

Off-Grid Utilities Report

A holistic financing view for
off-grid utilities



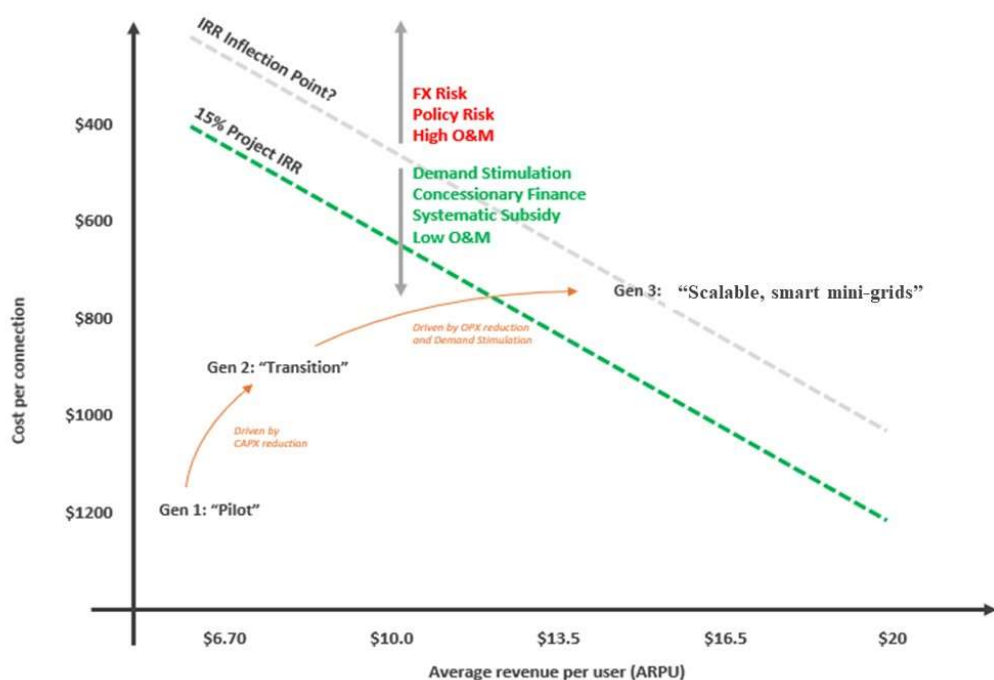
A targeted financing approach will be vital to scaling off-Grid utilities.

As discussed in the other [Shell Foundation report](#) in this series, off-Grid utilities have the potential to provide low-cost electricity to over 100 million people, representing a multi-billion dollar market, *annually, in Africa alone*. At Shell Foundation, we have worked with off-Grid utilities for over a decade and increasingly see our partners and the sector gain momentum and commercial interest from investors and large corporates as the ecosystem evolves. Developers are gaining experience in site selection and operational processes and the sector is getting more access to performance data to give a clearer indication of site economics. Technology prices are coming down rapidly, often making off-Grid, renewable-based electricity the least cost solution to electrify an area.

Governments are increasingly starting to recognise mini-grid infrastructure as part of the rural electrification roadmap and are working on policy frameworks that support the sector to scale.

As described by our partners at [Factor\[e\] Ventures](#) in the graph below: the last five years were a pilot phase for the off-Grid utilities sector and we believe we are now entering the transition phase, en route to a scalable, infrastructure industry.

We also believe during this transition phase, as costs come down and developers gain experience in their business models, precise, co-ordinated donor interventions can help move the sector past its infancy, unlock commercial capital, create economies of scale, and allow the sector to reach an IRR inflection point to reach scale, as demonstrated in the graph.



The objective of this article is to explore what type of financing interventions are needed to allow the sector to reach that inflection point faster than its current, organic trajectory.

There is an affordability gap that stops rural customers from using enough energy at cost-reflective tariffs to allow off-grid utility operators and their investors to recover capital costs and receive

reasonable returns. The size of the gap varies based on the site specifics, but [CrossBoundary Energy Access](#) modelling, using [AMDA \(Africa Mini-Grid Developers Association\)](#) member data, suggests it varies from \$400 to \$700 a connection. This viability gap makes it difficult for off-grid utilities to convince commercial investors to fund them.

A coordinated blend of capital will help produce economies of scale to drive down costs, close the affordability gap and make the sector investable.

