THE GREEN PATHWAY THROUGH DISTRIBUTED RENEWABLE ENERGY SYSTEMS
Acknowledgements

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Introduction

Disparity in Electricity Consumption

A little over 90 per cent of the world’s population had access to electricity in 2019 but this figure put out by the World Bank when examined region-wise reveals a clear disparity. Countries that are part of the Organization for Economic Co-operation and Development (OECD) show a full coverage of their population but the access to electricity was as low as 44.6 percent of the population in heavily indebted poor countries (HIPC) and 52.8 per cent in the least developed countries.\(^1\)

The disparity, however, gets starker if the per capita electricity consumption figures of the two sets of countries are analyzed. Data put out by the International Energy Agency (IEA) data shows the 36-member OECD grouping (the number of its members increased to 38 by 2021) consumed 10,421.6 Terra Watt an hour (TWh) electricity in 2019 while the non-OECD countries used 14,108.8 TWh in 2018.\(^2\)

Residents of OECD consumed on an average 8 MWh of electricity which was almost four times of 2.2 MWh consumed by the non-OECD residents.\(^3\)

Addressing this disparity is crucial both for economic and social development. Any solution to energy poverty, however, has to intertwine options that do not result in higher emissions adding to the climate change challenge. Planning for a greener future for communities that are on the cusp of rural and urban living is, therefore, important. This will also ensure that the environment friendly bearings of rural population do not get eroded on their path to economic uplift.

India, for instance, has special programmes for access to electricity along with access to cooking fuel. The Government of India launched a revamped scheme for power access in 2015 under the name of ‘Deendayal Upadhyaya Gram Jyoti Yojana’ for rural electrification after subsuming the earlier ‘Rajiv Gandhi Gramin Vidyutikaran Yojana’. This aimed for village electrification and providing electricity distribution infrastructure in the rural areas. Under the scheme DDUGJY, the Union ministry of power sanctioned 921 projects to electrify 121,225 un-electrified villages, intensive electrification of 592,979 partially electrified villages and provide free electricity connections to 39.7 million poor rural households.\(^4\)

The Ujjwala Yojana, under which domestic LPG or cooking gas cylinders are provided to poor families, is also aimed at improving the living conditions. Both these schemes are in a way an attempt to meet the seventh Sustainable Development Goal (SDG) of affordable and clean energy, considering that greater energy access helps in cutting down emissions due to burning of diesel for power, and use of coal, wood and kerosene for cooking.\(^5\)

Nonetheless, while the grid power is affordable, it is not necessarily clean and is not reliable both in the number of hours it will be available and also the quality or voltage at which it is available. LPG cylinders, too, have become unaffordable for the poor due to increase in prices and phasing out of subsidies since May 2020.

At the same time, access to energy is crucial for even the third goal of good health and well-being and the fourth of quality education, the eight goal of decent work and economic growth, and the tenth goal of reduced inequalities.\(^4\)
The Rural Electrification Board in neighbouring Bangladesh has been working in this field for more than four decades. The board gets financial assistance from the Government of Bangladesh and philanthropists. It operates through consulting partners to supply power to households, businesses, and industries in rural areas. Rural Electrification Board Act, 2013 was adopted superseding the Rural Electrification Board Ordinance, 1977 to change the name to Bangladesh Rural Electrification Board. Which was responsible for electrifying rural Bangladesh. The aim, according to the board’s website, is to use electricity as a means of creating opportunities for improving agricultural production and enhancing socio-economic development in rural areas, whereby there would be improvements in the standard of living and quality of life for the rural people. \(^7\)

According to the Bangladesh Rural Electrification Board’s website, there are 76 operating rural electric cooperatives called *Palli Bidyuit Samity* (PBS), which brought in approximately 12,225,103 new connections and more than 283,448 kilometre of line has been constructed. According to the World Bank data, 57 per cent of the Bangladesh population had access to electricity in 2009, this rose to 92 percent in 2019. \(^8\)

In India, 97.8 percent of the population had access to electricity in 2019 as against 75 percent a decade ago. This indicates a sharper rise in Bangladesh’s rural electrification programmes implying that the challenges in that country were probably more daunting. Afghanistan seemed to have scaled even more impediments despite the political upheavals seen by it. It had 97.7 per cent of its population covered by 2019, a stupendous rise from a low of 45.5 percent in 2009.

