powering Livelihoods are needed to leverage philanthropic investment to generate the minimum market evidence to then attract patient and private capital.

Thirdly, most entrepreneurs are decent at technology but do not understand markets. DRE-productive use innovations are not just about the technology. Enterprises must understand the economics of the technology for the customer, its and value proposition, the go-to-market strategy to create viable businesses. It needs innovation in business models, financing models, marketing, after-sales service and so forth. Incubators and accelerators play a crucial role to convert a lab-based promising technology into a market-proven commercial product. Given the on-ground experiences across several developing countries, more structured exchange of knowledge and learnings is needed via a South-South collaborative platform — to build markets for DRE for productive applications in many more regions.

Finally, mutually beneficial partnerships can transform the latent opportunity. The partnership models designed in India can serve as templates for a larger-scale multilateral platform. Social enterprises are leading the scale-up of DRE-productive use in India, anchored by a market accelerator – Powering Livelihoods, backed by large philanthropies, reinforced by a group of investors and financiers, and supported by the government policy. Such mutually beneficial partnerships with completing roles and anchored by a catalyst can chart a new course for energy transition by putting people’s jobs and economic growth at the centre.



5. Prevailing international initiatives on energy access do not power livelihoods

Beyond the policy developments in a few countries, a large number of programmes and initiatives have been launched globally to advance energy access and to deploy DRE solutions. These programmes have been established by international organisations, development partners, philanthropic foundations, donor governments and non-governmental actors and aim at achieving the target of universal energy access by 2030.

Some notable initiatives include: Sustainable Energy for All, a global initiative launched by the UN aiming at universal access to modern energy by 2030; Energising Development, an international programme currently active in 21 countries and has benefited 22.9 million people by providing them access to modern energy services; Power Africa, which has connected about 22 million homes and businesses to on- and off-grid energy solutions across Sub-Saharan Africa; Global Alliance for Clean Cookstoves, which had provided improved stoves to approximately 24 million households by 2015 (REN21, 2015); and CleanStart, a multi-donor programme currently active in six countries and has benefited 3.1 million people.

Other programmes have been launched by development finance institutions (DFIs). For example, the World Bank approved the Regional Off-Grid Electrification Project for West Africa (ROGEP), a USD 333.7 million programme that aims to improve the policy landscape and the business and investment climate for off-grid energy businesses in the region and aims to benefit about 1.7 million people. DFIs also committed an estimated USD 1 billion to off-grid electricity access programmes and projects during 2019 (REN21, 2020).

Various donor governments launched bilateral initiatives to support off-grid electricity access. The UK increased its support towards the Transforming Energy Access Programme, Africa Clean Energy Programme and others. Italy signed a USD 9 million extension of its partnership on clean energy with the International Finance Corporation, supporting the Lighting Global Programme.

Several partnerships have been established between philanthropic foundations, corporations, donors and financial intermediaries. For instance, the Rockefeller Foundation and Tata Power (India) have come together to create an enterprise to set up 10,000 mini-grids and provide power to 5 million households in India by 2026 (REN21, 2020). The UK government and Shell Foundation launched the \$30 million Catalysing Agriculture by Scaling Energy Ecosystems (CASEE) initiative in 2019 (Shell Foundation, 2019).

We analysed 36 programmes aiming to further energy access (see Annexure 1). Our analysis focused on parameters such as the scale of funding, geographical focus, impact created, the type of financing, and availability and focus of technical assistance and knowledge sharing, among others.

However, most of these programmes do not focus on productive use applications of DRE technologies. Only three multi-country programmes have explicitly focused on productive use applications, namely Powering Agriculture, CASEE, and Powering Renewable Energy Opportunities (PREO). Two of these three programmes are supported by a partnership of a bilateral donor and philanthropy. In addition, two of the multilateral programmes – Energising Development and Water and Energy for Food (a successor of Powering Agriculture



itself) are partly focusing on productive use of DRE among their broader objectives.

Beyond these multi-country programmes, we also found three single-country endeavours, started more than two decades ago. These were possibly ahead of their time when many of the DRE productive use applications were not economically viable.

In June 2021, Rockefeller Foundation and IKEA Foundation announced a USD 1 billion commitment (USD 500 million each) towards distributed renewables for energy access. In turn, the foundations aim to crowd in at least USD 10 billion from development finance institutions. While details about the initiative's fund deployment plan and focus are not publicly available yet, it would be important for a philanthropic initiative of this scale on DRE to bring particular attention to productive use.

It is important to note that the productive use of DRE may not be considered a mere extension of expansion in the scope of the existing programmes. The focus on productive use of DRE needs a fundamental shift away from an 'energy service provision' approach to a 'demand-centric' view. It means going beyond developing or running mini-grids, and looking into aspects of productive use equipment design and manufacturing, skilling and training of the end-users and local communities, financing of the productive use assets for the end-users, enabling market linkages for the products and services being produced by the end-users, and so on. Catalysing such a market needs a convergence of actors associated with livelihood promotions, skilling, equipment manufacturing, asset financing and market-linkage partners — in short, an ecosystem of productive use DRE applications is needed.

Further, the programme strategies for scaling productive use of DRE should no longer focus only on a village, a district, a state, or a region, but rather on the value chain. A solar-powered bulk milk chiller manufacturer cannot grow their business by focusing on saturating one village, which may not have the demand for more than one such chiller. It, instead, needs to focus on the dairy cooperatives across a state, a region and a country. Barring the Powering Agriculture and the Powering Livelihoods programmes — both dedicated to productive use of distributed renewables — no other initiative on energy access has taken such value-chain or economic sub-sector-based approach.



6. Powering Livelihoods Globally — a multilateral platform

The energy access deficit can undermine progress towards many SDGs. But even if households were electrified, governments will continue to face the challenge of subsidising additional connections. DRE systems could cost less and reduce losses, but their high upfront costs also serve as a deterrent to households adopting the systems if they do not have access to easy financing. The missing link is the productive uses of DRE technologies, since productive applications increase livelihood opportunities, increase incomes and thereby ability and willingness to pay for clean electricity solutions. It is an opportunity worth tens of billions of dollars in various regions. Since many of the existing initiatives for energy access have hitherto targeted households, they have failed to tap into the potential of powering livelihoods.

We propose a multilateral and multi-stakeholder platform to drive large-scale adoption of productive uses of clean energy to stimulate jobs and growth in rural economies globally. The platform would catalyse local innovation and entrepreneurship to deploy sustainable technologies for livelihoods — such as green cold storages, agro-processing machinery, textile processing — at scale.

The proposed platform is envisioned as one in which the **private sector takes the lead with support from civil society, philanthropy and DFIs, and buy-in from the public sector.** The private participants, in collaboration with CSOs, would identify, generate and cater to the on-ground demand for such products and innovations.

The role of philanthropy, impact investors, and DFIs would be to extend risk and patient capital. In turn, national governments would provide the enabling policy conditions through tax breaks, incentives, and improved ease of doing business in the oft-ignored DRE sector.

The platform would exploit three key levers: pooled capital, technical assistance, and technology and knowledge sharing. First, **pooled capital** can be enabled through innovative instruments that draw on the strengths of different types of financial institutions. Specifically, risk capital is needed to spur innovation and would be needed from strategic philanthropic organisations and impact investors. Meanwhile, patient capital from DFIs can help to scale enterprises to a level at which commercial lenders get interested. Therein, bonds and distributed renewable energy certificates (DRECs) with verified social returns can be further leveraged to crowd in more private capital. Secondly, **bespoke technical assistance** is needed to help with the rapid replication of successful models in new geographies and consumer segments and to scale enterprises beyond pilots. Thirdly, **technology and knowledge sharing** across national and private players under the principles of mutual gains can create an ecosystem of productive use DRE enterprises that can together create a viable sector.

