

# POSITION PAPER

## Off-Grid Renewable Energies to achieve SDG-7 and SDG-13: Cheaper, Cleaner and Smarter

The number of people without access to modern forms of electricity still remains at a level of almost 1 billion. Access levels are unevenly distributed with especially Sub-Saharan African countries tailing behind on ambitions to reach universal access to electricity by 2030.<sup>1</sup> Significantly more investments are needed to achieve SDG-7 to “ensure access to affordable, reliable, sustainable and modern energy for all,” as well as SDG-13 to “take urgent action to combat climate change and its impacts.”

**Until now what has been missing is evidence of the potential of off-grid technologies to achieve both SDG-7 and SDG-13 in a cheaper, cleaner and smarter manner than other alternatives.**

New evidence from the GIZ, Reiner Lemoine Institute and the greenwerk. study **“Off-Grid Renewable Energy for Climate Action”** © Catherina Cader




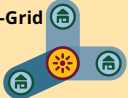

is without ambiguity: off-grid renewable energy solutions, such as clean energy mini-grids and solar home systems (SHS) have significant environmental, practical, economic and socio-economic merits over grid expansion.<sup>2</sup>

**Off-grid renewables are vastly superior to its competitors on three parameters:**

1. **Cheaper cost of deployment:** Off-grid renewables reduce investment needs compared to grid extension to achieve full electricity access no matter if the forecast scenario is based on lower demand estimations and tiers of energy access (USD 276 billion vs. USD 393 billion) or higher demand estimations and tiers of energy access (USD 584 billion vs. USD 614 billions). In short, **off-grid systems can reduce investment costs of achieving full electrification by up to 30%.**

1 IEA, IRENA, World Bank and WHO, Tracking SDG7: The Energy Progress Report, 2019: page 1

2 See also: Scaling-up energy investments in Africa for inclusive and sustainable growth, 2019

	Lower Tier Case			Higher Tier Case		
	BaU	uEA	prOG	BaU	uEA	prOG
<b>Grid</b> 	236	226	41	236	226	41
<b>Mini-Grid</b> 	98	103	141	226	250	341
<b>SHS</b> 	34	64	94	72	138	202
<b>Total</b>	<b>368</b>	<b>393</b>	<b>276</b>	<b>534</b>	<b>614</b>	<b>584</b>

Business-as-Usual (BaU), relative values applied for people to be electrified based on New Policy scenario of IEA.  
 Universal-Electricity-Access (uEA), based on GIS analysis of current grid infrastructure and settlement patterns combined with current policy frameworks.  
 Progressive Off-Grid (prOG), based on uEA with most progressive policy frameworks for off-grid.

Table 1: Initial investment needs until 2030 in USD Billion

- Cleaner than grid extension:** Achieving full electrification by 2030 with off-grid renewables is more climate-friendly than grid extension and thus goes hand in hand with SDG-13 objectives. In comparison with an electrification scenario favouring grid electrification, off-grid electrification can save from 500 to 800 Mt of CO<sub>2</sub> in the period until 2030. Annual emissions can be reduced up to 100 kg CO<sub>2</sub> / pc. In other words, **off-grid electrification can play a strong role in climate change mitigation and is up to 50% cleaner than grid extension as a means of achieving full electricity access by 2030!**

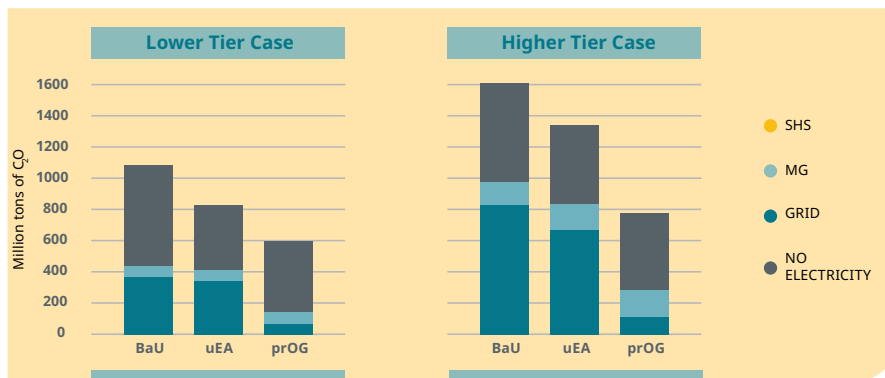






Figure 1: Cumulated GHG emissions in million tonnes of CO<sub>2</sub> (2017-2030)

3. **Smarter, faster and more reliable:** Off-grid renewables are fast to deploy. Clean energy mini-grids take weeks to set-up and SHS can be implemented in a day, while grid infrastructure can take years to build. Moreover, off-grid electrification can also help local communities in adapting to and building resilience towards climate change. For example, off-grid renewables mitigate risks of power cuts across larger areas, as systems are decentralised and independent failure in one system does not affect other nearby communities. Also, reliability of off-grid systems is very often significantly superior to the central grid in rural areas. Lastly and most importantly, via the Productive Use of Renewable Energy (PURE), such as agricultural, commercial and industrial activities, off-grid electrification can act as a strong catalyst to create local jobs and socio-economic development.<sup>3</sup> This in turn can help communities adapt to climate change, as access to electricity often helps drive improved education, extended access to information via computers or mobile phones and improved administrative services in local communities. **Off-grid renewables are thus in the majority of cases also the smartest electrification option.**

 **Electricity access improves livelihoods and resilience** of rural communities which leads to various socio-economic benefits.

 **Grid extension** often fails to bring reliable energy access, as it provides **high capacities** but only **little energy** in the case of weak grids.

