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NREL and the Quality Assurance Framework for Minigrids

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Dakar, Senegal

NREL's Multilateral and Bilateral Initiatives in Africa

NREL Initiatives in Africa

21st Century Power Partnership (21CPP)
Department of State, DOE

Africa LEDS Project
European Commission

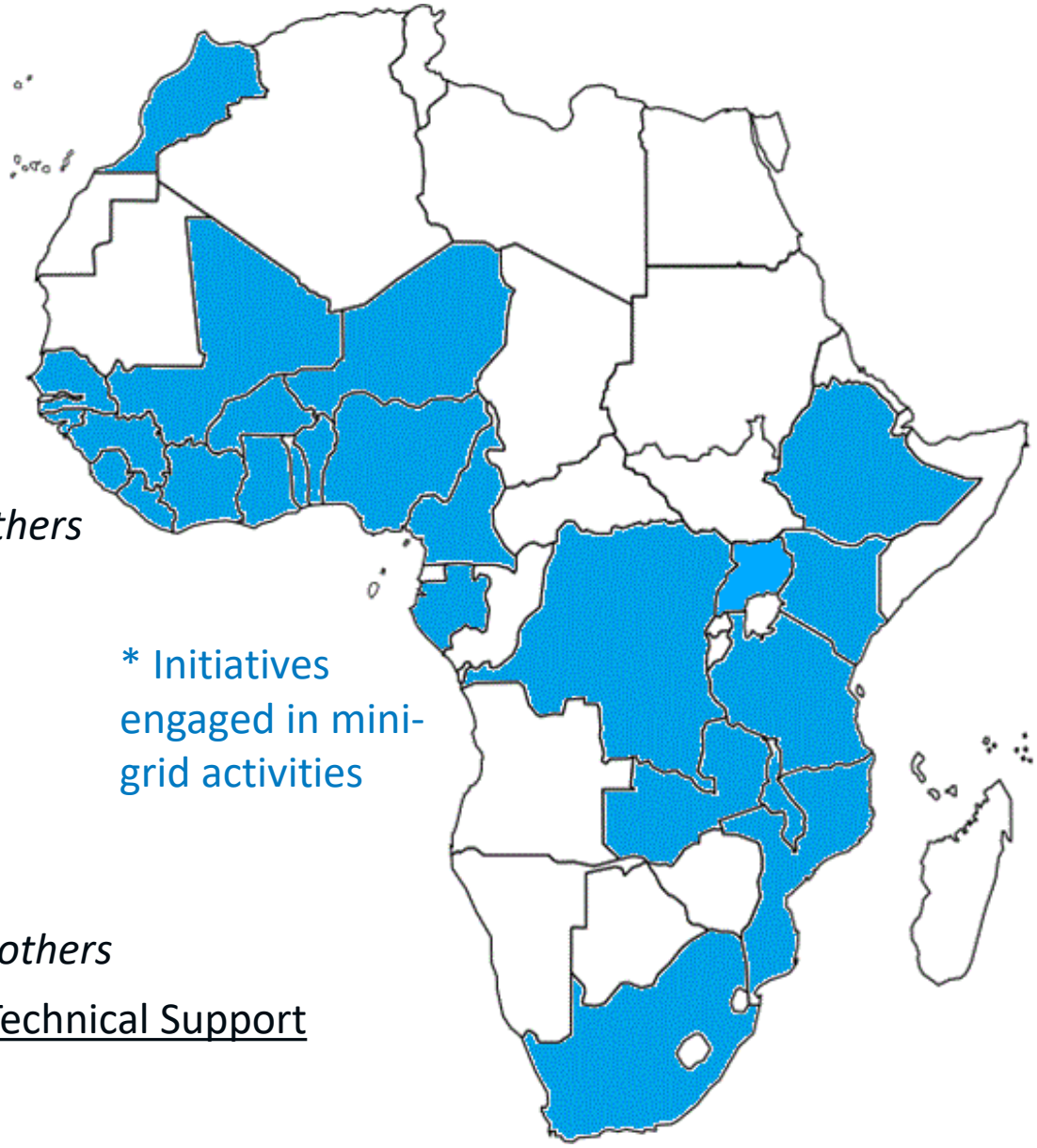
*Clean Energy Solutions Center (CESC)
DOS, DOE, Australia, Power Africa, others