Early-stage developers need patient, risk-taking capital to hire staff, fund R&D and build sites to reach a level of scale that reduces costs in a meaningful way. We have directly experienced the importance of injecting early-stage capital to achieve positive unit economics, in working with our access to energy partners such as [Husk](#) and [Redavia Solar](#). For example, Redavia Solar provides containerised, turnkey solar plants for industrial, commercial and mini-grid usage. From 2014, we supported them for five years on R&D, new product development, testing business models, supply chain improvement and building local sales teams. In that time, they applied our grant funding to innovation and efficiency, driving down their container costs by an average of 30% per annum since 2014.

Public/donor funding has both a direct and indirect influence on costs because it directly reduces the cost of the CAPEX to allow for a more certain return for investors. It also indirectly reduces costs because efficient funding mechanisms allow developers the opportunity to leverage economies of scale, gain more experience and drive innovation that directly links to cost reduction. Cost reduction is key to making these services accessible to low-income consumers in Africa and Asia.

Off-grid utility developers are already seeing cost reductions as technology costs decline and they gain stronger vendor partnerships – more capital will just enable it to happen faster and at a larger scale. AMDA members forecast average costs to drop by 44% as connections rise by 300%, provided they can raise the funding to build their existing pipeline.

Currently, mini-grid projects receive very little project financing, further delaying cost reduction and site viability.

[As Shell Foundation has outlined previously](#), an estimated \$7-11bn will be required to scale off-grid utilities across Africa.¹ Yet our off-grid utility partners continually struggle with raising capital. AMDA reports that among their 12 members in Kenya and Tanzania, the financing gap is \$130m of project financing over the next three years, slowing the development of over 185,000 electricity connections in those two countries alone.

One of our grantees, [Odyssey Energy Solutions](#), that works with over 350 project developers with pipelines totalling more than \$500m worth of mini-grid projects, confirms the same bottleneck.

According to Emily McAteer, founder and CEO of Odyssey, there is a serious lack of funding flow, which could be improved by creating more continuity and certainty around donor programmes. “Our platform holds the largest collection of mini-grid projects in the world, which allows us to see how capital is moving into the sector. And capital is not flowing, at least nowhere near the scale needed –

¹ Catalyst & Shell Foundation Proprietary research, 2017. CrossBoundary Research, 2018.

and particularly not from commercial investors. The sector needs systemic subsidy schemes with matching private capital to truly scale.”

[Our work across several social impact markets has demonstrated nascent sectors need coordinated ecosystem interventions to overcome these initial viability gaps and attract commercial capital to scale.](#)

There is urgent need for coordination to ensure impact and commercial capital are reinforcing each other.

This need for reinforcing public/donor funding has been repeatedly iterated. For example, we recently took a survey of 11 sector investors who express a commitment to invest in mini-grids, including Acumen, the Rockefeller Foundation, DOEN Foundation, REPP (managed by Camco), FMO, DOB Equity, CrossBoundary Energy Access, Microgrid Investment Accelerator, All-On, Kawisafi Ventures and Blue Haven Ventures. At that time, 50% of these funders had already invested, while half had been trying, but not yet committed. When asked which milestones the sector would have to meet to mitigate enough risk to unlock their capital, the top two milestones, tied at number one, were positive project economics and consistent public/donor funding, followed by policy alignment. We classify this group as impact investors with a mandate to reach a varied level of return, ranging from 5% to 20% in the survey.

Nine of the 11 investors who have their own capital to deploy said certainty around public/donor funding would unlock \$190m from them into the sector in the near term. They organised themselves with support from Power for All to [provide a coordinated message](#) to donors on specific mechanisms of subsidy programmes that would help them gain certainty and unlock their funding. We believe these nine investors represent a small subset of commercial investors and corporates that would also deploy alongside donor-led public/donor funding for off-grid utilities.

Various forms of public or donor capital have always been key to making both rural electrification and renewable energy more commercially viable.

While some may question whether public or donor funding detracts from the perceived viability of a sector, examples from all over the world demonstrate exciting investment opportunities enabled by subsidies or other development finance, which have on many occasions fuelled the healthy growth of now-established and profitable sectors.

In most OECD countries, rural electrification was heavily subsidised over years and in many cases, decades. A classic example is the Rural Electrification Agency in the USA, which took electricity rates from 10% to 90% in less than 15 years in US agricultural zones, with over \$16bn in subsidies during the same period beginning in 1935².