The envisioned platform can be realised as a stand-alone facility, or its design and governance principles (as discussed below) can be used to shape some of the existing or recently announced initiatives. Either way, our proposition is that the full potential of DRE for promoting energy access would be realised only when productive use applications get due attention and if the initiatives help to catalyse a global market for them — and impact at scale.



Bottom-up governance design to catalyse markets

A top-down institution-focused governance design will not solve for bottom-up market creation. We need a governance design that can help scale productive use of distributed renewables responding to the unique challenges that the sector poses. Such a platform would be designed to solve for the specific barriers, which, if removed, can catalyse a DRE-based productive use market at scale.

1. DEMAND-CENTRIC, NOT SUPPLY-DRIVEN, GOVERNANCE

Most of the existing electricity access programmes have been limited to enabling and improving the supply of modern forms of energy. The supply-focused approach, akin to a utility, is sufficient to enable basic energy access for households such as lighting, mobile charging or cooling. However, generating demand for productive use of electricity needs catalytic support. Newly connected communities are unaware of how to leverage it for income-generating activities. They lack the necessary skills, financing, and know-how about the potential businesses to leverage energy for income generation effectively. The stark difference between consumptive and productive demand means a highly differentiated approach to programme design, focusing on ecosystem support to promote DRE for productive use. It needs a fundamental shift away from tracking the generated units of electricity to mapping the increase in income of the microenterprise or the local farmers resulting from the use of modern, clean energy. It needs the programme designers, implementers and executors to shift away from a “supply-driven” approach to embrace a “demand-centric” view.

How can the facility design respond?

In order to realise a demand-centric approach, the platform would extend bespoke technical assistance for ecosystem development in a wide range of countries. The platform would prioritise high-potential countries to reach at least 80% of the target population in the developing world within a decade. Leveraging sufficient existing evidence across geographies about DRE’s potential to catalyse sustainable livelihoods, the platform would concurrently initiate deep engagements in high-priority countries. The technical assistance from the facility would support national policy formulation, market assessments to bridge the knowledge gap among local actors, and incubating a national “market accelerator”, which could anchor and lead the development of the local ecosystem. With the facility’s support, the accelerator would assess the local capabilities and market gaps. It would engage with local enterprises, enterprise incubators, policymakers, financiers and investors to address those gaps. Over time, the in-country accelerators would be well-established to continue building the market for DRE productive use in the respective geography with minimal support from the global facility.

Who would extend the support?

The technical assistance for productive use ecosystem development would primarily be supported through the grant resources raised from philanthropic and public resources. The support would be delivered through a network of civil society organisations with existing experience in energy access and rural livelihood spaces, who can help incubate the “market accelerators” in respective geographies.



2. CATALYSING INNOVATION, FROM LAB TO MARKET

Despite its multi-billion-dollar potential, the market for DRE-powered livelihoods is at a very early stage. While some mature technologies can be replicated and scaled, rapid technological and business model innovations are required to test, pilot and then scale the context-suitable solutions. Due to their poor energy efficiency levels, off-the-shelf equipment for productive activities are not suitable to run with decentralised renewables. It necessitates technological innovations, including in platform technologies such as low-capacity and low-cost energy-efficient motors. The nascent market also needs experiments with new business models to adequately define go-to-market strategies for businesses, the right value-proposition and appropriate market linkages for the end-users. None of this is required in the traditional energy access market, necessitating a marked shift in approach.

How can the facility design respond?

By extending risk capital, the facility could de-risk the early-stage technology and business model innovations, attracting more innovators and entrepreneurs to the sector. It could partner with technology and business incubators at the national (through market accelerators) and international level. By leveraging approaches, such as global innovation challenges, the facility can help support the development of low-cost platform technologies that find applications in many productive use applications. It can run grand challenges to lower the cost of major productive use solutions, such as cold storages that find application across most developing countries.

Who would extend the support?

Since investors and financiers would not provide risk capital for early-stage technology and business model innovations, the risk capital would primarily be sourced from philanthropic, bilateral donors and public resources. The support would be administered through the in-country market accelerators and a network of incubators and civil society organisations in consultation with market participants.

3. SOLVING FOR VALUE, NOT VOLUME

Most of the DRE programmes and enterprises have primarily focused on basic energy access for households, often facilitated by small-scale solutions such as solar lanterns and home systems. Even in mini/micro/pico-grids, the focus (rightly) is on connecting the maximum number of households in the community. While each household requires a lantern, a home system, or a mini-grid connection, not every community member needs a grain milling machine or a solar cold storage. Often, the productive use appliances would be far fewer than the consumptive use appliances in a community. Given that most existing energy access programmes and enterprises have focused on households, the metrics of success are about large volumes of deployment of individual appliances. Reaching tens of millions of households with solar lanterns is much easier than selling a million solar-powered sewing machines.

Accordingly, the programmes focusing on productive use of DRE need a fundamental rethink of the capital requirement against the desired impact. A simple analysis of the major large-scale international programmes on energy access in the past two decades suggests that, on average, such programmes have extended capital support of USD 55 per life impacted.¹ The majority of this support is in the form of concessional debt and grants, with a minor contribution from private investors. The support varies across programmes from as low as USD



5 to as high as USD 436 per life impacted.² Programmes focusing on catalysing the uptake of solar lanterns are at the minimum end of the spectrum. In contrast, those focusing on productive use tend to be upwards of USD 150 per life impacted. Thus, the distributed energy programmes mainstreaming its productive use must remain mindful of the scale of capital required to realise the necessary impact.

Beyond adequate capital, mainstreaming DRE for livelihoods needs equipment manufacturing and deploying enterprises – often focusing on specific value-chains such as dairy, fishery, cotton, silk, poultry, oil expelling, etc. – to work in conjunction with energy providers like mini-grid players. It needs enterprises evolving their business models beyond direct equipment sales or direct electricity sales to focusing on service-based business models. For instance, instead of selling solar-powered cold storage, a company may have to evolve the business to sell a cold storage service to farmers. Such evolutions in business models are required to tap into a larger customer base who cannot afford the equipment's upfront cost and to effectively utilise the asset. Only then would the commercial viability of the asset make sense.

Unlike the energy access markets thus far, the productive use market would be driven by value, not volume. Supporting such a market needs a shift in mindsets, methods and metrics.

How can the facility design respond?

The value-focused productive use market needs investors and financiers, who are not looking at the scale in volume terms alone. It needs investors who understand the impact and revenue metrics commensurate to a medium-scale equipment manufacturing company or a value-chain-focused enterprise instead of comparing it with a consumer-durable company. It needs investors who are willing to bet on many stallions rather than invest in one unicorn. The private capital anchored by the facility can help support equity investment in such productive-use enterprises.

The enterprises also need patient capital to suit evolving and service-based business models. And their customers need longer-tenure loans to adopt such solutions. Through appropriate downstream structures, the facility can extend patient debt capital to end-users and enterprises to enable the adoption of DRE-livelihood solutions at scale.

Who would extend the support?

The equity investments would be extended by the (impact) investors committing their support to the sector as part of the global facility. The in-country market accelerators would help identify and match enterprises with relevant investors in the facility. The patient debt support to enterprises and end-users would be extended through the DFI capital committed towards the facility, channelled through in-country lenders.

4. ENABLING PARTNERSHIP OF EQUALS, BY DESIGN

Many of the existing programmes on energy access are primarily donor-led. The philanthropies and bilateral donors from the global north have pooled resources or anchored the design and administration of these programmes. It creates a trust-deficient environment and limited local buy-in and the long-term commitment of national participants beyond the programme duration. It hurts the sustainability of the programmes, as well as that of the assets deployed under such programmes.



