



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

RENEWABLE ENERGY-BASED MINI-GRIDS



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THE UNIDO
EXPERIENCE



AGENDA

Introduction to UNIDO

UNIDOs experience in Mini-Grids

What we have learned – Challenges and success criteria

Where we are heading to – Outlook and opportunities

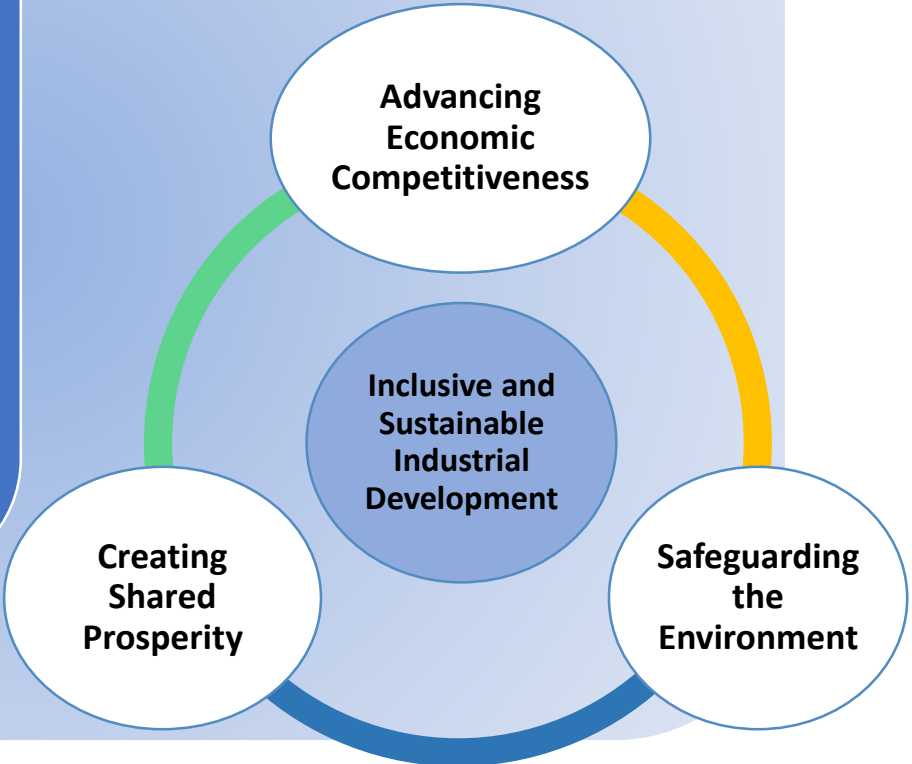
Planned partnership on



UNIDO's mandate

UNIDO fosters Inclusive and Sustainable Industrial Development (ISID) by providing **technical cooperation**, analytical and **policy advisory services**, **standard setting and compliance**, and by **convening for knowledge transfer, partnerships and networking**.

UNIDO services are delivered across **three strategic pillars**:





Department of energy

Energy Systems & Infrastructure

sustainable energy
solutions
FOR and IN
industry

Climate Technology & Innovation

empowering and
catalyzing
entrepreneurial
ecosystems for
climate innovation in
developing countries

Climate Policy & Partnerships

climate technology
network centers &
global network of
regional sustainable
energy centers



Mini Grids: Where we stand

Globally

- N° of mini grids project in UNIDO portfolio: 37
- Total amount of budget allocated: > 50 billion US\$
- Technology: biomass, small hydro, solar PV, wind power
- Region covered: Africa, Asia, Eastern Europe , South America
- N° of countries covered: 27



China

* Under Sustainable City Development

Country Project Period

- Technology
- Actual size of installed mini-grids (w/ Total Installed Capacity)
- Ownership
- Key UNIDO's function

