Position Paper

CORE

CORNERSTONE OF RURAL ELECTRIFICATION

Alliance for Rural Electrification
Shining a Light for Progress

IRENA
International Renewable Energy Agency

SUSTAINABLE ENERGY FOR ALL

UN environment programme

UNIDO

International Copper Association

LANDSCAPE

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Electricity is an essential driver of development in rural and peri-urban communities, enabling essential services such as clean water, education and reliable health care services, and creates opportunities for developing income-generating activities. Yet, 870 million people currently lack access to safe, reliable and efficient electricity, while another 1.5 billion suffer from unreliable electricity services[1].

A key solution to these challenges is decentralised renewable energy (DRE) systems, recognised to be the least-cost electrification provision option for off-grid systems. DRE provides rural and peri-urban communities with reliable electricity, which can be a catalyst of local job creation and socio-economic development[2]. The market for DRE mini-grids alone is estimated to generate an annual profit of USD 3.3 billion for DRE developers between 2019-2030[3], making DRE an imperative to achieve the Sustainable Development Goals (SDGs).

Tremendous progress has been made in the DRE sector in recent years. From 2010 to the end of 2019, companies in the sector raised more than USD 2.1 billion in corporate financing[4], while at least USD 16 billion were mobilised to address energy access overall in 2018 alone[5]. On the policy front, a growing number of countries are developing and implementing policies integrating DRE as one of the chief solutions to reach electricity access objectives[6].

As the DRE sector inevitably grows and the world moves towards universal electrification by 2030, it is of utmost importance that sustainability is embedded in all projects and that safety, efficiency and reliability become the cornerstone of rural electrification efforts. What is at stake is no less than the achievement of the SDGs, most of which are largely dependent on sustainable electricity to be delivered.

1 *Rocky Mountain Institute, SEforALL & Rockefeller Foundation,* Electrifying Economies: distributed renewables to end energy poverty, *2020*

2 *PowerForAll,* Powering Jobs Census 2019: the Energy Access Workforce, *2019*

3 *ESMAP,* Mini Grids For Half A Billion People, *2019*

4 *WoodMackenzie,* Foresight 20/20: Off-grid renewables, *2020*

5 *SEforALL,* Energizing Finance: Understanding the Landscape, *2020*

6 *SEforALL,* State of the Global Mini-grids Market Report, *2020*

WHY CORE?

The solution to the sustainability challenge lies with the skills of the local workforce, which must be strengthened to deal with the monumental increase in decentralised electrification needs in the years to come. A recent survey with DRE industry players indicated that more than 70% of companies have difficulties in finding skilled local field staff.

With this in mind, the Cornerstone of Rural Electrification Initiative, CORE, is established jointly by the Alliance for Rural Electrification (ARE), the International Copper Association (ICA), the International Renewable Energy Agency (IRENA), Sustainable Energy for ALL (SEforALL), the United Nations Environment Program (UNEP), and the United National Industrial Development Program (UNIDO) to address the immense capacity building and technical assistance needs to support the development of DRE systems as a means to achieve the Sustainable Development Goals.

ALIGNMENT WITH THE SUSTAINABLE DEVELOPMENT GOALS

SDG-1: CORE empowers local communities to develop additional income-generating activities via business and entrepreneurship training.

SDG-4: Access to safe and reliable energy helps to increase education rates, which is a precursor to better-paying jobs. Additionally, CORE works directly with educational institutions, such as universities to build the future workforce of the DRE sector.

SDG-5: Energy is especially critical to improving health, safety, productivity, education, and income-generation opportunities for women and girls, who are disproportionately impacted by lack of access. CORE empowers women entrepreneurs via capacity building, especially related to productive uses of energy.

SDG-7: By embedding safety, efficiency and reliability in the decentralised electrification sector, CORE directly contributes to ensuring access to affordable, reliable, sustainable and modern energy for all.

SDG-13: CORE empowers communities to adapt to climate change and indirectly contributes to climate change mitigation by improving the long-term sustainability of DRE systems.

SDG-17: CORE brings together the key organisations as part of a collaborative approach in the energy access and energy efficiency sectors.

MAJOR BARRIERS TO BE ADDRESSED

IMPROVING SAFETY, EFFICIENCY AND RELIABILITY OF DRE SYSTEMS

Ensuring maximum levels of safety, efficiency and reliability of DRE systems is critical to maximise the electricity output and ensure longevity of the system. Such aspects can be improved at the three stages of DRE systems project cycles:

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System Design: A good system design is the backbone of any successful DRE project. In the design process, several factors need to be considered. Key considerations include the choice of power generation (and energy storage) technology, sizing of the system, choices of system configuration, the distribution system and subsequently procurement of components. Inappropriate design can lead to various issues, such as wrong system sizing (mismatch between electricity demand and supply), sub-optimal selection of components leading to poorer performance of the system than expected, and safety hazards.

Installation: Installation is the process of constructing the DRE system, with the procured materials and services identified in the system design process. Installation involves planning and scheduling, interface management, as well as quality management. At all stages, installation should be accompanied by quality checks and equipment tests and documentation of the same. Installation should conform with standards and regulations, as well as health and safety guidelines and should be performed by skilled staff with certified credentials. Lack of good installation practices can lead to a mismatch between the system design and the installed system, safety hazards for both workers and end-users of electricity, as well as poor performance of systems.

Operations & Maintenance: Operation and maintenance (O&M) is the process of operating and maintaining systems throughout their lifecycle. O&M strongly affects project bankability and return on investment and should be planned prior to the start of operations. An O&M plan is essential in this regard. New technologies, such as modern remote monitoring and control & management software can also play a critical role in improving O&M. Both O&M planning and technology improvement are contingent upon the human resources that drive the O&M process, and it is essential that the O&M staff have the required skills, motivation, integrity and relationship with the community. Without proper O&M, systems perform poorly and break down more frequently, leaving communities in the dark, shatter trust in the DRE sector and puts in peril otherwise sustainable business models.