How can the facility design respond?

The jobs and economic growth outcomes emanating from the productive use of DRE need to be leveraged to create local political buy-in, resulting in a demand-responsive support structure. Instead of directly providing support to various countries, the facility should extend support where and when there is an expressed demand from the country signalled by an economic commitment. The facility and a national government could make an equal contribution (at least to the public pot of support) to unlock the support for the country. Such a structuring would ensure that the facility works in true partnership spirit with the national participants, responding to their needs and aspirations.

Who would extend the support?

The facility would need an anchoring UN agency, such as UNDP, as one of its founding members. Through its country offices, it could enable access to national governments in order to establish dialogues and to facilitate the implementation design at a country level. This is meant to be an enabling mechanism, not a controlling one since UNDP's country strategy is developed in conjunction with the host government. In addition, it could closely engage with local civil society organisations and businesses to ensure more wholesome buy-in from stakeholders within a country. The in-country strategy would align with the articulated platform design and common concrete goals towards substantial and systematic DRE-livelihood diffusion at the global level.

5. LEVERAGING THE POWER OF THE COLLECTIVE VIA POOLED RESOURCES

What we see in the multitude of existing programmes is a limited focus on knowledge sharing and collaboration within and across the programmes. Sharing lessons learnt, best practices, and most importantly, the failures help reduce the time and cost to deliver successful solutions to the masses. But knowledge sharing is often left to chance or individual champions and not addressed by the governance design of such programmes. Given that the DRE-based productive use sector is at its infancy in most countries, the role of knowledge sharing becomes even more important to help learn and grow faster as a global community.

Furthermore, individual programmes get limited by their resources as well as geographical focus. At best, they fail to harness the power of collectives, and at worst, they can often lead to duplication of efforts or competition.

How can the facility design respond?

The facility must keep the spirit of collaboration and mutual trust at its core, ensuring that major support of DRE and rural livelihoods of today and tomorrow become part of the facility to effectively harness the power of the collective. Pooling resources across major philanthropies, DFIs, and private investors and continuously expanding such a group of partners would ensure that the limited resources do not get thinly spread but are pooled to gain more than the sum of its parts. For instance, by aggregating demand across geographies, the facility can offer bulk procurement avenues, significantly reducing the technology cost.

The facility design would also ensure that knowledge sharing and feedback from ecosystem stakeholders becomes a key prerequisite to major ongoing decision-making at various governance levels. The facility's presence across geographies would help enable rapid knowledge sharing and a global body of evidence and knowledge for the sector.

Who would extend the support?

The core founding partners and members of the facility must include



organisations and individuals who champion collaborations and are perceived as the credible and trusted actors and voices in the international development community.

How would the platform work?

Figure 1. Overview of the funding resources and fund-use for the catalytic facility

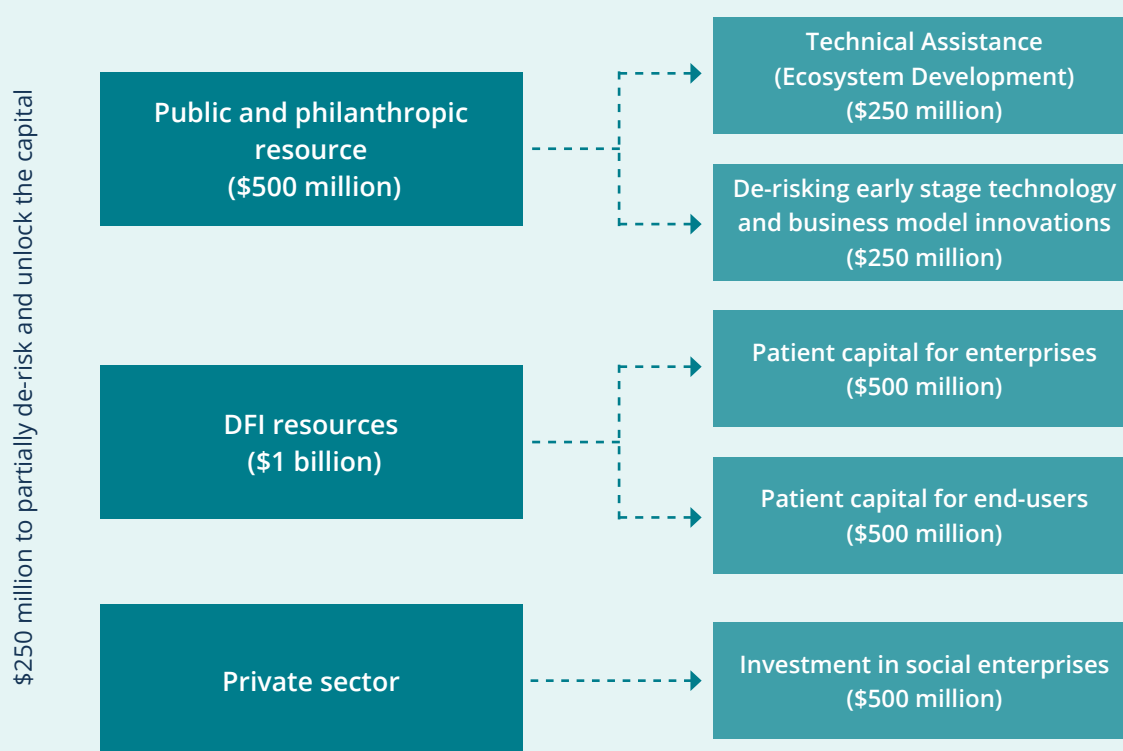


Figure 1 sets out schematically the sources of funding that would together make up the facility. Each category has a different role to play, in line with the governance design outlined above. As an illustrative example, we envision a minimum scale of a USD 2 billion catalytic facility. It would be capitalised with USD 500 million of philanthropic, donor and public funding for early-stage de-risking of innovations in technology and business models and extending bespoke technical assistance. The philanthropic, donor and public commitment would help unlock support from DFIs, who would provide another USD 1 billion as long-tenor, low-cost patient capital as a revolving fund. The remaining USD 500 million would come from private investors who wish to make equity investments in the enterprises. Another source of private financing could be carbon markets, wherein carbon credits deriving from the deployments supported under the facility could serve as a revenue stream.



Through its technical assistance, the facility would, first, catalyse innovation and enterprise pipeline development in the countries with a limit or no activity on DRE productive use. As the absorptive capacity of the sector rapidly evolves on the back of aggressive support from the platform, the DFI and private capital would help scale up the commercial deployments and market development.

What would be the expected impact?

The initial USD 2 billion facility could enable at least two million microenterprises (livelihoods) across developing countries, impacting at least 10 million lives directly and creating more than 200,000 jobs in the value chain. After repaying the USD 1 billion credit to DFIs, the local communities would have garnered a minimum earning of USD 5 billion over a decade. Essentially, the net spending of USD 500 million (philanthropic, donor, and public funds) under the facility would have yielded at least USD 5 billion as an economic return in the hands of the poor and the vulnerable, resulting in a tenfold impact return. Concurrently, it would have catalysed a market that would continue to expand its impact way beyond the initial push and with minimal further philanthropic support.



7. Conclusion

There is not much time to meet the SDG of sustainable energy for all, under Goal 7, by 2030. Numerous initiatives have been launched over the past decade, and many are still underway. But nearly all of them have missed a crucial link between energy access and improving livelihoods. This vital policy gap – which should now be centrally addressed in existing globally governed institutions or initiatives as well as the proposed new platform – explains the persisting challenge of unmet energy needs despite a plethora of initiatives.