Cambodia 2012-

- Solar based
- 2 sites / 250 kW
- Community & Private Sector
- TC

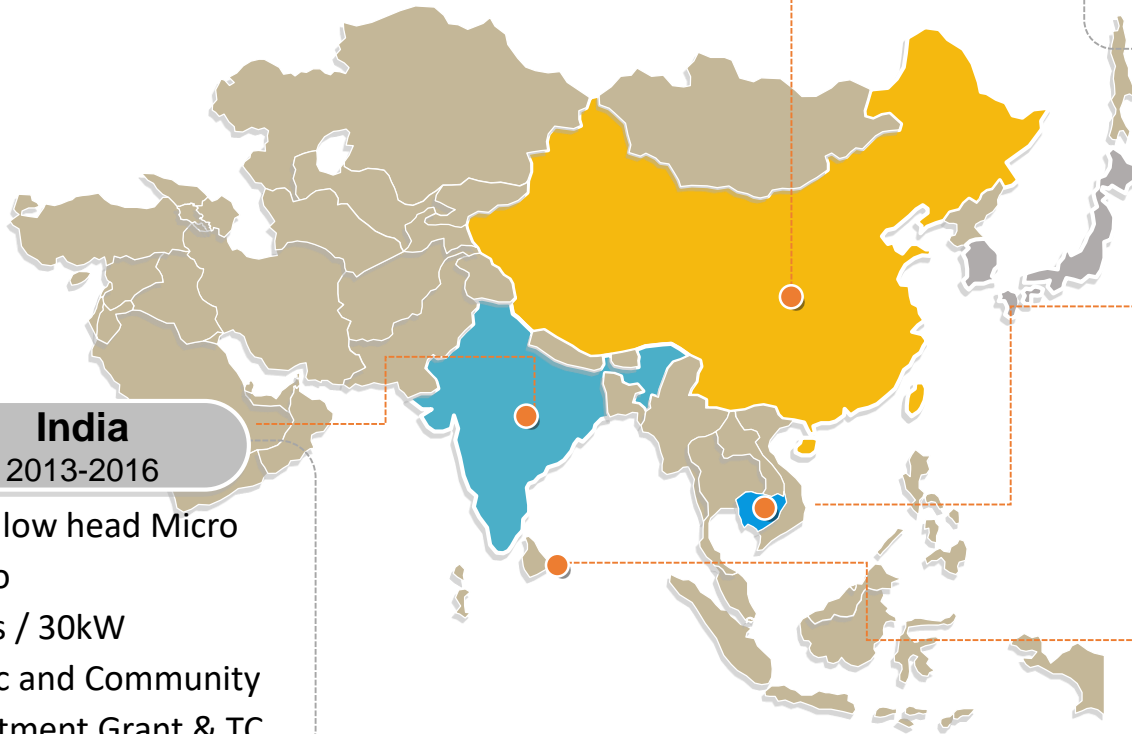
India

2013-2016

- Ultra low head Micro Hydro
- 3sites / 30kW
- Public and Community
- Investment Grant & TC

