Off-grid PPPs towards access to electricity scale-up in Africa

Yann Tanvez, Energy Specialist, IFC
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Outline

1. Why off-grid PPPs?
2. Off-grid PPP approaches
3. Conditions for successful off-grid PPPs
4. Looking forward – market trends
5. Lessons for off-grid PPPs
6. IFC DESCO SSA program
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Sub-Saharan Africa is the most electricity-poor region in the world

Two-thirds of Africa’s population – over 600 million people – lack access to electricity

Source: IEA WEO 2012, 2014
Population growth is currently outpacing access progress in Sub-Saharan Africa

Under current trajectory, more African will lack access to electricity in 2030 than today

Source: World Bank, 2017
Off-grid solutions are foreseen to play a major role in solving SSA access challenge

IEA projects that universal access by 2030 will be best achieved with off-grid solutions for almost half of the continent population, representing 63% of electricity sector investments.

Off-grid space as part of the electricity sector new ‘continuum’
Public-Private Partnerships offer an approach to addressing challenges facing public sector-led infrastructure delivery

<table>
<thead>
<tr>
<th>Infrastructure delivery challenges</th>
<th>Benefits of PPPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large gap between available financing and investment required to address infrastructure needs</td>
<td>Mobilisation of additional sources of financing through improved asset utilization and implementation of user fees</td>
</tr>
<tr>
<td>Difficulties with project planning and selection process</td>
<td>Application of extensive analysis of costs and revenues and development of innovative ways to meet infrastructure needs</td>
</tr>
<tr>
<td>Ineffective or inefficient project delivery and management and inadequate maintenance, potentially leading to higher costs</td>
<td>Alignment of incentives and measurement of outputs to ensure effective and efficient infrastructure delivery, operations and maintenance</td>
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To support realization of these benefits, PPPs should be:
- Structured to allocate risks to the parties best placed to manage the risk
- Assessed based on affordability and value for money
- Procured through competitive processes (where bids are comparable)

Source: IFC PPP Knowledge Lab
Key roles between public and private actors in off-grid PPPs

Public sector partners
- Energy access commitments
- Ability to set regulations
- Convening power (national level)
- Large contracts
- Competing priorities/limited resources

Private sector partners
- Multi-country presence
- Innovative business models
- Operational expertise
- Financial strength
- Understanding of/desire to enter new markets

What does each party bring to the table?
Off-grid energy PPPs have been implemented in emerging markets over the last couple of decades.
Historically, off-grid PPPs have taken the form of concession models.
Lessons are emerging as countries implement programs with varying approaches and outcomes
Programs have tended to underperform vs targets but can still provide valuable lessons

Program performance – targeted and installed connections (’000)

<table>
<thead>
<tr>
<th>Country</th>
<th>Target</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morocco</td>
<td>150</td>
<td>52</td>
</tr>
<tr>
<td>South Africa</td>
<td>300</td>
<td>100</td>
</tr>
<tr>
<td>Mali</td>
<td>100</td>
<td>78</td>
</tr>
<tr>
<td>Senegal</td>
<td>107</td>
<td>4</td>
</tr>
<tr>
<td>Peru</td>
<td>150</td>
<td>90</td>
</tr>
</tbody>
</table>

Off-grid solutions shifted from being seen as a final to a transitional solution.

Initial target was 100,000, follow up call for proposals had no target.

Slow implementation.

High poverty rates, SHS seen as sub-standard, caps placed on installations due to funding uncertainties.

Complex design and insufficient demand assessment work.

Morocco
82% of the population was without energy in 1995
18 years

South Africa
51% of rural households were without electricity
15 years

Mali
~97% of the rural population lacked access to electricity in 2003
14 years

Senegal
88-92% of the rural population lacked electricity in 2003
14 years

Peru
30% of people lacked access to electricity in rural areas (>6m people)
7 years
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Timely payments
Avoid delays in payments as it has the potential to disrupt

Regulatory conditions

Clarity
Roles of key parties should be well-defined and remain clear

Consistency
Major changes in the PPP’s framework should not be made without agreement with key parties

Flexibility
PPP framework should contain mechanisms to learn/evolve over time

Reporting
Realistic and fair timing of compliance and reporting

Financial conditions

Pre-investment support
Upfront data availability and adequate levels of definition to make decisions

Financial viability
Understanding that private capital requires sufficient rewards for risks, thus consider capital subsidy or continual tariff support

Timely payments
Avoid delays in payments as it has the potential to disrupt

Prices of solar PV energy have dropped dramatically

• Declines in costs are making solar PV installations (and hybrids) more attractive.

• This has been evident in recent solar IPPs, but holds true for off-grid energy projects as well.

Source: Bloomberg New Energy Finance
Energy efficiency of appliances has improved significantly

**Energy consumed at equivalent light output (W)**

- **Incandescent**
  - Heat
  - Light
- **Halogen**
  - Heat
  - Light
- **LED**
  - Heat
  - Light

**Estimated power rating of off-grid appliances**

- **12” Table fan**
  - Mainstream appliances
  - Off-grid appliance 2015
  - Off-grid appliance 2020 (expected)
- **15” TV**
  - Mainstream appliances
  - Off-grid appliance 2015
  - Off-grid appliance 2020 (expected)
- **<100l refrigerators**
  - Mainstream appliances
  - Off-grid appliance 2015
  - Off-grid appliance 2020 (expected)

Source: superbrightleds.com; Global LEAP, The State of the Global Off-Grid Appliance Market
Mobile money and smart metering have made business models more attractive

- Mobile money accounts mean that collection costs and risks can be reduced
- Mobile money accounts enable access to credit services and therefore access to higher quality/tier services
- Other innovations such as smart meters allow for greater certainty around energy usage and revenue collection and the ability to switch equipment off remotely for non-payment
Off-grid deals are increasing and becoming larger

- Half of the largest solar deals in SSA in 2017 were off grid

- Niger solar minigrid deal ranked 7 out of the 12 SSA largest solar deals with $US10M

- Additional government backed minigrid tenders to be expected in 2018-2019 including but not limited to Kenya, Sierra Leone, DRC, Zambia, Togo, Benin, Niger, Cote d’Ivoire (TBC).