This paper has proposed a multilateral and multi-stakeholder global platform to plug this gap, designed particularly from the bottom up and focused on end-user needs and demands rather than chasing supply-side metrics of scale. The innovative mix of risk and patient capital, combined with bespoke technical assistance, can help create demand-centric governance, catalyse innovations, focus on value-based impact, create collaborative partnerships and leverage collective learnings. The global public-private partnership could enable millions of green livelihoods and help bring vulnerable people out of poverty as economies slowly recover from the pandemic-induced recession. It would also ensure that developing economies are supported towards a co-created green development pathway.

There remain some unanswered governance challenges. For instance, multilateral funds work through country programmes, so the buy-in of national governments will be necessary, emphasising the need to highlight the key policy connections as shared in this brief at the highest levels of international decision-making. Further, the facility for Powering Livelihoods Globally is not envisioned as one overbearing institution but a mix of services and financing. Yet, it would need a secretariat to manage and oversight bodies to monitor and regulate. It would be necessary not to make these arrangements onerous and bureaucratic. Additionally, transparency in such an initiative must go beyond annual reports to more fluid and dynamic updates on innovations in technologies, business models and financing solutions so that learnings can happen and be adopted quickly. Such a transparency framework should look very different from the multilateral institutions of the 20th century.

But these are not insoluble challenges, nor are they reasons not to reimagine how energy access can become both an enabler of and be driven by progress in other SDGs, particularly for jobs, growth, innovation and infrastructure. If we claim that the SDGs are interlinked and interdependent, then the governance innovations must break silos too and cut across opportunities — across enterprises, communities and political boundaries.



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Annexure 1: Programmes and initiatives furthering energy access

Source: Author's compilation

Name of Programme	Brief Description	Key promoters	Scale of Funding	Focussed Geographies	Impact/ Key Achievements	Main use of funds	Technical Assistance	Knowledge Sharing	Status: productive use
Bilateral Initiatives									
Power Africa	The initiative aims at supporting economic growth and development by increasing access to reliable, affordable and sustainable power in Africa. Its goal is to add more than 30,000 megawatts (MW) of cleaner, more efficient electricity generation capacity and 60 million new home and business connections	It is a U.S Government led partnership, coordinated by USAID. A multi-stakeholder partnership among the governments of the United States of America, Tanzania, Kenya, Ethiopia, Ghana, Nigeria and Liberia, the US and the African private sector	<p>The project was launched in 2013 and the African Development Bank Group (AfDB) expects to allocate USD 3 billion in 5 years. The main financial source for the Bank is the African Development Fund.</p> <p>The U.S. Government has committed \$7+ billion in financial support, loan guarantees, and technical assistance</p>	Sub-Saharan Africa	Power Africa has delivered first time electricity to 103.5 million people across Sub-Saharan Africa and has connected ~22 million homes and businesses to on and off grid energy solutions. Additionally, 4883 MW of cleaner and more reliable electricity is online	Grants to financial institutions to unlock capital for off-grid solar companies in Sub-Saharan Africa; reaching financial closure (133 transactions financially closed)	Power Africa's in country advisors identify the technical, political and financial solutions needed to facilitate faster access to power. 58 power projects have commissioned and are operational	No publicly available information	Incidental focus on productive use of DRE
Global Energy Efficiency and Renewable Energy Fund (GEEREF)	GEEREF is a Fund-of-Funds advised by the European Investment Bank Group and it invests in private equity funds which focus on renewable energy and energy efficiency projects in emerging markets	It is a public - private partnership. GEEREF has been funded through the following key supporters: EU, Germany, Norway and others	Total funds under management: Euro 222 million. Mainly raised from the private sector	GEEREF has invested in 15 funds across Africa, Asia, Latin America and the Caribbean	Key Targets include: Add over 25 GW of new clean energy capacity; generate 144,000 Gwh of clean electricity; provide clean power to ~ 93 million households annually; reduce 100 million tonnes of emissions annually once all Investee Projects are Developed ³	Private equity investments and grants including for technical assistance ⁴	No publicly available information	No publicly available information	No explicit focus on productive use of DRE



Name of Programme	Brief Description	Key promoters	Scale of Funding	Focussed Geographies	Impact/ Key Achievements	Main use of funds	Technical Assistance	Knowledge Sharing	Status: productive use
ACP-EU Energy Facility	This programme was established to co-finance projects on increasing access to modern, affordable and sustainable energy services for the poor in African, Caribbean and Pacific (ACP) countries	ACP-EU Council (government driven)	It was first financed with EUR 220 million for the period 2006-09 and was refinanced with EUR 200 million for the period 2009-13. The program is financed by the EU within the 9th European Development Fund (EDF) and the 10th EDF	African, Caribbean and Pacific countries	ACP-EU Energy Facility has been working at improving the situation for about 12 million beneficiaries. With a contribution of around EUR350 million so far, it has helped fund 139 projects, many of them in rural areas	Grants to projects in combination with other capital like private investments	The Energy Facility set up a dedicated system to monitor the projects (via external consultancy) and provide technical assistance on the projects to the EU Delegations. The Energy Facility has also devoted EUR10 million for technical assistance and institutional support in the context of the Africa – EU Partnership for Infrastructure	Thematic reports drawing on the knowledge gained from Energy Facility projects. Additionally, case studies are shared as well as all deliverables provided by the projects (manuals, guidelines, films, courses or studies)	No explicit focus on productive use of DRE
Distributed Energy Service Companies (DESCOs) Financing Programme	The programme promotes securitisation financing techniques to address barriers to accessing finance for DESCOs, while supporting their growth and expansion into existing and new markets. The programme will also facilitate local currency financing for DESCOs and provide local lenders with risk mitigation instruments to support them	Supported by European Fund for Sustainable Development and administered by the African Development Bank	Euro 50 million guarantee facility and Euro 6 million technical assistance grant by the European Fund for Sustainable Development ⁵	Sub-Saharan Africa	The programme aims to provide clean energy access for 900,000 households (4.5 million people) by 2025. Additionally, the programme aims to create approximately 6,000 new direct jobs and contribute to avoidance of nearly 37.08 kilotons of CO ₂ eq emissions per year	Concessional debt facility for energy enterprise financing	The programme provides technical assistance to DESCOs	No publicly available information	No explicit focus on productive use of DRE
Capital Access for Renewable Energy Enterprise Programme (CARE2)	CARE2 programme aims to improve capital access in the renewable energy markets across four countries in East Africa.	Swedish International Development Cooperation Agency	USD 7 million	Kenya, Tanzania, Uganda and Rwanda ⁶	The programme targeted the creation of 4400 new jobs in 1200 micro, small and medium energy focussed enterprises ⁷	No publicly available information	Technical Assistance Facility, providing advice to businesses seeking capital and others	No publicly available information	No explicit focus on productive use of DRE