 Compared to grid expansion, off-grid electrification is often the **smarter solution**, providing **flexible and reliable electricity** for the fast implementation of various **activities** in rural areas.

 In the context of **climate action**, off-grid renewables provide not only **greenhouse gas (GHG) emission reductions**, but also adaptation services and **sustainable development** tailored to local needs.

Box 1: Off-grid electrification benefits



Figure 2: Nexus between off-grid renewable energy and livelihoods

3 AEEP & ARE, The Productive Use of Renewable Energy in Africa, 2015: page 4

## GIZ-ARE Recommendations

### 1. Supporting integrated and holistic rural electrification planning and regulations

**Electrification planning should not only consider least-cost approaches, but also focus on the environmental and social impact of electrification efforts.** Efforts therefore need to involve not only Ministries of Energy and Rural Electrification Authorities, but also other relevant stakeholders such as Ministries of Agriculture, Environment and Finance.

In the context of the Paris Agreement, Parties have to revise their Nationally Determined Contributions (NDCs) by the end of 2020. NDCs represent important communication vehicles for conditional mitigation and adaptation activities that require international support such as capacity-building, technology transfer and financial assistance for implementation.

**It is hence imperative that off-grid renewables are part of the revised NDCs especially in countries with lower access to electricity and with large shares of the population living in remote and rural areas.**

**Technical assistance programmes are needed to support energy and related ministries in reviewing policies and legislation in line with climate policies**



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**and commitments, as well as long-term sustainable development objectives via deployment of off-grid renewables.** Review processes can refer to international best practices to address the need for public-private partnerships, for example in mini-grids, alongside other de-risking mechanisms to unlock off-grid renewable energy investment. ARE and GIZ stand ready to assist government stakeholders in implementing such technical assistance programmes.

## 2. De-risking investments in off-grid renewables

**Specific measures and financial instruments must be adopted to enhance off-grid renewable energy projects' economic viability and their attractiveness to potential investors by mitigating project risk.** Public financial institutions should boost cooperation with private lenders to move from direct finance towards a wider risk mitigation strategy. This could boost the use of concessional finance and smart grants to leverage private investment and address funding gaps. To some extent this can be implemented in a result-based-finance (RBF) structure. Innovative de-risking packages for tendered projects can be provided, via technical assistance in project preparation phases, such as by funding site identification and pre-feasibility studies or by providing end-user subsidies. These efforts should favour scalable and sustainable solutions that create a pathway towards long-term financial independence from international funding partners and host governments.

**Local banks and local institutional investors must also be supported to invest in the sustainable energy transition. Capacity building programmes can give local commercial banks templates on due diligence and risk assessment methods for off-grid projects.** Current investors, notably development finance institutions, can accelerate these capacity building processes through co-investing alongside local institutions to transfer due diligence and risk assessment skills, as well as provide first loss or risk sharing. With these measures more local banks can be incentivised to co-invest in off-grid projects alongside international funding partners.

Fossil fuel subsidy reform presents part of the solution to free up money, correct distorted incentives and inequitable subsidies. This can bring associated benefits for off-grid renewable energy efficiency, emissions reduction, and government balance sheets.

## 3. Catalysing and supporting innovations to optimise the business case for off-grid renewables

Investments into frontier market businesses, especially as they relate to the building of infrastructure or supply chains, are often characterised by substantial risks, high transaction costs, long lead times and a lack of reliable data for planning and impact measurement. Off-grid renewable energy businesses are no different.

**Innovations can help address these challenges and enable off-grid renewables to act on SDG-7 and SDG-13 in an even cheaper, faster and more effective manner than what is currently the case.**



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For example, digital solutions can help create more transparency, thereby attracting more (and more targeted) investment, and make results more measurable, helping the industry to learn more systematically from experience. More work is needed to enable detailed quantification of economic value and social impact of digital solutions to this end. The same is true for measuring the social impact of applying digital solutions for off-grid renewables.

Another example is that there is a clear need to catalyse innovations for batteries and other energy storage solutions that are tailored to off-grid and mini-grids systems and deployable on a large systematic scale in emerging countries. To address this need, ARE has joined the World Bank's 'Energy Storage Partnership', which focuses on energy storage technology research, development and application.

#### 4. Proliferating standards of technology and consumer protection

**To avoid that low-quality, hazardous and copied components for off-grid renewable energy systems flood the market and cause reputational damage and distrust in off-grid renewables, quality standards should be introduced and enforced where they are not already in place.** Where mini-grids are deployed, interoperability with the main grid that may eventually extend to the mini-grid location is also of paramount importance, necessitating standards and technical grid codes.

Such standards and management procedures are equally relevant for the increasing ecological and health related problems from broken or unused products. The challenge of waste management and recycling must be addressed with systems that are easy to maintain and repair and avoid the usage of hazardous substances.



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**Additionally, standards of consumer protection for example for clean energy mini-grids, as already implemented by ARE, in partnership with African Minigrid Developers Association (AMDA) and Smart Power India, need to be more widely proliferated.** Increasing capacity to implement consumer protection should not be limited to mini-grid companies but should also target inclusion in national regulations and in mini-grid/off-grid tenders to ensure trust in the sector and the protection of vulnerable populations.

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## Note to the editor:

The Alliance for Rural Electrification (ARE) is an international business association that promotes a sustainable decentralised renewable energy industry for the 21<sup>st</sup> century, activating markets for affordable energy services, and creating local jobs and inclusive economies. ARE enables improved energy access through business development support for more than 150 Members along the whole value chain for off-grid technologies.

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