

# Opportunities and Challenges of Scaling up Renewable Energy Projects

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### ECREEE : Established to support ECOWAS member states in realizing their RE and EE potential

- ECREEE: Economic Community for West African States (ECOWAS) Centre For Renewable Energy And Energy Efficiency
- Established by Regulation C/REG. 23/11/08 of the 61<sup>st</sup> Session of the ECOWAS Council of Ministers on November 23, 2008. as the ECOWAS agency with the mandate to promote RE&EE markets
- Secretariat is based in Praia, Cape Verde with National Focal Institutions (NFIs) among all ECOWAS countries
- Established with support of core partners:







- Official Inauguration of the Centre on 6th July 2010
- Governance Structure: Executive Board/Technical Committee
- ECREEE Business Plan with long-term vision by 2016
- Annual Work Programmes: 2016 edition under execution
- Also the SE4ALL Focal Point for West Africa



### THE ECOWAS REGION

- 15 countries with a land area of 5 million  $m^2$
- Climate from semi-arid to humid tropical
- Population of over 300 million people
- 60% of population live in rural areas
- 11 of the 15 countries are LDCs
- <u>Access to electricity: ~ 42%</u>
- Access to modern energy for cooking: ~ 25%



# **Opportunities for Scaling up Renewable Energy Projects 1**

• Broad level Opportunities

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- Energy access
- Job creation and improved wellbeing



# Opportunities for Scaling up Renewable Energy Projects 2

#### 1. RE resources plentiful; in ECOWAS Region

- 23,000 MW of feasible large and small hydropower potential (16% exploited);rough estimation.
- Huge potential for all forms of bioenergy (e.g. biomass, biogas, biofuel);
- Average solar radiation of 5-6 kWh/m2 per day throughout the year;
- Considerable wind power potential in some countries;

#### 2. Impressive cost reductions of RETs

- Solar PV costs fell form \$4.00/W in 2008 to 0.85/W \$1.01/W in 2012 (for chinese non-Chinese mono crystalline silicon modules) (Bazilian et al., 2012).
- 3. Existing markets to support the financial viability of RE
  - Economic growth and increasing population
  - New energy capacity required to meet electricity Demand forecast (140 Twh by 2030).



Elaboration of data by United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2015 Revision. (Medium-fertility variant). <u>http://www.worldometers.info/world-population/western-africa-population/</u>



### **Current Status of RE Development in West Africa**

#### **Grid connected Solar PV**

- > The total grid-connected solar PV capacity stands at only approx. 33 MW.
- Two utility-scale solar PV parks in Cabo Verde on Santiago (4.3 MWp) and Sal (2.2MWp) and 1.9MW and 20 MW BXC project in Ghana, which is currently the biggest in West Africa
- Distributed generation in Cabo Verde, Gambia, Ghana and Senegal.

#### **Off-grid solar PV**

- > 200 hybrid mini-grids (mainly diesel/PV) as well as pure solar PV mini-grids in operation in Mali, Senegal and other countries.
- Stand-alone systems for lighting and electricity supply installed at thousands of private houses, SMEs and public institutions, mainly in rural areas across the region
- Specific applications include water pumping for drinking water supply and irrigation as well as street lighting



### GEF: Promoting Market Based Development of Small to Medium Scale RE Systems in Cabo Verde

#### Mini-grid, Carriçal, S.Nicolau: 22 kWp





#### PV Water Pumping, S.Nicolau: 11,5 kWp





PV Ice Factory, Furna-Brava: 8 kWp



- Three Demonstration Projects funded by GEF and implemented by ECREEE;
- Five Demonstration Projects under implementation (to be concluded in 2016):
  - Mini-grid Figueiras, S. Antão 37 kWp;
  - Mini-grid R.Alta, S. Antão 22 kWp;
  - 1.4 MW wind project for desalination;
  - Solar hot water for Hospitals of Praia and S.
    Vicente;
  - Solar pumping program (25 systems)
- Successful implementation of Capacity Building and Awareness Raining activities;
- Direct collaboration with the Ministry of Energy on the consolidation of the Legal and Regulatory Framework.