Name of Programme	Brief Description	Key promoters	Scale of Funding	Focussed Geographies	Impact/ Key Achievements	Main use of funds	Technical Assistance	Knowledge Sharing	Status: productive use
Promotion of Rural Renewable Energy (RRE)	The aim of the programme was to improve the quality of life of rural farmers and support poverty alleviation and income generation	The programme was set up with assistance from Dutch Government	Grant of Euro 5.3 million was provided by the Dutch government, with matching funds of just over Euro 0.5 million from the Chinese Government	China	The programme consisted of demonstration projects on technologies such as microhydro, biomass/ biogas and solar power. The programme also promoted non-productive uses of electricity	Types of financing includes: grants	No publicly available information	No publicly available information	Explicit focus on productive use of DRE
Bilateral Initiatives with Support Anchored by Multilateral Institution									
IRENA- Abu Dhabi Fund for Development (ADFD) Project Facility	It is a joint project facility to support replicable, scalable and potentially transformative renewable energy projects in developing countries	It is a collaboration between IRENA and the Abu Dhabi Fund for Development	USD 350 million	IRENA member countries	The facility has supported 32 renewable energy projects, helping to mobilise a further USD 567 million in co-financing, benefitting 2.5 million people ⁸	Concessional debt to renewable energy enterprises	No publicly available information	No publicly available information	No explicit focus on productive use of DRE
Bilateral-Philanthropy Partnership Initiatives									
The Catalysing Agriculture by Scaling Energy Ecosystems (CASEE) programme	The programme was launched in 2019 and will deliver access to energy for smallholder farmers in Sub-Saharan Africa and South Asia. The programme aims to support agriculture focussed businesses to test new models and technology with the potential to reach commercial viability	The programme is established by the UK government along with the Shell Foundation	30-million-Pound, five-year co-funding between the UK Government and Shell Foundation	Sub-Saharan Africa and South Asia	The programme aims to improve the lives of a million people and leverage 110 million Pound of additional funding into the sector	No publicly available information	No publicly available information	No publicly available information	Explicit focus on productive use of DRE



Name of Programme	Brief Description	Key promoters	Scale of Funding	Focussed Geographies	Impact/ Key Achievements	Main use of funds	Technical Assistance	Knowledge Sharing	Status: productive use
Powering Renewable Energy Opportunities (PREO)	It is a demand-led, productive use of energy (PUE) programme stimulating partnerships, innovation and learning to address the needs and improve livelihoods of Sub-Saharan African communities	The programme is supported by the IKEA Foundation and UK Aid and delivered by the Carbon Trust and Energy 4 Impact	Euro 5 million from IKEA Foundation and Euro 5.9 million from the UK Aid. Seeking additional funding to deliver a project portfolio with a total value of more than Euro 20 million ⁹	Sub-Saharan Africa	Key Targets include: <ul style="list-style-type: none"> • Create 3,500 jobs • Empower 1,000 women • Benefit 11,000 rural households • Grant support to 20-30 action learning projects¹⁰ 	Grant support and TA	The programme will provide enabling support to actors executing PUE-related initiatives and enterprise development in the form of a Technical Assistance facility	One of the core offerings of the programme includes: function as a Knowledge Hub that will act as a knowledge repository and promoter	Explicit focus on productive use of DRE
Multi-party Initiatives									
Energising Development (EnDev)	EnDev is an international flagship programme for providing energy access, having reached well over 20 million people. EnDev tackles energy poverty with a market-based approach putting the focus on consumers' needs	The initiative was commissioned by German Federal Ministry of Economic Cooperation and Development (BMZ). It is a multilateral initiative supported by the governments of Germany, the Netherlands, Norway, Switzerland, Sweden and United Kingdom ¹¹	<ul style="list-style-type: none"> • First Phase (2005-09): Budget 60 million Euro • Second Phase (2010-15): Budget 200 million Euro • Third Phase (2015-19): Budget 100 million Euro¹² • Funded by BMZ, DGIS, NORAD, SDC, European Union, Irish Aid, KOFIH, Power Africa, and ICEIDA 	EnDev is currently active in 21 partner countries on three continents (Africa, Asia and Latin America)	Key Achievements (as of December 2019): 22,900,000 people have gained access to modern energy services, 53,900 small and medium sized enterprises with modern form of energy for productive uses, 2.3 million tons of greenhouse gas emissions reduced annually. Additionally, in total 23,500 jobs are created ¹³	It provides financial support to energy related businesses that become partners in the implementation of energy access, to kick-start markets or buy down capital investments, but not for operational costs. In new countries, the program initially funds only start-up phases with limited budget	Project interventions include developing markets for energy products and services; this includes targeted awareness campaigns, assisting entrepreneurs with energy-related businesses as well as transferring knowledge regarding technology and business skills, technical assistance and capacity building ¹⁴	No publicly available information	Partly focuses on productive use of DRE



Name of Programme	Brief Description	Key promoters	Scale of Funding	Focussed Geographies	Impact/ Key Achievements	Main use of funds	Technical Assistance	Knowledge Sharing	Status: productive use
African Renewable Energy Fund (AREF)	AREF invests in small hydro, wind, geo thermal, stranded gas and solar projects across Sub-Saharan Africa excluding South Africa. AREF aims to make investments between \$10 million to \$30 million into 10–50-megawatt (MW) power projects. It is the first pan-African renewable energy focused private equity fund	Promoted in a joint initiative by the African Biofuel and Renewable Energy Company (ABREC) and the African Development Bank (AfDB) and AREF is managed by Berkeley Energy Africa Limited (Berkeley Energy)	The total fund size is \$200 million. CDC (FCDO) invested \$20 million ¹⁵ , EIB has invested \$16.6 million ¹⁶	Sub-Saharan Africa excluding South Africa	The fund has so far made sixteen investments in various African countries ¹⁷	Equity, technical assistance/ grants and debt mezzanine	AREF manages an additional \$10 million Project Support Facility (PSF), which will provide resources to be deployed at an early stage to structure bankable deals	No publicly available information	No explicit focus on productive use of DRE
Sustainable Energy Fund for Africa (SEFA)	SEFA is a multi-donor special fund managed by the African Development Bank to support small and medium-scale Renewable Energy (RE) and Energy Efficiency (EE) projects in Africa	It is a multi-donor facility funded by the governments of Denmark, United Kingdom, Italy and United States and managed by AfDB ¹⁸	USD 95 million fund	Africa	Catalysed the first two AfDB supported scale-up programmes in the Democratic Republic of Congo and Burkina Faso. SEFA played a catalytic role in the preparation and financial close of the Africa Renewable Energy Fund and in establishing the facility for Energy Inclusion	Equity investments and grants	SEFA provides technical assistance and concessional finance instruments to remove market barriers, build a more robust pipeline of projects and improve the risk-return profile of individual investments	No publicly available information	No explicit focus on productive use of DRE
Powering Agriculture	Design as a Grand Challenge, the programme was launched in 2012 and concluded in 2019. It sought to identify and support new and sustainable approaches to accelerate the development and deployment of clean energy solutions for increasing agriculture productivity and/or value in developing countries	It was a partnership between USAID, Swedish International Development Cooperation Agency (Sida), the Government of Germany (BMZ), Duke Energy Corporation and the Overseas Private Investment Corporation (OPIC)	\$51.2 million programme ¹⁹	Africa, Asia, Latin America and Middle East	Key Achievements include: 71 clean energy solutions developed, 6.2 MW of clean energy generation capacity installed, 8,537 clean energy systems deployed, 29,520 tonnes of CO ₂ e reduced, and 234,100 beneficiaries reached (such as farmers, households and agribusinesses) ²⁰	Innovation grants, direct debt, equity investments and funded projects through GIZs in-kind support	Provided on-demand tailored technical assistance and business acceleration support through PASTO	Generated several knowledge pieces for the sector Documented its program-level activities, challenges, and the lessons learned implementing the programme that can be used for the design of future similar programs	Explicit focus on productive use of DRE