The countries which achieved near full electrification for its population over the 10-year period from 2009 had an opportunity to scale up their renewable power generation. Since the number of people, households and new habitations are ever evolving, there is opportunity to have accessibility established along with greener imprints even in the current decade.

The Rockefeller Foundation, which works through its subsidiary Smart Power India in parts of the country, believes that since ‘the dawn of the electric age, a great divide has widened between those with access to power and those without. In 1930s America, just 10 percent of rural households in the US were electrified’. The federal government helped fund a massive, decades-long effort to bring electricity to the countryside that American cities enjoyed. It estimates 325 million people currently live without any access to electricity, and hundreds of millions more have unreliable access across the Asia-Pacific region. ‘That pathway to prosperity has become even more vital in the age of globalized commerce and the internet. Societies locked out of the energy economy are simply unable to rise out of poverty. In much of the world, regions or countries suffering from extreme poverty almost always suffer as well from a lack of steady power. We cannot remedy the one without pushing as well to remedy the other,’ says the foundation. \(^9\)

India and developing markets, in general, need access to reliable and clean energy. That reliability factor is important for SMEs and it is difficult to meet with weak or lack of grid connection. Therefore, mini-grids can play a catalytic role in the growth of an economy.

*Sunay Gupta*
Investment Manager, Swedfund
Positioning of Distributed Renewable Energy Systems

Clean energy-based distributed energy systems (DES) or distributed renewable energy (DRE) systems have evolved in the non-OECD countries especially in the South Asian region and parts of Africa over the last few decades primarily as a way to light up households in rural areas. With it, however, came the need for lighting up schools, community centers and common facilities in the villages. Apart from these small consumption centers, DRE systems also caught on with centers of economic importance in cities; like airports, storages, convention complexes and even offices. Though these are more rooftop solar systems unlike rural DREs, which are primarily ground mounted, they have the commonality of having their own local distribution infrastructure as also the flexibility of catering to higher load during the sunlit hours.

Low on Carbon High on Inclusion:
DREs can reduce carbon emissions that can come along with the initiatives for ending energy deprivation. Simultaneously, they address the issue of emissions from power back-up solutions. Smart Power India, for instance, was able to reduce carbon emissions from its target villages by over 20,000 tons.

- Affordable, Reliable and Sustainable: Not only are DRE solutions cheaper, they also mitigate climate change, create more local jobs and income generating opportunities for rural populations and enable communities to adapt to climate change effects more efficiently.

- Reliability: DREs serve small enterprises in rural areas that rely heavily on diesel and kerosene, and do not have adequate access to quality power supply.

- Integration in Future Programs: Integration into the grid systems can help in de-carbonization of the grid (thermal) through smart grid integration and leverage schemes like KUSUM to decarbonize agri-feeders.

The work done in the field of DRE has so far managed to replace kerosene and diesel-based power generation with renewable sources, while simultaneously providing reliable access to electricity. Following are some of the ways Smart Power, a subsidiary of Rockefeller Foundation, creates sustainable DREs models:

India: At the onset of solar power adoption in many remote areas, solar charged small battery systems and appliances were partially meeting the need for power. State government subsidy programs in India, for instance, pushed solar cookers, water heating systems and lanterns, especially in hilly and remote areas that had adequate solar radiations. The Union ministry of new and renewable energy has been promoting the setting up of Aditya Solar Shops in major cities of the country since 1995 to sell solar energy products and also to provide easy after sales services. Initially, shops were established by the state nodal agencies, manufacturer associations and non-government organizations but later private entrepreneurs were also allowed to open the shops. Under a new scheme, the shops were called Akshay Urja shops.