Often rural electrification is subsidised by the urban and industrial areas which is a model embraced by Shell Foundation incubation company, [Konexa](#). They are working with distribution companies in

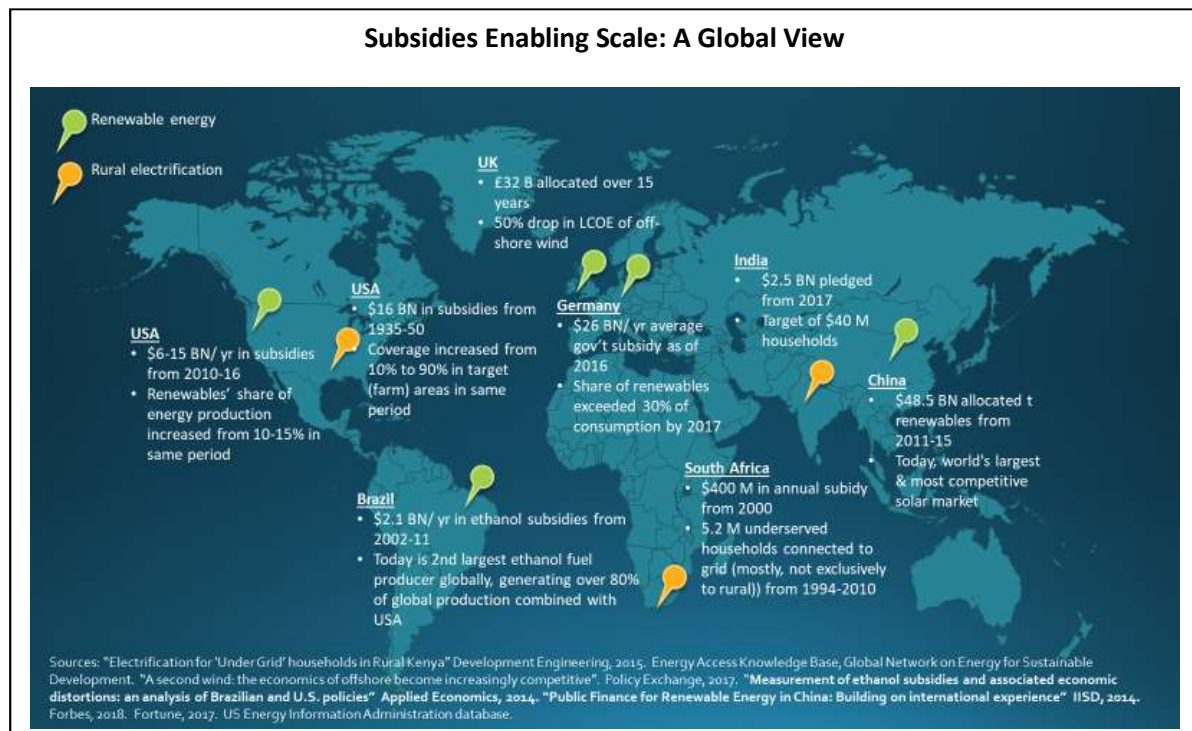
² C. Kitchens, P. Fishback/Flip the Switch: The Spatial Impact of the Rural Electrification Administration 1935–1940, National Bureau of Economic Research, Cambridge, MA (2013), NBER Working Paper 19743

Nigeria to provide an holistic energy model where large industry customers with high energy demand allow for lower tariffs for rural, off-grid customers. However, most rural utilities don't have that option because there are no industrial companies in the regions where they operate.

The cleantech sector has also flourished under very targeted public funding programmes; almost any cleantech investor in the US/EU is benefitting from subsidies, which were an instrumental tool in growing the renewable energy industry to scale. Cleantech investments anywhere in the world would not have happened without credible, trusted subsidy programmes, encouraging private investment and driving down costs to where they are today. Subsidies in the US were even described by the NY Times as a “goldrush” for investors in 2011, because they practically removed uncertainty from the equation³.

To use a European example, the cost of offshore wind (OSW) has plummeted due to systematic public funding. Not long ago, OSW was an infant industry with few players, yet over the past two decades, government and industry worked together to create a “protective space” to nurture, shield and empower the industry, including a top-up subsidy and revenue support for developers. In 2016 the LCOE, at £97/MWh beat the 2020 target of £100/MWh by four years⁴ Today, Germany has accepted its first subsidy-free offshore wind auction bid, and the UK is coming close⁵.