Name of Programme	Brief Description	Key promoters	Scale of Funding	Focussed Geographies	Impact/ Key Achievements	Main use of funds	Technical Assistance	Knowledge Sharing	Status: productive use
Water & Energy for Food (WE4F) Programme	The WE4F programme capitalizes on the learnings from Powering Agriculture. The programme focuses on environmentally sustainable innovations aiming to improve energy and water efficiency in the agricultural sector	It is a joint international initiative of the BMZ, the European Union, the Ministry of Foreign Affairs of the Government of Netherlands, Sweden through the Swedish International Development Cooperation Agency (SIDA) and the USAID ²¹	USAID has committed \$35 million ²² , SIDA has committed \$11.9 million ²³ , towards the programme. We were not able to find overall funding commitment across all the partners to the programme, in publicly available information.	WE4F will operate through regional hubs located in Africa (East, Southern and West Africa), Asia and the MENA region	Targets include: <ul style="list-style-type: none"> • Increase food production along the value chain through a more sustainable and efficient usage of water and/or energy • Increase income for base of the pyramid women and men in both rural and urban areas • Sustainably scale innovators' solutions to meet the challenges in the WE4F nexus • Promote climate and environmental resilience and biodiversity through the sustainable, holistic management of natural resources and ecosystems 	Financial brokering and technical assistance. The financial brokering is responsible for providing seed funding to the innovators and for connecting them to other global, regional and local finance sources.	The programme provides technical assistance in terms of e.g. gender sensitisation, environmental impact assessments. Additionally, there are instances of technical assistance on investment readiness	The programme facilitates knowledge exchange within the structure	Partly focuses on productive use of DRE
Renewable Energy and Energy Efficiency Partnership (REEEP)	REEEP invests in clean energy markets to help developing countries expand modern energy services and improve lives; increase prosperity and economic dynamism. It aims to keep CO2 emissions in check	REEEP is an international multilateral partnership. Few donors include, Australia, Austrian Federal Ministry for Sustainability and Tourism, Blue Moon Fund, European Commission, GIZ, USAID, The Rockefeller Foundation	REEEP has received funding worth Euro 23.55 million over the 2011-12 to 2019-20	Global	Main Objectives include: <ol style="list-style-type: none"> 1. Significant global increase of investments in renewable energy 2. Significant global increase of energy efficiency measures 3. Significant increase in access to sustainable energy services for the poor Beyond the Grid fund for Zambia: 835,775 beneficiaries, 2600t annually CO2 emissions avoided, 3.7 MW capacity added, 1294 agents and 370 full time employees- jobs created	REEEP operations, including outreach, represented 18% of total expenditures. PFAN accounted for 45%; off-grid energy access accounted for 25%; analytics, programme, and other accounted for 9%, while agriculture accounted for 3% of the total ²⁴	No publicly available information	REEEP shares the insights and knowledge they gain with government and private sector stakeholders, helping to improve policy and investment decisions	No explicit focus on productive use of DRE



Name of Programme	Brief Description	Key promoters	Scale of Funding	Focussed Geographies	Impact/ Key Achievements	Main use of funds	Technical Assistance	Knowledge Sharing	Status: productive use
CleanStart	CleanStart is a multi-year and multi-donor programme which aims to increase sustainable access to clean and affordable energy for more than 2.5 million people and 501,000 low-income households and micro entrepreneurs through access to finance	It is a multi-donor programme implemented by UNCDF ²⁵ . The program is supported by UK Aid, SIDA, Norad, Austrian Development Cooperation, Sweden, The Government of the Grand Duchy of Luxembourg	The estimated funding for the programme amounted to USD 26 million, as of December 2016 and the total funding secured amounted to USD 15 million resulting in a funding gap of 42%	Burkina Faso, Ethiopia, Uganda, Democratic Republic of the Congo, Nepal, Myanmar	Key Achievements: 3.1 million people benefiting from CleanStart programme and 1.2 million tons of Co2 emissions offset from the transition of clean energy solutions. Additionally, 500,000 tons of wood energy is saved ²⁶	Capital grants, credit enhancement	One of the outputs of the programme includes technical assistance to selected Financial Service Providers and Energy Service Providers (FSP/ ESPs). This output incurred 22.5% of the expenditure between 2010-16	The program's long-term vision includes new learning about the energy access market, in particular consumers, through research and knowledge sharing between market actors	No explicit focus on productive use of DRE
THE PAPUA NEW GUINEA ELECTRICIFICATION PARTNERSHIP	Papua New Guinea through this partnership aims to achieve the goal of connecting 70% of its population to electricity by 2030	It is a partnership between Papua New Guinea, Australia, Japan, New Zealand and the United States	USD 25 million has been provided by the governments of Australia, Japan, New Zealand and United States	Papua New Guinea	The main objective is to support PNG's target of connecting 70% of the population by 2030. The programme further aims to provide electricity to at least 200,000 households in Papua New Guinea	No publicly available information	No publicly available information	No publicly available information	No explicit focus on productive use of DRE
Africa - EU Renewable Energy Cooperation Programme (RECP)	RECP contributes to the Africa-EU Energy Partnerships (AEEP). It focuses on economic growth, employment, energy security and improved energy access, and a low-carbon energy system in Africa. RECP will also help build a significant new area for industrial trade and business cooperation between Africa and Europe	Launched by the African and European government, this programme was commenced under the Africa-EU Energy Partnership	It is funded by European Commission, Netherlands, Germany, Austria and Finland (total deployable budget: 10.5 million euro)	The RECP operates in six African countries (Nigeria, Rwanda, Uganda, Senegal, Zambia and Mozambique) ²⁷	Impact targets (not yet realised): <ul style="list-style-type: none"> • 466 million Euro investment volume • 147 MW installed capacity • 543 GWh annually produced electricity • 2.4 million end-users with access to electricity • 616.00 t CO₂e – annual GHG emission reduction²⁸ 	The funds from the RECP support market development in various ways: identification of concrete project opportunities, matchmaking between project developers, technology suppliers, and service providers for joint projects and business development in Africa. It also provides rapid policy support	The project provides technical and other assistance: Policy advisory; Market Information; Project Opportunity Identification; Matchmaking; Project Preparation and Access-to-Finance; Innovation and Skills Development. Also: Policy advisory services; local skills development support; Networking and information events	No publicly available information	No explicit focus on productive use of DRE



Name of Programme	Brief Description	Key promoters	Scale of Funding	Focussed Geographies	Impact/ Key Achievements	Main use of funds	Technical Assistance	Knowledge Sharing	Status: productive use
Lighting a Billion Lives	Launched in 2007 by TERI. It is a global initiative to facilitate clean energy access and the delivery of last mile energy services for basic and productive use. The programme operates through an entrepreneurial model of energy service delivery to provide innovative, affordable and reliable off-grid solar solutions	The programme was conceptualised and initiated by TERI, which is a research institute headquartered in India. Additionally, TERI is harnessing public-private-partnerships for delivering clean energy and increasing energy access	The estimated total value of the initiative is \$9 million. Various partners include MNRE, NABARD, UK Aid, ADB, UNEP, Embassy of Finland, Rockefeller Foundation, GAIL, Barclays, IDBI Bank and others	Asia and Africa. This initiative has spread across 24 states in India and has expanded to countries like Afghanistan, Sierra Leone, Kenya, Uganda, Ethiopia, Mozambique, Myanmar and others	Key Achievements (as on June 2017): the programme had impacted over 5.65 million lives, illuminated 1,130,570+ houses globally, 3304+ villages lit up, 60,000+ improved cook stoves disseminated, 172,640+ solar lanterns disseminated globally, 3000+ green jobs created and others	Product subsidy, TA support	No publicly available information	The programme accelerates market development for clean energy technologies through knowledge sharing, capacity building and market seeding	Incidental focus on productive use of DRE
Africa Renewable Energy Initiative (AREI)	AREI is an Africa-owned and Africa-led inclusive effort to accelerate the continents huge renewable energy potential	The initiative is under the mandate of African Union and is endorsed by African Heads of State and Government on Climate Change (CAHOSCC)	In 2016 received funding from the governments of France and Germany worth Euro 6 million and Euro 1 million respectively.	The initiative aims to address the entire African continent and benefit all African countries	The Initiative aims to achieve at least 10 GW of new and additional renewable energy generation capacity by 2020 and at least 300 GW by 2030	Three different streams of funds: independent delivery unit, attributed activities and AREI trust fund. Financial assistance for implementation of incentives towards replicable and scalable business models	The Initiative will provide technical and financial assistance for policy analysis and design and implementation of incentives, building on replicable and scalable best practices in Africa and other regions	The capacity building cluster of this initiative includes building partnerships with the very best knowledge institutions outside of Africa with the goal of accelerating technology and knowledge transfer. It aims to establish an African Energy Institute for action-oriented research, training, capacity mobilisation and skills building	No explicit focus on productive use of DRE