Alongside these efforts, DRE systems came up primarily bagged by either state government agencies or organizations, like Smart Power India that roped in NGOs working in the area of environment and clean energy to make power accessible. The wholly-owned subsidiary of The Rockefeller Foundation supported last-mile electrification in Bihar, Uttar Pradesh and Jharkhand, three states with high concentrations of energy poverty. It provided technical support to local renewable energy mini-grid companies and
promoted an ecosystem for local enterprises. Over the last six years, Smart Power India has been field-testing new technologies and business models that can take distributed renewable energy from an off-grid alternative to a mainstream component for widespread rural electrification.

**Sub-Saharan Africa:** Smart Power Africa estimates 573 million people or 55 percent of the population have no access to electricity, and in rural areas, this figure rises to 77 percent. Current trends indicate that the number of un-electrified people will increase by 2030, as population growth outpaces the expansion of electricity access. The three-point strategy includes:

**Mini-Grid Projects**

PowerGen, founded in 2011 at Nairobi to set up off-grid systems and with offices in four African countries, represents Africa Microgrids Association. Smart Power Africa provides them with a working capital loan. It is facilitating the construction of 240 new microgrids in Sierra Leone adding momentum to distributed renewable energy development.

**Progressive Utility Collaborations**

Smart Power Africa also works with Power for All, a global coalition of 200 private and public organizations for universal energy access before 2030 through the power of distributed, renewable electricity, to facilitate new partnerships between Umeme, Uganda’s largest energy distributor, and off-grid companies to extend connections to more last-mile communities.

**Mini-Grid Financing Vehicles**

Smart Power Africa has also created Africa’s first long-term project finance structure for rural mini-grid development, Cross Boundary Energy Access, which is starting with Tanzania.

**Myanmar:** Less than 50 percent or 30 million people in Myanmar have access to the national grid. The country plans to connect 7 million homes by 2030 to meet national goals. For this, Smart Power Myanmar estimates, half of the unconnected population will require more than $6 billion, world-class data analytics, innovative financing solutions, and integrated grid and off-grid planning.

Building on lessons from its work in India, Smart Power Myanmar was launched in 2018 in partnership with The World Bank, USAID, Yoma Strategic Holdings and Shell. Focus here, too, is distributed solutions, as well as innovative financing solutions to accelerate rural grid connections.

**Mini grid planning and deployment**

This involves providing ‘proof of concept and strategic insights’ to shape the World Bank and Department for Rural Development’s $80 million off-grid programme through data analytics, productive use and demand modeling innovations, and technical research. Structuring infrastructure financing solutions for mini-grids through local commercial banks in partnership with private developers and government, paving the way for increased access to project debt at scale in the future.

**Mini-grid financing**

Alongside, the French Development Agency’s $50 million loan to support distributed mini-grids is also being implemented.

**Progressive utility collaboration**

Designing and developing a large-scale financing facility for 4,000+ villages that require last-mile connections to the grid or are in close proximity to the grid.
A Model for Planning DRE Systems

The first step as in any planning for any ground level socio-economic intervention should start with a survey of villages which also stimulates awareness about how seemingly complex systems can change lives. Estimation of cost can be worked upon once the basic data of number of households and establishments and their energy requirement is in place.

With a workable model in place, community mobilization can be done in order to further understand energy requirements. This is possible through formation of committees at village levels that work alongside the implementing agency or company for an implied community ownership and maintenance of the grid. If a DES is also sponsored by the village community then an escrow account needs to be created for depositing a basic connection fee that can be used for initial capital cost and also for depositing monthly collection from billing for reinvestment purpose.

Available funding from the governments, private agencies and their corporate social responsibility kitty, and philanthropists could bring in the viability gap funding of the capital cost. Project design including selection of technology, creating of generation, distribution and billing infrastructure, and manpower deployment could then be worked out.