Sri Lanka 2005-2014

- Small Hydro/ Biomass
- 1 site
- Community
- Investment Grant & TC





Guinea Bissau
2012-2019

- Solar PV
- 2 sites/812kW
- Community Based
- Investment Grant & TC

Cote d'Ivoire
2013-2015

- Solar PV
- 7 Sites / 1.4 MW
- Community
- Investment Grant & TC

Nigeria
2012-2020

- Biomass
- 5MW
- Private Companies
- TC

Zambia
2006-2012

- Solar PV/Small Hydro/ Bio
- 3sites / 1.5MW
- Public entity
- Soft Loan

Chad
2012-2015

- Solar PV
- 3 sites / 111 kW
- Private Companies
- Investment Grant & TC

Ethiopia
2013-2016

- ULH-MHP and PV
- 1 site/ 10 kW
- Communities
- TC & Grant

Kenya
2013-2016

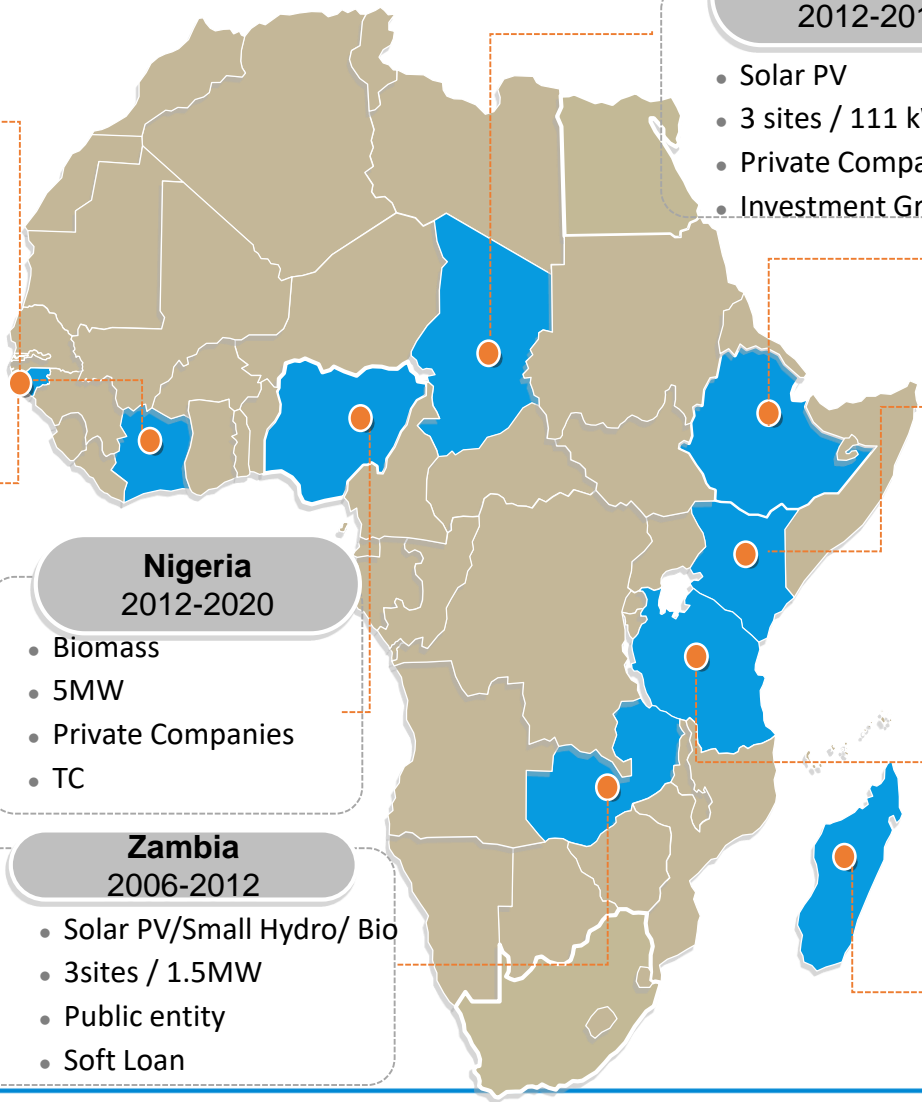
- ULH-MHP
- 2 sites/ 20kW
- Communities
- TC & Grant

Tanzania
2012-2018

- Small Hydro
- 8sites/ 4.8 MW
- Private Companies
- Investment Grant & TC

Madagascar
2015-2022

- Small Hydro
- 6-7 sites / 20 MW
- Private companies
- TC&Grant



Success stories – The Gambia



Promoting Renewable Energy for Productive Uses



The Gambia

2015 - 2019

Objective :

Support the greening of
productive sectors in rural
areas

Type of mini-grids:

Solar PV, gasoil hybrid

Outcomes:

- Local workforce used for civil engineering
- Productive activities supported : Milling machines, tailor and welding shops
- Reduction cost of energy: none
- Greenhouse gas reduction: 2,206.3 tCO₂eq/year
- Ongoing process to review energy policy, including creation of a regulatory agency for the sector

Success stories - India



Technology transfer of ultra-low head micro hydropower



India
2013-2016

Objective :

Increase the access of rural communities to renewable electricity in the State of Uttarakhand

Type of mini-grids:

Ultra-low head micro hydro

Outcomes:

- 27 permanent jobs created
- Productive activities supported : Agro-food, eco-tourism, energy services including local manufacture
- Reduction cost of energy: Savings of USD 4,500/year from 1st site
- Greenhouse gas reduction: 286 tCO₂eq/year
- New policy guidelines for micro hydro, state policy on the development of hydro up to 2MW, specific grants

Success stories - Zambia



Upscaling Small
Hydro Power
mini-grid
development



Zambia
2014-2019

Objective :

Increase electrification and economic development in rural areas and deliver RE for productive uses

Type of mini-grids:

Solar PV, biomass, small hydro

Outcomes:

- 500 jobs created
- Productive activities supported : lodge, shops, storing frozen food, (fisheries)
- Reduction cost of energy: Savings of USD 320 (diesel) to USD 40/month
- Greenhouse gas reduction: 6 088 tCO₂eq/year
- Revised national energy policy in May 2008