Name of Programme	Brief Description	Key promoters	Scale of Funding	Focussed Geographies	Impact/ Key Achievements	Main use of funds	Technical Assistance	Knowledge Sharing	Status: productive use
Global Alliance for Clean Cookstoves (GACC)	The alliance aims to save lives, improve livelihoods, empower women and protect the environment by creating a thriving global market for clean and efficient household cooking solutions. Its aim is to foster the adoption of clean cookstoves and fuels in 100 million households by 2020	It is a public private partnership. Some donors and supporters include: World Bank Group, Ministry for Foreign Affairs of Sweden, Denmark, Finland, Norwegian Agency for Development Cooperation, Shell, Morgan Stanley, United Nations Foundation, Lincoln Street Fund and others	NA	Global	The projected impacts of the alliance by 2020 include: 640,000 lives saved, 2.1 million sector jobs, 1.6 billion metric tons of CO ₂ e saved, 61% reduction in spending on fuel per household	Types of financing includes: grant funding through subsidized capital, angel equity, commercial capital	Development of knowledge products, Engagement with sector stakeholders, Market making activities, etc.	Develop publicly available knowledge products	No explicit focus on productive use of DRE
Global Lighting and Energy Access Partnership (Global LEAP)	It is an initiative of the Clean Energy Ministerial. Global LEAP and its partners aim to accelerate progress toward achieving UN Sustainable Development Goal 7 – universal energy access by 2030 by accelerating markets for small-scale solar lighting, off-grid appliances, and mini-grids through efforts focused on promotion of demand-side super-efficiency, product quality assurance, and partner collaboration	This initiative is led by the U.S Department of Energy	Global LEAP is operated by CLASP, with funding support from USAID, UK Aid, United States Department of Energy (DOE), Power Africa and others ²⁹	Global	Key Achievements: Global LEAP launched the Outstanding Off-Grid Appliance Awards which helps to build sustainable markets for energy-efficient off-grid appliances	No publicly available information	The programme provides technical assistance to policymakers	No publicly available information	No explicit focus on productive use of DRE



Name of Programme	Brief Description	Key promoters	Scale of Funding	Focussed Geographies	Impact/ Key Achievements	Main use of funds	Technical Assistance	Knowledge Sharing	Status: productive use
IDEAS- Energy Innovation Contest	It is an Energy Innovation Contest to support the development of innovative projects promoting renewable energies and improving energy efficiency	IDEAS was launched with the support of the Inter-American Development Bank (IDB), the Government of Korea, non-governmental organisation GVEP International and the German Technical Cooperation for Development (GIZ)	The initiative provides up to USD 200,000 for innovative projects that improve energy efficiency and increase access to renewable energy ³⁰	Latin America and the Caribbean	<u>The winning ideas</u> included a biogas system using waste from hotels and farms in Jamaica; an affordable solar power and micro-financing model bringing energy to remote communities in Suriname; and a gasifier, which drives a 20kW turbine supplying electricity for a micro-grid in Haiti	No publicly available information	The programme provides technical assistance	No publicly available information	No explicit focus on productive use of DRE
Lighting Africa	It is a joint IFC-World Bank programme which aims to provide affordable, clean, and efficient modern lighting and energy solutions for millions of Sub-Saharan Africans who currently live without access to the electricity grid	The Programme is funded with support from ESMAP, the Public – Private Infrastructure Advisory Facility (PPIAF), the Netherlands' Ministry of Foreign Affairs, the Italian Ministry for the Environment, Land, and Sea (IMELS), and the IKEA Foundation.	USD 20 million-foreign exchange credit facility was established by the Development Bank of Ethiopia with World Bank Funds ³¹ .	The initiative is spread across Africa and is currently operational in more than 25 countries	Overall impact as on June 2018: 32,280,275 people are meeting their basic electricity needs in Africa, quality verified solar lighting products sold amount to 17,920,902 and 1,792,090 metric tons of GHGs avoided in Africa in the past year	Grant Competition, providing seed funding for innovations in off-grid lighting product development; Credit facility	The programme provides technical assistance	No publicly available information	No explicit focus on productive use of DRE
Lighting Asia	The IFC led programme aims to increase access to clean, affordable energy by promoting modern off-grid lighting products & systems and efficient DC appliances	Lighting Asia/ India Programme is anchored by IFC and is supported by the governments of Australia, Austria, Canada, Hungary, Iceland, Italy, Luxemburg, Netherlands and Norway	No publicly available information	The World Bank Group provides lighting programmes in six countries throughout Asia including India, Pakistan, Myanmar, Bangladesh, Afghanistan and Papua New Guinea	Impact: benefits environment by reducing GHG emissions; savings by reducing spending on energy; safety improved by reducing fire hazards; benefits in health due to reduction of indoor air pollution, benefits in income by extending the working day of small businesses	No publicly available information	Programme provides technical and business skills training including and 360 degree integrated consumer awareness campaign including mobile exhibitions, school connect, retail connect and women outreach programmes	The programme provides knowledge sharing	No explicit focus on productive use of DRE



Name of Programme	Brief Description	Key promoters	Scale of Funding	Focussed Geographies	Impact/ Key Achievements	Main use of funds	Technical Assistance	Knowledge Sharing	Status: productive use
Multilateral Initiatives									
Scaling Up Renewable Energy in Low Income Countries (SREP)	SREP aims to expand the deployment of renewable energy solutions and expand renewable markets in the world's poorest countries	It is funded by the Strategic Climate Fund (SCF) under the Climate Investment Fund	The total fund size amounts to USD 750 million	Benin, Ethiopia, Ghana, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Rwanda, Sierra Leone, Tanzania, Uganda, Zambia	Targets includes: generating over 3 million MWh per year of renewable energy, improving access to energy for over 140,000 businesses and 17.3 million people and reducing 2.5 million tons of GHG per year	Funding includes grants, contingent grants, concessional loans, guarantees and equity	SREP also supports complementary technical assistance as this is considered essential for transformative and enduring change and country engagement and ownership. TA includes support for planning and pre-investment studies, policy development, legal and regulatory reform, business development and capacity building	Knowledge management and monitoring and evaluation are part of the TA. No clear focus on knowledge sharing, however	Partly focuses on productive use (but not necessarily through DRE)
Regional Off-Grid Electrification Project for West Africa (ROGEP)/ Regional Off-Grid Electricity Access Project	The project aims to increase electricity access of households and business using modern stand-alone solar systems through a harmonised regional approach	The project was approved by The World Bank in 2019	The total project cost is USD 333.7 million ³²	15 ECOWAS Countries and four additional countries (Cameroon, Chad, Mauritania and Central African Republic)	The project is expected to benefit about 1.7 million people	The funds are used to finance credit infrastructure (93%) and MSME finance (5%) ³³ . Entrepreneurship Support- This is in the form of seed funds and matching grants, for companies that qualify to receive seed capital investment from participating private equity and debt funds	The program provides technical support. The technical support will seek to enhance the capacity, skills, and expertise of eligible businesses	The project aims to transfer and share knowledge of technological innovations and new business models across the region in a harmonised manner, which will serve to improve the enabling environment for stand-alone SHS in the region	Incidental focus on productive use of DRE