The executing company has to undertake project implementation work but a village-level oversight committee is important even if the initial capital cost has no contribution from the potential customers. This is required in order to create faith in the implementing agency and confidence in the system.

There are almost 13 partners like GIZ, MNRE, Mlinda, Husk Power System, ONC, TARA Urja, etc who have been a part of our journey enabling us to demonstrate more than 492 mini-grids since 2015 in India. We have actually witnessed more failures than successes. And we have seen how we can actually overcome each and every barrier. We initially found that there is a lack of awareness regarding the DRE-based business model. We need to sensitize stakeholders on how we can actually make a very sustainable and robust business model around it, where all the stakeholders can be benefited.

Satya Choubey
Associate Director, Program implementation & Micro Enterprise Development, Smart Power India.
Challenges to Decentralised Generation and Distribution

Rural electrification programmes through grid-scale connectivity where power generated at one end of the country can easily travel to the other have picked up pace in countries where the access to electricity was not full. Mini-grids or distributed renewable energy solutions (DRE) solutions had in many of these regions already created the initial demand for power through awareness around the multiple advantages of electricity for clean, healthy and a better quality of life.

DREs range from mini-grids, single panel micro grids and tiny grids that have a capacity of 1.5–3.5 Kw. Any capricious use of these panels, however, has to come along with adoption of better panels, maintenance, and eventual disposal and recycle of old panels after their useful life is over or after replacement. Awareness around what essentially is a greener option of power generation but can create an environmental challenge in disposal and recycle is required. Local oversight committees can be used for the purpose with support from environment and energy supply companies. This requires adequate planning and a uniform operating procedure, especially in rural areas. Incentives and fines on non-compliance are crucial here. The policies around them, however, need to be carefully drafted with an approach that sensitizes and not penalizes to an extent that it becomes another source of administrative control and disincentivizes adoption of more efficient technology.

These interventions will also have to come along with technological improvements that tackle the intermittent nature of solar and wind power and prevent breakdown during adverse weather conditions. For this, an important component is use of improved battery storage technology. These storage systems make power more reliable and smoothen the flow during peak hours. Just as in the case of panels, maintenance of batteries to reduce cost of replacement and enhance efficiency is critical. Besides, safe disposal of battery systems can be part of an overall scheme to tackle scrap from DREs.

Grid power a competitor or a complement: Distributed systems cannot match the scale of grid power and, therefore, find in it a competitor primarily because of the price points. The price differential is manifold especially since initial grid connectivity is driven by cheap power supply and free connections. DRE solutions in comparison are more expensive which is why households and small commercial establishments may move away from them. This, however, implies that local sustainable solutions, like power generation from solar, biomass and biogas, can find it difficult to sustain unless backed by government policy and philanthropic capital.

Nonetheless, DREs and grid power are not competitors and can complement and support each other especially since grid connectivity does not necessarily mean availability of power. For a consumer, therefore, cheaper grid power is an option that can exist along with a reliable back-up. These back-ups are still largely diesel based and are widely used in countries that have recently migrated to near full electrification even in areas where grid power has existed for long. DREs can replace them with sustainable power sources that do not have recurring costs.

Decentralised energy systems are also important for power islanding to weather grid collapses due to system failures caused by natural calamities or otherwise. Cyclones and floods often require shutting down of overhead power supply lines and sub-stations due to risks of electrocution. This leads to disruption in water supply as well as telecommunication services. At these times, storage-backed DRE systems can be easily put to use.
The COVID-19 challenge has posed a livelihood crisis especially in 2020 which came with national lockdowns. During the lockdown in India, almost 27 percent of migrants stayed back in their villages even after restrictions were lifted. Most of them started small businesses by getting connected to mini-grids and took the help of reliable electricity for this.