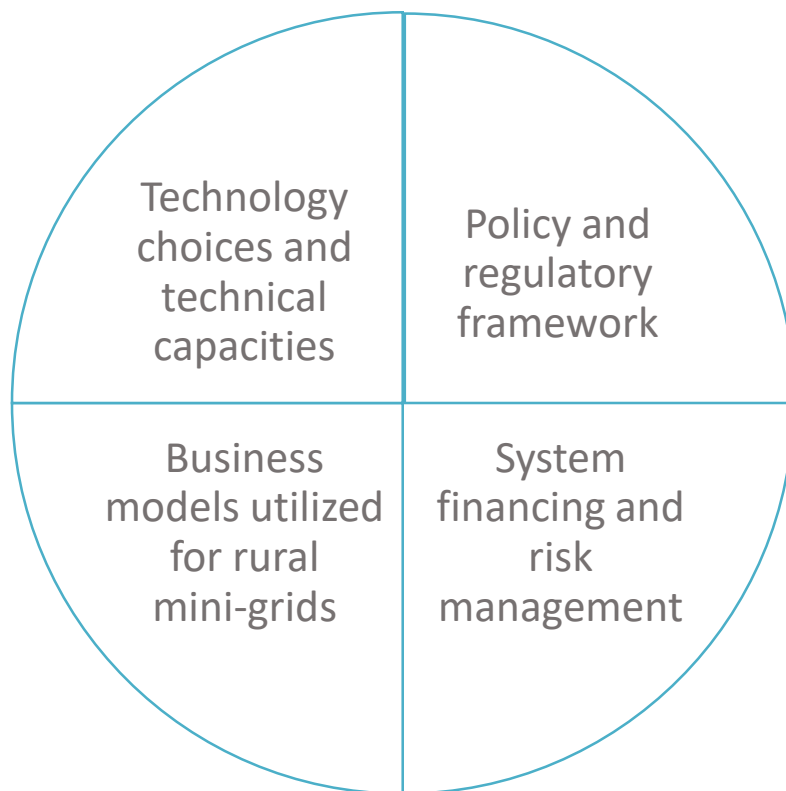


What we have learned – Assessment

Critical criteria	Assessment
Revenue to support the mini-grid	<ul style="list-style-type: none">▪ Sites selected with potential future customers in mind (business connected)▪ Productive activities able to operate more efficiently with reliable electricity supply▪ Cost of operator covered by tariffs and grants; co-finance by the communities▪ Encourage new users to connect to the grid
Willingness & ability of consumers to pay bills	<ul style="list-style-type: none">▪ High level of national ownership▪ Set tariffs for all consumers; tariff should not be changed as a result of the project.▪ High willingness to pay: consumers benefit from higher reliability and availability of electricity
Community participation	<ul style="list-style-type: none">▪ Community and leading actors involved in project identification from the start▪ Population understands the benefits of mini-grids in terms of green energy generation and local business development
Regulatory framework	<ul style="list-style-type: none">▪ Clear regulatory framework favorable for mini grids▪ Investment plan in place▪ Sufficient finance, powers and training of lead actors to supervise, manage mini grids development and stimulate the market▪ Regulatory measures designed to structure/standardize tariff setting and reduce financial risk perception by private actors
Local capacity building	<ul style="list-style-type: none">▪ Capacity building activities▪ Awareness-raising to help shape new policy development and interest from private sector▪ Creation of local jobs and local manufactures▪ Capacity to expand the skillset outside the project.▪ Good collaboration between all partners and local stakeholders