Name of Programme	Brief Description	Key promoters	Scale of Funding	Focussed Geographies	Impact/ Key Achievements	Main use of funds	Technical Assistance	Knowledge Sharing	Status: productive use
Project for Renewable Energy in Rural Markets (PERMER)	The main aim of the programme is to provide rural areas with reliable electric supply in a sustainable manner using renewable energy technologies. Additionally, the programme objectives were consistent with GEF goals	The project was supported by GEF grant and loan from the World Bank	Total project cost amounted to USD 225.7 million	Argentina	The first stage of the PERMER project ended in 2012 and allowed the electrification of approximately 1,800 schools, 350 public services and 27,000 residences	Types of financing includes: grant and loan	No publicly available information	No publicly available information	No explicit focus on productive use of DRE
Rural Energy Development Programme (REDP)	The main aim of the programme is to enhance rural livelihoods through the promotion of rural energy technologies like micro hydro schemes	The programme was initiated in 1996 by the Government of Nepal and UNDP	REDP's micro-hydropower programme: USD 14.3 million; REDP's improved cooking stoves programme: USD 1.5 million; REDP has also launched an exercise to develop a single common harmonized programme (USD 120 million) of all donors under joint funding arrangements, wherein most of the donors have shown their willingness to support ³⁴	Nepal	Impacts include: the program has connected 59,172 households to micro-hydro plants; it has installed 317 new micro-hydro plants, 5,747.2 KW of micro-hydro capacity, 14,743 improved cook stoves, 7,041 toilet attached biogas plants and 3,238 solar home systems. It has brought modern energy services to almost a million people in remote rural communities in Nepal. Productive Use: small scale cottage industries like water mills, grain mills, battery charging, video shows and computer centres. Additional income from small scale cottage industries has raised earnings and livelihoods of rural households	Grants and concessional loans	The programme provides technical assistance	No publicly available information	Explicit focus on productive use of DRE



Name of Programme	Brief Description	Key promoters	Scale of Funding	Focussed Geographies	Impact/ Key Achievements	Main use of funds	Technical Assistance	Knowledge Sharing	Status: productive use
The Renewable Energy for Agriculture Initiative	The initiative began in 1999, with the aim to reduce GHG emissions by using renewable energy in the agriculture sector. The project focuses in social capital development and aimed at promoting the use of renewable energy for productive uses such as irrigation and refrigeration	It is a collaborative effort between the GEF, the World Bank and Mexico's Trust Fund for Shared Risk (FIRCO)	GEF USD 8.9 million financed under OP6, Beneficiaries USD 6.9 million and Government USD 1.8 million	Mexico	The project's executing agency (FIRCO) estimates impacting 60,000 farms could directly benefit from using renewable sources to energise their productive activities	No publicly available information	The programme provides technical assistance. The project's technical assistance component was designed to ensure the quality and appropriate operation of renewable energy systems acquired through the project and to disseminate information about successful operation	No publicly available information	Explicit focus on productive use of DRE
African Rural Energy Enterprise Development (AREED)	AREED aims at developing energy enterprises that use clean, efficient, and renewable energy technologies to meet the energy needs of under-served rural populations in Botswana, Ghana, Mali, Senegal, Tanzania, and Zambia	It is an initiative of the UNEP and UN Foundation	Approximately USD 8 million (2002-07) and USD 2.3 million (2008-12)	Botswana, Ghana, Mali, Senegal, Tanzania, and Zambia	AREED has fostered the development of companies involved in energy efficiency, biomass, biogas, PV, solar thermal, water pumping, and wind energy	No publicly available information	No publicly available information	No publicly available information	Incidental focus on productive use of DRE
Energy Business for Development (EBD) Programme	The programme provided advisory services and capacity building support for energy sector micro, small and medium enterprises, developing productive use activities of newly electrified villages, clean cooking and womens empowerment in Kenya, Tanzania, Senegal, and Uganda	EBD was the second phase of the Energy SMEs Programme, financed by the ESME Trust Fund, which was administered by the World Bank	It is a USD 4.27 million programme ³⁵	Sub-Saharan Africa	The programme has supported 350 businesses	Technical assistance	The programme provided technical assistance to energy enterprises	No publicly available information	Incidental focus on productive use of DRE



Name of Programme	Brief Description	Key promoters	Scale of Funding	Focussed Geographies	Impact/ Key Achievements	Main use of funds	Technical Assistance	Knowledge Sharing	Status: productive use
Asian Development Bank - Energy for All Initiative	The Asian Development Bank (ADB) established the Energy for All Initiative to empower the regions poor through access to energy	ADB	The total fund size is USD 2,300,000 ³⁶	Asia and Pacific Region	The Energy for All Partnership brought new and improved connections to electricity and modern fuels to more than 100 million people between 2008 and 2015. The Partnership's new goal is to double its energy access impact by providing modern energy access to 200 million people by 2020	Technical assistance, special fund/ grants	The programme provides technical assistance	The initiative shares its success stories and lessons learned through its knowledge products which include publications, websites for both the initiative and partnership and knowledge-sharing events	No explicit focus on productive use of DRE
Central American Clean Cooking Initiative (CACCI)	It is an initiative that aims to help scale up clean cooking solutions in various countries	World Bank	No publicly available information	Guatemala, Honduras, Nicaragua, El Salvador	Its aim is to help people transition from solid fuels to clean cookstoves and support the development of markets for clean fuels ³⁷	No publicly available information	Provides technical assistance	Other features of CACCI include awareness, special financing and capacity building	No explicit focus on productive use of DRE
Energy for the Poor Initiative (EPI)	In 2008, The OPEC Fund for International Development (OFID), launched EPI with energy poverty alleviation as its primary focus	OFID	OFID had committed a minimum of USD 1 billion towards financing of OFID's Energy for Poor Initiative ³⁸	Asia, Africa and Multiregional, Latin America & The Caribbean	No publicly available information	No publicly available information	No publicly available information	No publicly available information	No explicit focus on productive use of DRE
Sustainable Energy for All Initiative (SE4ALL)	It is a global initiative launched by the UN Secretary-General Ban Ki-moon in 2011 and aims to achieve the following objectives by 2030 - ensure universal access to modern energy services, double the global rate of improvement in energy efficiency and double the share of renewable energy in the global energy mix	It is multi-stakeholder partnership between governments, private sector and civil society. Few funders include, Austrian Development Cooperation, Climate Works Foundation, Bloomberg Philanthropies, Rockefeller Foundation, Ministry of Foreign Affairs Denmark, UK Aid, USAID Power Africa	In the financial year 2020, new revenue from donors amounted to USD 22.8 million with an additional USD 1 million of in-kind contributions ³⁹	Global	SEforALL works to ensure a clean energy transition that leaves no one behind and brings new opportunities for everyone to fulfil their potential	No publicly available information	At country level the initiative is mobilizing public and private sector partners to provide critical support including technical assistance, resources, and access to timely information and knowledge	Regularly develops knowledge pieces to further the SDG 7 achievement	No explicit focus on productive use of DRE, so far



Endnotes

- 1 It does not include investments by the beneficiaries themselves, but only the concessional loans, grants and formal equity based on the publicly available information about these programmes.
- 2 One of the programmes has an outlay of USD 1,590 per life impacted, but since it is significant outlier compared to the rest of the distribution, we are not considering it as a representative upper bound of the range.
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Global Challenges Foundation

Grev Turegatan 30, 114 38 Stockholm, Sweden

+46 (0) 709 54 74 27 | www.globalchallenges.org