For mini-grid operators whose customers have low income, sustaining business and ensuring adequate demand is critical. Smart Power India and its partners conducted two customer surveys in different phases to analyze the impact of the lockdown on mini-grid customers in Uttar Pradesh and Bihar. The first phase survey findings revealed poor cash flow. Those who had shops and establishments have been the worst hit since commercial establishments were not allowed to work fully during lockdown. Smart Power India survey showed only 21 percent had agriculture as their primary occupation. With remittances from family members being under squeeze because of lockdown in cities, spending on non-essential items was less. Buying electricity came low in priority to food and healthcare. As a result, the consumer demand for power dropped.

Smart Power India introduced a Customer Voucher Scheme (CVS) to ease the economic burden on mini-grid customers and revive demand allowing customers access to reliable power even during the lockdown. The scheme gave a direct cash discount of up to 75 percent over a three-month period in their electricity bills. ‘Rural communities were under financial stress as cash balances got depleted due to the lockdown. As a result, many customers either started defaulting on their payment, or requesting disconnection, or trading down on their service packs. Through the customer voucher scheme, we were able to provide crucial financial support to our mini-grid customers and help them continue to access reliable electricity,’ says Samit Mitra, director, program implementation, Smart Power India.

The COVID-19 experience shows DRE systems can offer more customized solutions depending on whether demand is agriculture, commercial, industrial, residential or institutional.

“Distributed renewable energy can help the economy to grow at the local level and what we call the bottom of the pyramid. This is where there is growth. So, if we focus, provide and take care of those energy needs, both the electricity and the energy part of it, I think we would be able to leapfrog and the economy will bounce back.”

Manoj Gupta
CEO, Tata Power Renewable Micro Grid
Prospects

The requirement of power in low income groups grows as communities realize the benefits of better quality and longer hours of power supply. Mini-grids or distributed renewable energy (DRE) solutions can complement and support what the power grid has achieved by meeting this requirement. Reliability and the assurance of fixing breakdown, as and when they arise, through personal interventions can create a supplier–customer connect, which is often found missing in grid connectivity.

The impact of energy access is not limited to enterprises that directly benefit from reliable electricity but also benefit people working around them. These can be locals on whose land the power is generated or commercial side staff that is involved in billing and collection. The involvement of women in these activities is especially advantageous since it assures a job for them in the village itself and brings in more accountability in payments.

From a business perspective, companies need to have a standard product they can duplicate at an optimum cost level. The return on investment both for commercial customers and the energy companies needs to be worked out based on the capital investment. Companies looking to improve their environment, social and governance (ESG) scores can make investments in these energy supply companies. These companies may not look for very high returns but have low-cost capital available with them. Besides, the scale they add through greater spread can bring down the costs.

Patient capital rather than concessional capital which does not work like a venture capital investment in seeking quick yields but looks for returns over longer term is suited for the sector. Setting flexible tariffs that do not have a huge mark-up over grid power tariff can be one of the commercial approaches.

Simultaneous targeting of industrial clusters and smaller businesses can be one of the approaches especially if these clusters are using diesel-based back-up systems during curtailment of grid power supply.

Electrification in many markets, including India, has nearly achieved universal electrification, while those like Indonesia, Philippines, many others have reached more than 95 per cent but this electrification approach is not inclusive and not sustainable. More than 2 billion people in 60 countries have unreliable access or are underserved. It is not sustainable because the electrification approach is heavily dependent on fossil fuel that adds significant pollution and greenhouse emissions in the National Capital Region of Delhi, many other states in north India and even in some other places in Asia.

DREs can contribute to three sustainable development goals (SDG), particularly SDG 1, 7, and 13. SDG 1 of ending poverty cannot be achieved without ending energy poverty. Because of its clean technology, and its far cheaper and faster deployment, it can combat climate risks.

Productive use of power generated from renewable sources can also help in income generation through application in irrigation and for agriculture related purposes, like in thrashers and mills. This also helps in diversifying the customer base.

Electricity is the key reason why almost more than 95 percent of total micro and small enterprises are based in urban areas and not in rural areas. Microenterprise contribute substantially to the economic growth of a village or a community and can avail power supply from DRE systems in a more productive and easier way at lesser cost compared to diesel and other fuel. This, in turn, will enhance the economy of that village. At the same time, it also offsets environmental and sound pollution.