What we have learned – Challenges

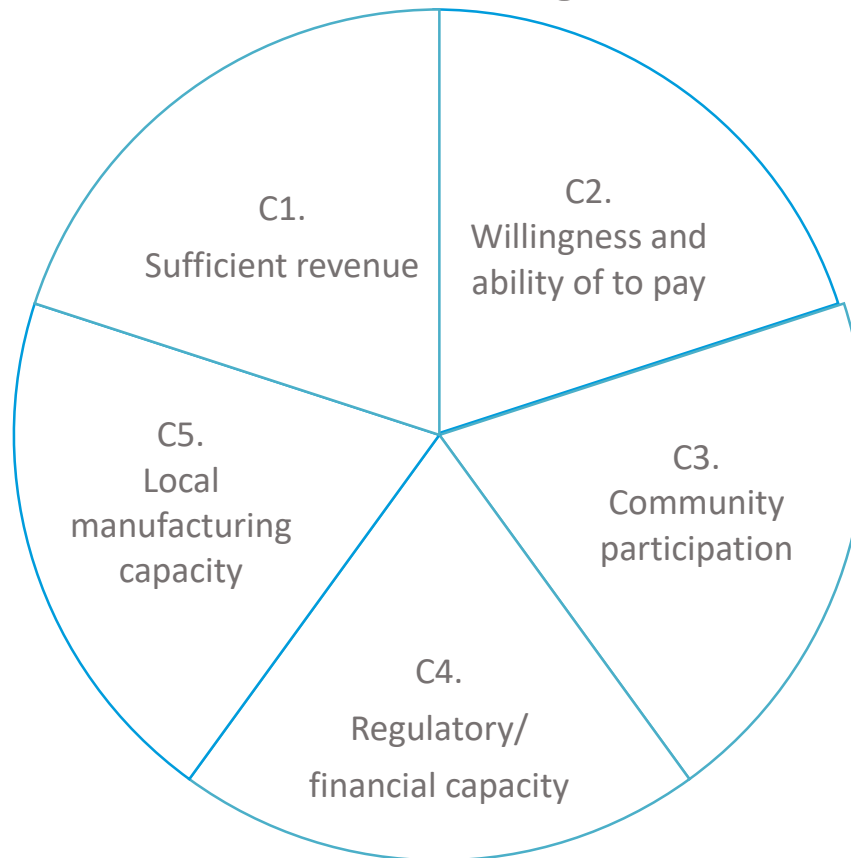


Source: Renewable energy-based mini-grids: The UNIDO experience, 2017



What we have learned – Success criteria

Five critical criteria identified for the long-term success of mini-grids

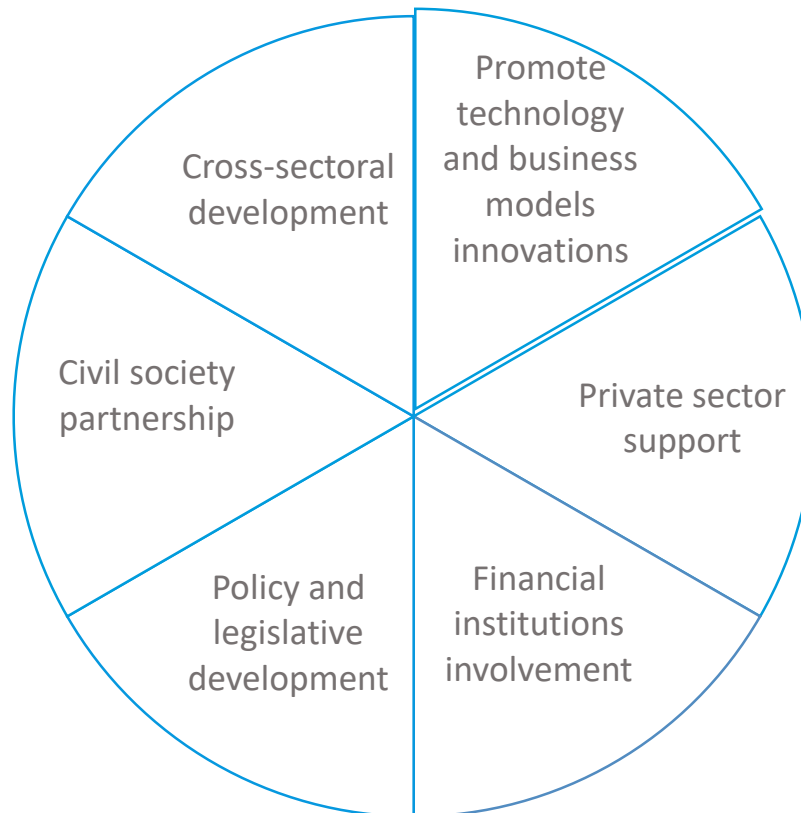


Source: *Renewable energy-based mini-grids: The UNIDO experience, 2017*



Where we are heading - Outlook

Further strengthen our engagement and assistance towards:





Where we are heading - Outlook

**Policy and
legislative
development**

Promote and facilitate
decentralized energy
planning

Define consumer
protection principles

Develop regulatory
toolkit

Encourage policy
intervention towards
financial institutions



Where we are heading - Outlook

Private sector support

Increase private sector engagement in collaboration with organization such as :

- Alliance for Rural Electrification (ARE)
- Africa Mini-grid Developers Association (AMDA)
- Renewable Energy for Africa (RES4Africa)
- **Cleantech Group**

Promote the creation of RE associations and technology clusters at:

- national level
- regional level

Build the capacity of promising energy access start-ups

Support promising energy access start-ups to access financial instruments and mechanisms



Where we are heading - Outlook

**Financial
institutions**

Establish a standardized
financial risk management
procedure

Find solutions
to improve access to loan

Increase financial institutions
involvement to scale up investment
in new technologies and promising
energy access start ups



Where we are heading - Outlook

**Civil society
partnership**

Professionalize energy access
associations to raise
community awareness

Create new prospects
through productive uses

Activate decentralized RE
market by facilitating the
establishment of and/ or
alignment of market
ecosystem



Where we are heading - Opportunities

Cross-sectoral development

Identification and development of potential clusters:

- Food-energy nexus
- Technology (transfer and scale up)
- Mobility / Transport

Explore new collaboration schemes

Establish a multi-stakeholders taskforce

Policy Guidance and Tool-kit

- MoU between UNIDO and the Alliance for Rural Electrification signed in January 2019
- Plan to jointly develop a toolkit to raise awareness of regulators on the impacts of various options for structuring markets as well as different options for electrification.
- Evaluation of different models
 - Government driven
 - Private sector driven
 - Hybrid driven markets





Thank you!

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