# EU: Renewable energy for communities Energy in Senegal

- Total Budget/ EU co-financing: 8,692,353 euro/ 6.423.828 euros (74%).
- Final beneficiaries: 3 000 Rural hhls, 150 SMEs, Productive use of electricity.
- 40 villages in the South-Eastern part of Senegal will be electrified.
- Capacity to be installed: 800kWp





### ECOWAS Renewable Energy Facility EREF-2 Promoting clean Minigrids in the Region

Some Off-grid Solar PV project subsidized by EREF	Capacity to be install (kW)	Numbre of HHLs to be connected
Solar PV hybrid system in Gori - BURKINA FASO	38	120
Solar PV and Small hydro hybrid system in GUINEA	50	200
Solar PV hybrid mini-grid in NIGER	27,5	124
Improving the operation of two Solar PV mini-grids in Guinea Bissau and Cabo Verde	372	637



## Scaling Up Renewable Energy in West Africa





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# EREP Targets for Grid-Connected RE

The ECOWAS Renewable Energy Policy (EREP), adopted by the Heads of State in July 2013, sets the following targets for grid-connected RE:

- Increase the share of grid connected RE in the overall energy mix (including medium and large hydro) to
  35% by 2020 and 48% by 2030
- Increase the share of (Variable)grid connected RE, from wind, solar, bioenergy and small scale hydro to 10% by 2020 and 19% by 2030. This would require the development of 2,424 MW by 2020 and 7,606 MW by 2030.





### Major Challenges in scaling up Renewable Energy Projects



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### Learning curve: Utility-Scale Solar PV Plants in Cabo Verde and Ghana

#### **Cabeolica in Cabo Verde- Key Facts**

➤ 25.5 MW PPP Wind farm

Two utility-scale solar PV parks on Santiago (4.3 MWp) and Sal (2.2MWp) constructed and commissioned in 2010

Operation by Electra SARL (national utility) under a concession agreement.

Financed through dept and equty finacing
 Benefits from the carbon market-CDM

#### <u>Navrongo in Ghana – Key Facts</u>

- 2.5 MWp solar PV project developed by the state-owned Volta River Authority (VRA) in the Upper East region
- Competitive process for selecting EPC contractor incl. O&M during first 6 months

#### Development in phases:

- 1.9MWp commissioned in February 2013
- Additional 600kWp commissioned in July 2013



### China: RE scaled up in a short time period

#### Achievements: Globally

- No. 1 in RE capacity
- No. 1 in wind capacity (75 GW grid connected, 92 GW erected)
- No. 1 in solar water heaters (2/3 of global capacity)
- No. 3 in solar PV capacity (18 GW)
- No. 3 in biomass capacity



source: China's Renewable Energy Scaling Up: Successes and Challenges Dr. Xiaodong Wang, The World Bank, EAP Renewable Energy Workshop, Pattaya, Thailand, April 2014



China has the world's largest wind power capacity in 2012 GW

### China: Committed to Reducing Carbon Emissions with an Aggressive Clean Energy Campaign

### National level targets:

- Carbon intensity reduction: 40-45% 2005-2020
- Energy intensity reduction: 20% 2006-2010 and 16% 2011-2015
- Non-fossil fuels: 15% in primary energy by 2020

### **Municipal level initiatives:**

- Pilot low-carbon cities in 42 cities/provinces
- Pilot carbon cap and trade in 5 cities/2 provinces

source: hina's Renewable Energy Scaling Up: Successes and Challenges Dr. Xiaodong Wang, The World Bank, EAP Renewable Energy Workshop, Pattaya, Thailand, April 2014



# Factors that made contributions to China's rapid scale up of RE

### Technical Assistance:

- Policy matters: Policy studies made important contributions to RE policies
  - Supported regulations and amendment for RE Law
- The quest for manufacturing quality: Technology improvement and transfer contributed to rapid growth of Chinese wind and solar industry
  - Cost-shared sub-grants: supported wind manufacturers
  - Quality control: standards, testing, and certification

### Lessons Learned:

- Long-term engagement with the government paid off
- A programmatic approach -- blending policy dialogue/TA (GEF) and IBRD investments, is the best conduit for scaling up RE
- Cost-shared sub-grant to support domestic manufacturers works well
- Flexible approach is required
- Improving manufacturing quality is essential for the transition to a world class manufacturing industry





### Thank You

### Adeola Adebiyi ECREEE