Renewable sectors are classic examples of how non-commercial capital can de-risk and grow nascent sectors, which are weaned off as they evolve into a credible commercially-attractive infrastructure investment. We believe donors and foundations, in coordination, can achieve similar results in the off-grid utility sector. As in any sector, it will be the risk-taking, forward thinking investors that manage to spot public/donor funding trends early and benefit from them the most.



³ www.nytimes.com/2011/11/12/business/energy-environment/a-cornucopia-of-help-for-renewable-energy.html

⁴ <https://ore.catapult.org.uk/press-releases/offshore-wind-on-target-to-become-lowest-cost-large-scale-clean-energy-source/>

⁵ <https://www.bloomberg.com/news/articles/2017-06-08/u-k-seen-headed-for-subsidy-free-power-from-offshore-wind-farms>

This potential upside is hinged upon public/donor funding programmes being designed effectively and in coordination. If grant funding schemes are not structured to help developers to reach investor hurdle rates, the commercial capital will not be raised and the sites will not be built. If the public/donor funding programmes are data-driven, that data will allow donors and governments to ensure grant levels are reduced appropriately as costs come down and new business models develop, until the sector evolves into a trusted, credible infrastructure investment.

Structured public/donor funding will not be the silver bullet to site-level viability – developers must use this toward innovations that increase demand and reduce costs within their organisations.

AMDA members advocate the following principles on how public/donor funding could accelerate the off-grid utilities sector.

One of the first challenges AMDA tackled when they were formed, was to try to find a common ground on subsidy needs. Private sector developers have struggled with the programmatic, cyclical format of donor programmes which create uncertainty for them and their investors. They are advocating for an Africa-wide, ongoing Results Based Financing (RBF) facility that will allow the sector to gain some stability and maturity to attract commercial capital and top talent.

The following are the AMDA agreed principles for SMART RBF.

- **Simple:** Subsidy is fixed and available once connections are installed, eligibility is clear.
- **Measurable:** Funds are disbursed based on specific, measurable outcomes – not arbitrary approvals. They propose the facility be results based so it's easy to measure when payment is due.
- **Africa-Wide:** Developers work regionally – consistency in how subsidies are managed improves rate of deployment and reduces application and reporting timing and costs. It will also reduce gaps in programmes across countries which stall progress in the sector.
- **Repeatable:** The programme is designed to be repeatable and consistent to create certainty for the private sector and encourage more commercial investment. The amounts can reduce over time and operating guidelines can be tweaked based on learnings, but it's important to ensure the facility builds trust and credibility if the sector is to mature.
- **Timely:** Funds are deployed in a timely manner once connections are verified. We recommend a management structure that ensures facility managers' performance can be measured and incentives can be aligned. For example, IT processes that can track facility manager service level agreements on response times.

AMDA members and various other stakeholders in the sector have donated their time to develop detailed operating guidelines for SMART RBF that a group of 13 commercial investors with over \$2bn under management have endorsed as an instrument that would unlock their capital if launched as an ongoing facility they can invest alongside.

Shell Foundation has supported the design of the operating guidelines and will provide \$1.5m for the first call to test the operating guidelines in Q1 2020.

The facility will provide performance-based grant to developers after reaching a pre-defined result (number and quality of connections). Once sites are constructed, connections can be verified

remotely through metered data and online verification/tracking methods, and then funds are released. A percentage of connections are also randomly verified in person.