The Indian government plans to encourage a market-oriented framework to attract private sector for development and deployment of DRE livelihood applications through easy access to end user finance.
Besides, there will be introduction of standards, stringent monitoring and evaluation frameworks. The other aspect is skill development for strengthening the service infrastructure at the local level and encourage innovation and R&D to develop efficient and cost-effective DRE livelihood applications.

Following steps have been proposed under a policy:

- **Assessment of Demand**: Assessing the possibilities or potential of deployment of DRE livelihood applications across sectors of the rural economy and across regions. This demand assessment activity will help in mapping needs of beneficiaries with appropriate fit to DRE livelihood applications. MNRE will develop a list of DRE livelihood applications in consultation with stakeholders, which will be updated regularly.

- **Research & Development and Standardization**: Innovation, research and development of DRE technologies to offer tailor made solutions is important for widespread adoption. Collective efforts by key actors are required to identify, develop and promote appropriate DRE livelihood applications through multi-disciplinary research and innovation. Therefore, institutions of MNRE as well as other ministries and state level institutions will help in development of new devices and applications for rural economy. In addition, private sector, technology incubation centres, bilateral and multilateral agencies and NGOs will participate in the research and development activities. In order to test innovative solutions on ground, grassroots organisations (NGOs, CSOs, FPOs, SHG federations, KVKs etc.) that lead up to prototyping and demonstration projects will also be involved. Post development of innovative technologies, standards and testing protocol will be defined.

- **Pilot and Up-scaling of DRE livelihood applications**: Piloting and field demonstration of new DRE livelihood applications is vital to ascertain the success of any technology innovation on ground. Pilots can be taken up across textile, animal husbandry, agriculture, carpentry, pottery, cottage industry, black-smithy, food industry and other sectors. In line with the Guidelines issued by MNRE for innovative solar pumps, other programmes may also announce opportunities to run pilot projects under the existing schemes.

- **Access to Finance**: MNRE will pursue with financial institutions for credit facilitation.

- **Skill Development & Capacity Building**: DRE livelihood applications have the potential of creating new local job opportunities in operations & maintenance and installation/fabrication. Trained manpower will be required across the country for these activities. The availability of trained workforce will further help in increasing the credibility of products for consumers and financiers. Skill India, SuryaMitra, Biogas Mitra and Varun Mitra initiatives have not only created technology and allied service specific training modules but also trained a pool of youth across geography. MNRE will facilitate in developing and implementing skills and training programs for DRE livelihood applications with Skill Council for Green Jobs, IITs promoting rural development and technology, National Institute for Rural Development and other organizations of stakeholder Ministries/Departments. In addition to this, existing community level institutional platforms, such as SHG federation, FPOs, KVKs etc will be mobilized to build capacity of potential users/buyers to boost adoption of DRE technologies.

- **Public Information and Awareness**: Awareness about the appropriate DRE technologies and related services amongst the relevant stakeholders is required for taking necessary decisions. Further, given that these are new forms of technologies for many consumers, awareness campaigns will help in increasing credibility and adoption of these products by end-users and financiers. Central and State Government Ministries/Departments under their existing programmes may take up public awareness campaign to push adoption of DRE livelihood applications.
Programmes of Various Ministries/ Departments: It is pertinent to identify and exploit opportunities for DRE livelihood applications under schemes of various Ministries and Department of Central/State Government. This will result in augmented benefits to the rural entrepreneurs and beneficiaries.

According to the Government of India estimates, nearly 8 million pumps out of approximately 30 million agricultural pumps installed in India are diesel pumps. The total diesel consumption of these pumps is 5.52 billion litres annually with equivalent CO2 emission of 15.4 million tonne. The PM-KUSUM scheme for solar irrigation pumps is targeted to reduce carbon emissions by as much as 32 million tonne of CO2 annually. Moreover, farmers whose diesel pumps are replaced will be able to work on their farms in a pollution free environment.\(^2\)

Mini-grids can target the third or component C of the PM-KUSUM scheme that provides for supply of excess power generated from solar water pumps to grid on pre-determined tariff. All three components of the scheme aim to add solar capacity of 30.8 GW with the total central financial support of ₹ 34,035 crore.