Source: Bloomberg New Energy Finance, December 2017
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Several lessons drawn from international experience remain applicable

**Strong policy commitment & sustainable funding**

- Develop a **clear vision** and secure strong, consistent government commitment
- Provide a clear **regulatory framework**
- Involve **local governments & communities** in planning

**Delivery models with sufficiently attractive risk-return profiles**

- **Reduce risks** where possible by providing certainty through long and clear PPP terms & compensation rules
- **Enhance business models** by allowing economies of scale
- Allocate **sufficient subsidies** based on a strong understanding of cost structures and potential revenues

**Effective implementation**

- Task a **strong authority** with dedicated capacity (and not subject to political interference) to operationalize the program (ensuring that grid and off-grid planning is integrated)
- Conduct transparent processes that **leverage competition** for price discovery
- Specify clear, up-to-date **technical and quality standards**
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IFC off-grid PPP “DESCO SSA” program overview

Objective

To increase access to modern, off-grid energy services in Sub-Saharan Africa through a PPP approach.

Promote DESCO business models based on mini-grid and solar home system technologies that will serve off-grid populations at a significant scale and, provide support to clarify and minimize different obstacles related to site selection, policies, regulations as well as the possibility of leveraging a mix of concessional and commercial capital.

Broad Approach

Help expand access to energy through renewable energy technologies that will mitigate climate change by converting consumers using fossil fuel-based lighting and energy sources to modern, clean energy solutions, avoiding emissions of greenhouse gases (GHG).

Goal
For each market, there would be a separate engagement with a public sector agency that has the remit to expand access to energy through a PPP approach.

IFC will commission a study to help the government determine (a) the energy access gap that may be reachable through a DESCO PPP approach; and, (b) where in the country that the approach would make most sense.

IFC (i) works with governments to secure all permits that can be obtained prior to tender; and, (ii) draft a clear and simple process for any remaining permits that is overseen by the client or other agency responsible for project implementation, and whose procedures, requirements, and timelines are guaranteed as part of the tender document.

Structure the PPP transactions and adjust the standardized documents as necessary to the specific country context.
TOGO IFC DESCO program overview

- **Geospatial Analysis**
  - Identifying theoretical technological options based on demand across the country
  - Developing cost scenarios based on level of service and timeline targeted
  - Complement to ‘Rural Electrification Program of Togo’s Localities 2018-2032’ adopted in December 2017 by Government

- **Business Model Assessment**
  - Leveraging best practice business models for serving the energy access market
  - Defining key success criteria for private sector entry/public-private partnerships
  - Understanding successes/challenges and business model “fit” in Togolese market
  - Estimating “viability gap” between required RoI and likely end-user contributions
  - Mapping public, private and donors’ stakeholders and funding sources

- **Strategic Roadmap Definition**
  - Reconciling planning scenarios with private sector models and funding needs
  - Outlining key milestones and action plan for the period 2018-2030
  - Defining “what it will take to deliver on the strategy” (immediate operational challenges to address, organizational needs, additional analysis required)
TOGO IFC DESCO program: designing electrification strategies inclusive of off-grid PPPs

### Optimal technology per locality (n=3248)

#### Results (for 100% access in 2030)

<table>
<thead>
<tr>
<th>Technology</th>
<th>Optimal %</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connexions</td>
<td>31%</td>
<td>~400k</td>
</tr>
<tr>
<td>% of households to be electrified</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Localities</td>
<td>61%</td>
<td>~965</td>
</tr>
<tr>
<td>% of localities to be electrified</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Génération - Additional capacity in MW</td>
<td>64%</td>
<td>~1970</td>
</tr>
</tbody>
</table>

#### Technologies

- Grid Extension
- Grid Densification
- Minigrids
- SHS

*Note: Values are approximate.*
The project will **undertake upstream work as an important input to the development and delivery of public-private partnerships (PPPs)** intended to scale-up energy access in Zambia, using off-grid solutions (specifically minigrids and SHS, as appropriate to the location-specific demand).

Three key workstreams:

(a) **engaging with the Government of Zambia to carve out space for off-grid** solutions in its broader electrification plans, and to define parts of the country in which private firms would be invited to develop off-grid systems

(b) **generating critical market data that private developers require**, including demand for energy services, consideration of the affordability of such solutions for the end-users, and how the viability gap can be covered

(c) **addressing uncertainty in the legal and regulatory framework** to attract high-performing international and domestic firms to serve the off-grid market.

**Rural Electrification Authority (REA)**
- Day-to-day engagement through Project Implementation Unit (PIU)
TANZANIA IFC DESCO program: data provision towards reducing private sector risk

- IFC works with private and public off-grid stakeholders in Tanzania towards market scale-up

- One key area of support has been on the provision of detailed demand data to reduce private sector risks

- Allows private companies to target markets more effectively and reduce investment risks

- Allows governments to assess business models and viability gaps with more precision
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