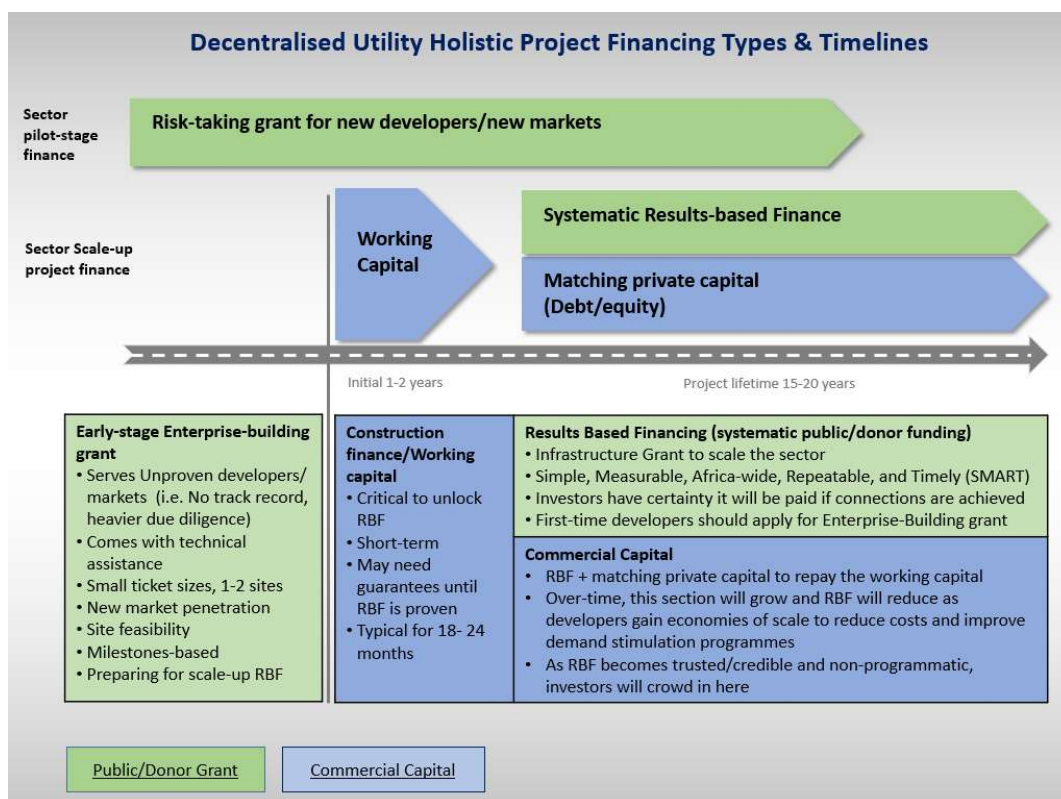
The facility will be managed by a dedicated, impartial RBF management team to create credibility and certainty in the sector.

Developers agree to share industry level data to AMDA’s industry report to pre-qualify for SMART RBF. This ensures the sector has one consistent industry report to better understand the sector. This data will allow donors to recalibrate the RBF amounts or tariff levels over time as costs come down and provide governments with site location, number of connections and pipeline, allowing better planning for the national electrification agenda.

Ultimately, the SMART RBF facility should leverage consistent donor/government funding and off-grid utility data to gain trust from commercial investors, so they can more confidently invest in the sector and build a commercially viable off-grid utility sector over the coming years.

Over the past 18 years, we’ve used our philanthropic funding to leverage \$6.7bn of additional capital into the energy and transportation sector. The most important thing we have learned is to not allocate funding in a silo but to use it actively to allow more commercial capital to enter the sector. As an example, \$2.7m of our funding could either have been deployed as grant funding alone or it could be structured in a blended capital facility to unlock an additional \$31m into the sector, which is the strategy we used in backing the responsAbility Energy Access Fund, anchored by IFC.

Based on our learnings over the past decade while fundraising with our partners in this sector and feedback from experienced stakeholders, we have outlined a visual below for a holistic financing mechanism for off-grid utilities to scale.



We believe there are two types of private sector grant funding needed for the sector, indicated in green on the graph above.

The first one is early stage grant for new developers or new market entry, used to build a team, implement the first few sites, gain experience in the market and collect performance data for that country. This can be viewed as **Enterprise-building grant**, which is the type of grant Shell Foundation uses regularly. The second type of donor funding needed is more structural and is normally filled by governments to provide a public good. It is systematic grant funding that businesses and investors are certain they can access before they invest in projects, providing certainty they can reach commercial returns. This can be viewed as **Infrastructure grant**, which in this case is RBF. We should separate the two to ensure RBF can be simple and systematic to allow a scalable solution that attracts entrepreneurial talent and commercial investors.

RBF will always only be a portion of the CAPEX needed, so it will not be successful **without matching private capital**. Most equity investors according to our survey, would be looking for above 15% return rates, which can be leveraged by cheaper debt once ticket sizes are larger and sites have been operating long enough to service debt.

If matching private capital cannot take development risk, it is very important there is **working capital** or construction finance available. RBF will work very slowly if there's no mechanism to unlock development/construction capital. Both matching private capital and working capital are indicated in blue above, provided by commercial investors to drive discipline in the sector.

With these interventions, we believe off-grid utilities move through the transition phase, unlocking commercial capital and attracting larger corporates into the sector to scale

While this proposed structure might be over-simplified, we hope it drives a framework for coordination amongst donors in the sector. Public funding has historically provided many success stories of renewable and rural electrification for us to learn from. This strategy aims to build on that experience, enable off-grid utilities to unlock latent potential in developing markets, and to help reach SDG7.