Tie-ups between power distribution companies of Bihar and Odisha and Smart Power India have come up with learnings for model distribution zones in order to improve both supply as well as billing for rural consumers.

SPI’s experience in the mini-grids programme has shown that improved electricity supply leads to positive payment behaviour among customers, which contributes to improved viability of rural electricity supply. SPI created the energy services framework (ESF) to build upon learnings from both on-grid and mini-grid ecosystems. Based on the ESF principles, standard business models of partnership between distribution companies and energy service providers were designed with the objective of ensuring sustainability of rural electricity supply. SPI partnered with the state governments and discoms in Bihar and Odisha. The two states have more than 80 per cent of their population in rural areas.

The first ESF pilot was done with Bihar discoms based on model 1 or customer service model which involved engaging village level entrepreneurs, training and capacity building. The programme was implemented from January 2019 to September 2019 and covered 30 villages catering to electricity needs of about 19,000 customers. Total volume handled in the scheme was 20 MW

DRE enabled the creation of new jobs, made agricultural and fishery businesses more efficient and profitable, and even expanded economic opportunities for women. We can see that this is contributing to achieving last-mile electrification or in even places where they’re dependent on fossil fuels they are thereby improving the SDG number 7.

Pariphan Uawithya
Director, Power and Climate initiative, The Rockefeller Foundation

The role of mini-grids is not only limited to households for energy, reliability, and security. It goes much beyond. I would say that with climate and energy independence goals in the back of our heads, we should look at the role of mini-grids and what role they have to play for applications like productive use, mobility, achieving healthcare outcomes, income generation from farm and non-farm activities.

Nidhi Sarin
Program Head, GIZ India
Ten Point Agenda

As part of outreach for COP 26 UN Climate Change Conference scheduled to take place from 1-12 November 2021, Smart Power India with GIZ amplified the conversation on climate-related issues and the role clean energy access can play in the last mile for India’s energy transition. The two on 20 September 2021 organised a webinar on ‘DRE Mini-Grids as a Pathway to the Adoption of Clean Energy by Emerging Economies’. Following are some of the recommendations that emerged from it:

1. Evolving a sustainable and robust business model around mini-grids, where all the stakeholders can benefit.

2. Creating or introducing sustainable technology partners and helping Energy Supply Companies (ESCOs) overcome problems to create a sustainable distributed renewable energy systems or solar mini-grid model.

3. Engaging the local community in terms of changing their behavior towards use of electricity especially through energy-efficient appliances. Work with them to align their productive active activities along with the sunshine hours to transition loads from the nighttime to daytime.

4. Finance being a major catalyzing factor for DRE developers and their customers, micro finance institutions should be encouraged to invest in setting up distribution infrastructure and help customers buy both appliances and connections.

5. The role of mini-grids becomes important for a green recovery from COVID-19 hit economy. Forty percent of rural activities are still dependent on fossil fuel, adding to climate warnings and bringing down the profitability of micro enterprises. A concerted policy approach just as in the case of solar water pumps needs to be devised.
Power generated through DREs can be put to productive uses in mobility, healthcare, income generation from farm activities by adding cold storages or cold rooms for vegetables and fruits, and even for non-farm activities. Power can be used for charging electric vehicles and farm equipment thereby decreasing dependence on fossils. While at health centers, DRE sources can reinforce telemedicine.

More research is needed to bring more efficient cooking solutions that can also be linked to mini-grids.

Partnership from various stakeholders, like original equipment manufacturers or OEMs who provide electrical motors, value engineering or value chain partners, could enhance value of DREs.

Availability of quality power can be an incentive for setting up training and skilling institutes especially among labour who have returned after COVID-19 induced lockdown and do not want to return to city centers.