Enhancing Capacity for Low Emission Development Strategies (EC-LEDS)
USAID

Leadership Compact
Department of State, Hewlett

*LEDS Global Partnership (LEDS GP)
Department of State, GIZ, and many others

*Power Africa Beyond the Grid (BTG) Technical Support
Power Africa

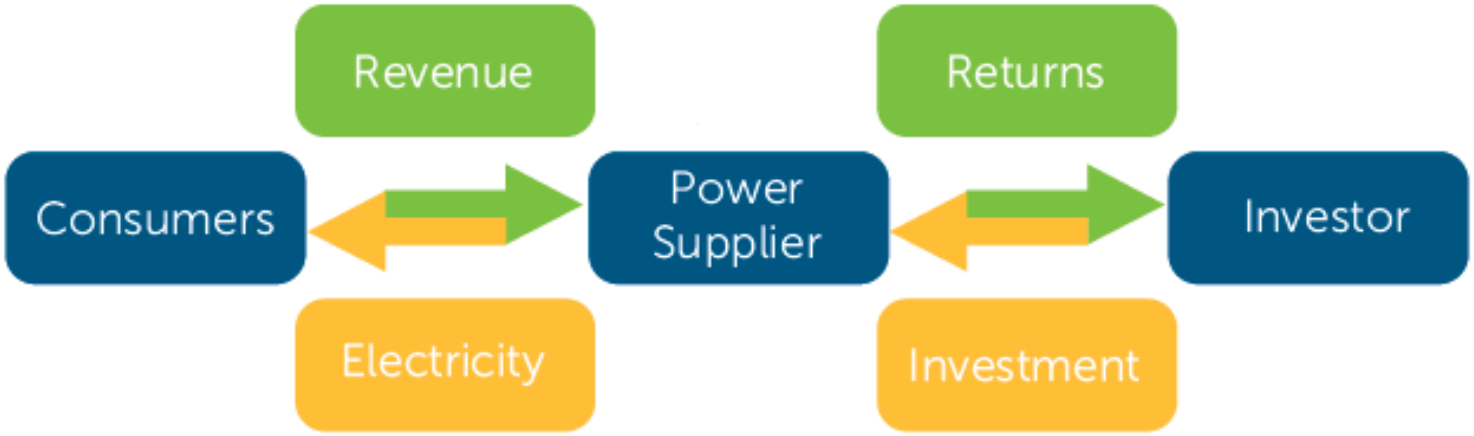


* Initiatives engaged in mini-grid activities

The Utility Model

Business models for commercially viable utilities must address the needs of the three key stakeholder groups:

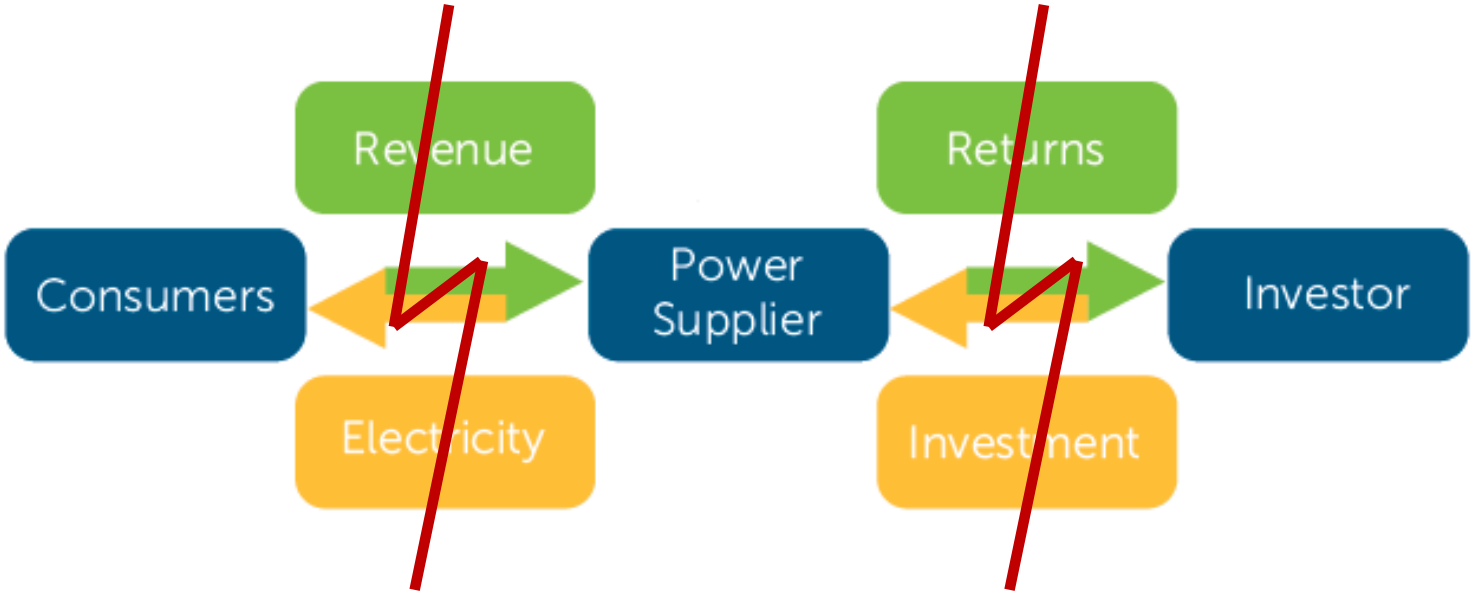
- **Customer:** Need guarantee of service that they are willing and able to pay for
- **Power Suppliers:** Need to cover operating costs while providing return to investors
- **Investors:** Need to understand and be confident of the risks they are taking



The Mini-grid "Utility" Model

Utility model breaks down in the case of rural electrification as a result of three main challenges:

- High cost of power provision to remote communities → Impacts customer ability and willingness to pay
- Lack of consistent cash flows from customers → Impacts power supplier ability to cover costs and provide returns
- Poorly understood investment risk profile → Impacts investor confidence in market risks



A Mini-grid Quality Assurance Framework (QAF)

Offer structure and transparency for mini-grid sector, based on successful utility models, that still reflects the diverse needs and requirements of off-grid consumers.

- Common understanding for classifying minigrids
- Better tailoring system design to customer needs with consistent and flexible specifications
- Flexible and adaptable framework for any minigrid
- Enable aggregation and investment with common classification and protocols and new market data

Source: Kari Burman, August 2007

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U.S. DEPARTMENT OF ENERGY

CLEAN ENERGY SOLUTIONS CENTER
ASSISTING COUNTRIES WITH CLEAN ENERGY POLICY

POWER AFRICA

https://cleanenergysolutions.org/qaf

Global LEAP
Lighting and Energy Access Partnership

Elements of the Quality Assurance Framework

1. **Define levels of service** tailored to consumer need and ability to pay, including appropriate and flexible thresholds for:
   - Power quality
   - Power availability
   - Power reliability

2. **Define accountability framework**
   - Clear processes for validation of power delivery with trusted information for consumers, funders and regulators
   - Suggested monitoring and reporting protocols for operators to improve transparency, sustainability and market information

QAF does not mandate a standard process or level of service, rather offers common means to reference and ensure service…

"TRUTH IN ADVERTISING"

QAF Element 1: Levels of Service for Isolated Mini-grids

1. **Power Quality** – Is the power provided of a reasonable quality to safely meet the energy needs of the consumers?
   - Voltage and frequency variations, distortion etc.
2. **Power Availability** – Is the power provided in an amount that meets expectations and at the times that meet consumer needs?
   - Hours of service, power and energy levels, etc.
3. **Power Reliability** – Is the power provided with reliability to meet consumer needs?

