RELIABLE RENEWABLE ENERGIES FOR OFF GRID EMPOWERING RURAL HABITATS

"Off-grid renewable energy systems have transformed our ability to deliver secure, affordable electricity to rural communities all over the world, and are playing a vital role in breaking a cycle of energy poverty that has held back socioeconomic progress for hundreds of millions of people."

Adnan Z. Amin, Director-General International Renewable Energy Agency

The case for off-grid renewables

The convergence of several powerful factors has opened a window of opportunity for achieving universal access to electricity supported by off-grid solutions (Figure 2). Rapid decreases in technology costs have meant that off-grid renewable energy solutions are now the cost-competitive choice for expanding electricity access in many unelectrified areas.

The number of people benefiting from standalone solar lighting and home systems has grown twelve-fold since 2010, exceeding 120 million by 2016. PAYG-based plug-and-play solar solutions, wherein consumers pay tailored, periodic instalments often towards eventual ownership of the systems, spread at an average annual growth rate of 140% between 2013 and 2016. East Africa has accounted for most of this growth, thanks to the existence of a strong mobile money ecosystem. The PAYG sector attracted a cumulative USD 773 million in investments between 2012 and 2017, equivalent to 85% of all investments in the off-grid solar sector. The sector is estimated to exceed USD 20 million in annual sales and to generate USD 6-7 billion in annual revenue by 2022.

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Delivery models tuned to technology and adapted to end-users' needs A remarkable feature of the off-grid renewables revolution has been the innovation in delivery models to make technologies and modern energy services accessible, affordable and sustainable over the long-term. Delivery models need to be adapted to local socio-economic conditions, the specific technologies and current and projected demand for electricity services.

➢ For stand-alone systems, Bangladesh stands out as a key solar home system market where over 4 million systems have been deployed to date providing electricity services to over 11% of the population.

In East Africa, especially Kenya, which has emerged as a hub for innovation and adoption in stand-alone systems, the private sector has devised different delivery models to reach unelectrified communities.

Catalysing financing through innovative instruments Investment in the off-grid renewables sector has grown strongly as deployment has accelerated. In the stand-alone solar sector, estimated annual investments have risen nearly four-fold since 2014, reaching USD 284 million by 2017 (IFC, 2018).

Both public and private sources of financing have an important role to play in bridging the financing gap.

Public finance can close the funding gap through:

 direct financing for public services, rural enterprises and households that are unable to access available solutions and are at risk of being left-behind

 ii) financing instruments that derisk investments and, thereby, attract private capital for enterprises and projects To scale-up off-grid renewables, there is a need to access commercial debt financing in large volumes. Increasingly, the pay-as-you-go solar segment is accessing debt often on favourable terms, but the renewable energy minigrid sector is still largely financed through grants and non-commercial, patient equity

Policy and regulatory frameworks that build a conducive environment for growth In the specific case of stand-alone systems, policies can strongly influence the accessibility and sustainability of such solutions for rural communities. Fiscal incentives, such as import duty and valueadded-tax exemptions, are often introduced to incentivise market development; these directly improve the affordability of stand-alone systems.

Technology innovations reducing costs, enhancing reliability and improving livelihoods Technology innovation has played a key role in an ongoing process of reducing costs, improving reliability and making solutions accessible. The innovation process covers generation technologies (e.g., solar modules, micro-hydro turbines), balance- of-system components (e.g., inverters, electronic load controllers, smart meters), control system and appliances.

To support a further scale-up in off-grid renewables, the innovation process needs to be strengthened through a focus on adaptation to local conditions and end-uses, and through the establishment of quality infrastructure.

Remote islands are also becoming a great showcase for digital technologies, as they leap-frog over older systems deployed elsewhere and implement state-of-the-art solutions tailored to their context.

Building capacity across the off-grid value chain and fostering entrepreneurship

If off-grid renewables are to be scaled up to meet potential demand, adequate capacity must be developed across the sector. Skills development and training must be tailored for different stakeholders, including end-users, financing institutions, local entrepreneurs, standardisation agencies and the private sector.

Harnessing the cross-sector linkages of off-grid renewables to meet the SDGs

The innovations in technology, delivery and financing described above are being leveraged to provide affordable and reliable electricity for cross-sector applications and to maximise socioeconomic and environmental outcomes.

There is a growing evidence of the tremendous potential of off-grid renewable energy to advance several SDGs. For instance, with over a billion people globally served by health facilities without access to electricity off-grid renewables can deliver reliable, affordable and sustainable energy to power medical devices and to support the provision of basic amenities

Accelerating off-grid renewable solutions to reach universal electricity access In 2016, the number of the world's people living without electricity globally fell below one billion. Today, the technologies exist to build on the present momentum and reach still-unconnected populations well before the target year of 2030. Off-grid renewable energy solutions (stand-alone systems and mini-grids) are now cost-competitive with grid extension for expanding access in many areas.

Off-grid renewable energy should be viewed as a job-creating opportunity, as it has the potential to create millions of jobs across the value chain.

Efficient end-use appliances should be included in the off-grid ecosystem to ensure affordability and long-term sustainability.