Scaling up of mini-grids while maintaining their distributed nature can bring in cost efficiencies and reduce risks by distributing revenue over a larger customer base. For instance, 500 plants for one operator can cover their operating costs, their fixed costs and start giving equity returns. This will, however, require sizeable amount of investment of $25-50 million in capital.
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The Global Energy Alliance for People and Planet

Preeminent philanthropic organizations, governments, multilateral development banks, development finance institutions and private sector partners have created a global platform to accelerate an equitable energy transition in 50+ developing and emerging economies, backed by an initial $10 billion of committed capital.

The Alliance will focus on delivering a transformational pipeline of projects that will enable an equitable energy transition across the emerging and developing world. To achieve these goals, the alliance will use its philanthropic capital to create significant public and private financial leverage, targeting countries that have demonstrated visionary leadership to deliver a clean energy future that benefits both people and the planet.

Mission Goals:

Carbon mitigation: Avoid and avert over 3 billion tonne of greenhouse gases

Energy access: Extend clean, productive-use energy to 1 billion underserved people

Jobs: Create tens of millions of green jobs to end poverty and economic growth

The Alliance will work across 50+ countries in Asia, Africa and Latin America. The requirements of these regions are different but the alliance focuses on increasing access to energy through greener options thereby reducing the carbon footprint.

Large developing nations: Making countries, like India, Nigeria, Democratic Republic of the Congo, Ethiopia, Indonesia, Philippines, Bangladesh and Pakistan, relevant across the full spectrum of DRE and grid-based energy transition projects. These countries face significant energy poverty challenges but are significant from a global energy transition perspective.

Small and mid-sized developing nations: Countries, like Malawi, Sierra Leone, Uganda, Tanzania, Myanmar, Haiti and Small Island Developing States with low per capita electricity consumption, with significant energy access challenges, where the focus would likely be on scaling up DRE.

Select emerging economies: The Alliance will support energy transition projects in countries, like South Africa, Egypt, Mexico, Colombia, Peru, Thailand and Vietnam, which have medium electricity consumption levels.

Scope of the Alliance: The Alliance’s core thesis is that increased energy consumption will translate into real growth in household incomes and poverty reduction, and will foster an ecosystem of investible projects and aggregated programs with a focus on three vital renewable energy pillars:

Distributed renewable energy (DRE) systems
Grid-connected renewables
Fossil fuel transitions

Standalone distributed renewable power systems of up to 10 MW and large-scale aggregated mini-grid programs that provide reliable power to underserved communities, small and medium enterprises, and local institutions in rural, peri-urban, and urban settings
Large (10MW+) renewable power plants (and associated transmission & distribution schemes) serving communities and industrial customers as well as auxiliary grid-connected distributed renewable generation and storage to diversify the energy mix of
larger utilities while improving reliability and coverage. Innovative mechanisms to drive down the cost of ‘round the clock’ renewables, aligning incentives to repurpose large installed diesel assets and aging coal plants

**The Four Levers:** Alliance will focus its support on unlocking four levers key to accelerating and scaling a set of high impact projects that will drive effort to address the global climate crisis while improving the lives and livelihoods of hundreds of millions of people.

- **Enabling environment:** Developing energy transition and universal energy access plans; designing regulatory and tendering schemes; streamlining licensing and administrative processes; expanding and open-sourcing data.
- **Project development and bankability:** Intensive technical assistance for feasibility, EPC and design, legal/financial advisory to originate and incubate new investments.
- **Risk capital & catalytic financial instruments:** Concessional capital to de-risk projects and unlock larger capital flows from DFIs and commercial investors along with tailored financial solutions that address key investment bottlenecks like local currency, pooled procurement, risk guarantees, etc.
- **Jobs & economic development:** Parallel investments to increase the productive use of power by local enterprises and emerging sectors (e.g., electric vehicles).
Citations

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[9] https://www.rockefellerfoundation.org/commitment/power/

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