Source: Kari Burman, November 2016

Source: Solar Nigeria, 2014

QAF Element 2: Defined Accountability Framework

1. **Consumer Accountability** defines, monitors, and validates that a specific level of service is being provided to a customer
   - Protocols for level of service verification
   - Guidelines for service agreements

2. **Utility Accountability** allows funding or regulatory organizations to understand if the system is safe and providing the agreed upon level of service
   - Technical reporting guidelines
   - Business reporting guidelines
   - Suggested standard reporting processes and templates

Source: NREL PIX #07805

Source: Jake Lyell for the Millennium Challenge Corporation

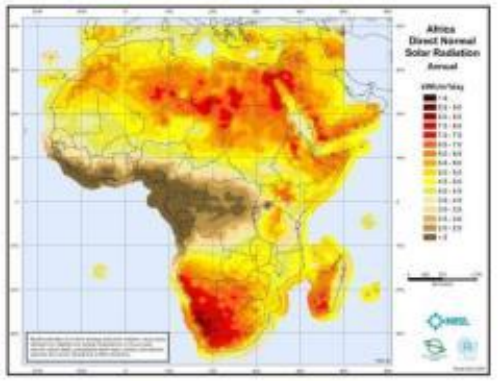
QAF Implementation at the Program and Project Level

Program Development Step	Regulator	Ministry	Developer	Mini-utility	Investors	Customer
1. Specify project goals	●	●			●	
2. Develop policy and ownership frameworks	●	●				
3. Develop reporting and measurement requirements	●	●	●	●	●	
4. Develop performance, monitoring, and reporting plans/procedures	●	●				
5. Develop a project or program quality assurance verification process	●	●				
6. Develop program and project documentation	●	●				
7. Implement quality assurance verification process	●	●				
8. Implement the mini-grid deployment project	●	●				
9. Collect and analyze long-term system operational data	●					

Project Development Step	Regulator	Ministry	Developer	Mini-utility	Investors	Customer
A. Conduct community needs assessments		●	●		●	●
B. Design power system		●	●	●		
C. Complete project permitting	●	●	●			●
D. Determine rate structure	●	●		●	●	●
E. Install power system	●		●			
F. Implement power monitoring system	●	●	●	●	●	
G. Commissioning the power system	●	●	●	●	●	

Power Africa Beyond the Grid (BTG) Program Support

Supporting the BTG program with demand-driven technical assistance to enable new micro-grid deployment, focused on the QAF

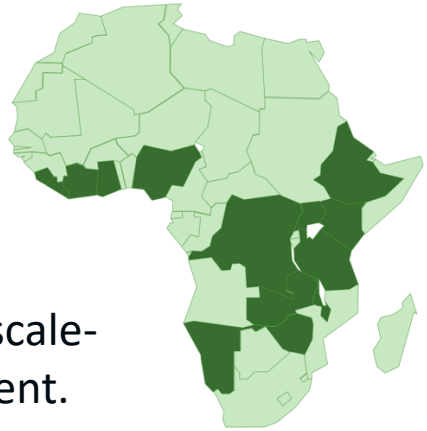


Specific areas of support include:

- Technical assistance to **developers**
  - Modelling and analysis, commissioning, battery selection, customer agreements, etc.
- Support for **government entities** to develop policy, new projects and the enabling environment
  - Tanzania, Sierra Leone, Ghana, etc.
- Publication of **reports, guides and templates** to support MG stakeholders with good practices
  - Performance monitoring, productive use, customer surveys, tariff issues, customer agreements, etc.
- Collaboration with **complementary programs**
  - GMG MDP, GMG HD, AfLP, etc.

Key Peer-Exchange and Technical Assistance Networks

The Africa Minigrids Community of Practice (AMG CoP)



- Over a dozen African countries looking to scale-up minigrid deployment.
- Share lessons regarding technical, policy and financial challenges of minigrids.
- Facilitate collective action across community members.
- Member workshops, webinars, facilitated exchanges, technical assistance and more.

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LEDS GLOBAL PARTNERSHIP

AFRICA LEDS Partnership

The Clean Energy Solutions Center (CESC)

- Helps governments design and adopt policies and programs that support the deployment of clean energy technology.
- Clearinghouse of technical assistance and training resources.

Over 90 experts from 30+ institutions around the world

Ask-an-Expert

Tailored, on-demand technical assistance for governments on a variety of clean energy topics (such as minigrids) at no cost.

http://cleanenergysolutions.org/

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Thank You!

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