LAYING THE GROUNDWORK FOR ENABLING POLICY AND REGULATORY ENVIRONMENTS

Governments equally play a critical role in driving the clean energy transition. They determine the market conditions by providing a conducive regulatory framework and leading policy interventions. In particular, the development of quality infrastructure and quality assurance frameworks provides avenues for governments to influence markets into a more sustainable direction.

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Quality infrastructure (QI): QI includes comprehensive standards for DRE product and component testing, certification and accreditation, inspection and monitoring and metrology standards. QI provides a wide range of benefits that far outweigh the costs of developing and implementing the QI. While QI is implemented at the national level by governments, they also greatly benefit DRE companies and communities, by limiting the flooding of markets with counterfeit, low quality products, hence improving the quality of components and products in the market. This in turn increases investor and community trust in DRE and enables more sustainable electricity services for end-users. On the other hand, inadequate QI can result in failed investments, lost electricity production and distrust in DRE solutions.

Quality assurance frameworks (QAF): Whereas QI sets the baseline for the development of standardized and sustainable DRE markets, QAF ensures that service levels and performance are monitored, standardised and regulated during the operation phase of projects. QAFs define a standard set of tiers of end-user service and links them to technical parameters of power quality, power availability, and power reliability. QAF also creates accountability and can help standardize performance data across projects. QAF is thus essential to ensure that electricity supply remains reliable, safe and sustainable for communities. They also help provide reliable data to DRE companies, financiers and regulators, making projects comparable, scalable and more investable. A lack of QAF on the other hand limits regulators' ability to monitor system performance and protect customers, limits comparable data between projects, and limits trust in the sector.

While implementation of central grid-based electrification at scale in Europe, North America and North Asia has been greatly facilitated by the adoption of standardised QI and QAF, such measures are not yet implemented at scale for decentralised electrification in emerging markets.

INCREASING LOCAL COMMUNITIES' RESILIENCY AND EMPOWERING WOMEN

The long-term sustainability of DRE systems in peri-urban and rural communities is intrinsically linked to economic development through productive uses of electricity. Productive uses of electricity are agricultural, commercial and industrial activities, powered by renewable energy sources, which generate income for local communities[7].

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Increasing productive uses of electricity creates a win-win scenario for DRE companies, rural and peri-urban entrepreneurs, communities, national utilities, and governments. Firstly, it secures revenues and increases margins for DRE companies, as customers will have more money to pay for electricity. This enhances the financial viability of DRE projects. Entrepreneurs and small businesses also benefit from switching from expensive diesel generators to affordable and more sustainable electricity, which also reduces greenhouse gas emissions. Communities and government benefit from the creation of new jobs and increased economic activity enabled by reliable electricity.

Women entrepreneurs are particularly important agents of change in peri-urban and rural communities. Women are more likely than men to reinvest their earnings within their communities in micro, small and medium-sized enterprises (MSMEs) and vital services such health and education. For example, available data indicate that women tend to spend more of their generated income —up to 90%, compared to 35% in the case of men— on the well-being of their family and community. As main electricity users themselves, women are equally well-positioned to understand customer needs and to take advantage of their extensive local networks to drive sales and build trust around sustainable energy services and products. In turn, MSMEs led by women entrepreneurs often play a critical role in driving socio-economic development in rural and peri-urban communities.[8]

7 *AEEP & ARE, The Productive Use of Renewable Energy in Africa, 2015*

8 *ARE, Women Entrepreneurs as Key Drivers in the Decentralised Renewable Energy Sector, 2020*

WHAT IS CORE?

As a response to the challenges outlined above, the Cornerstone of Rural Electrification (CORE) Initiative, spearheaded by the ARE, ICA, IRENA, SEforAll, UNEP, and UNIDO is established to ensure that DRE projects meet the highest standards of sustainability.

Scope: Decentralised renewable energy mini-grids in rural and peri-urban areas (all geographies)

Mission: CORE enables resilient rural and peri-urban communities by ensuring safety, efficiency, reliability, and sustainability become the cornerstone of decentralised electrification

Vision: As the world moves towards universal access by 2030, CORE supports and improves the livelihood of rural communities by ensuring all decentralised electrification projects meet the highest **standards of sustainability**

Value Proposition: CORE offers technical assistance on aspects related to increasing safety, efficiency and reliability of DRE systems, and on empowering local communities (especially women) on productive uses of electricity

CORE works with partners on the following avenues of support:

- **Certified CORE Academy trainings** for DRE practitioners conducted either virtually or in-person
- **Development of national/regional training and certification frameworks for DRE practitioners** together with universities, training institutions and governments
- **Flexible, on-demand technical assistance and capacity building activities** for governments, DRE practitioners, training institutions, universities and rural and peri-urban entrepreneurs
- An **open-source knowledge platform** (www.core-initiative.org), which gathers existing technical training materials and tools for the benefit of the DRE community

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Capacity building on system design, installation, operation & maintenance</th><th>Local communities
Capacity building to further empower women on productive uses of energy</th><th>Policymakers
Support to improve policy and regulatory frameworks for decentralised electrification</th></tr>
<tr><td rowspan="5">Approach</td><td>CORE Academy</td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td>Develop national/regional training and certification</td></tr>
<tr><td colspan="3">Open source online knowledge platform</td></tr>
<tr><td rowspan="3">Deliver technical asistance and capacity building through</td><td colspan="2">Cooperation with ongoing projects/programmes</td></tr>
<tr><td colspan="2">Design new programmes and secure funding</td></tr>
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