Expert Group Meeting on Sustainable Development Goal 7 & its Role in Mitigating impacts from Climate Change

Organized by the Division for Sustainable Development, UNDESA, in cooperation with UNDP Morocco & UNEnergy

13 November – 14 November 2016 - Mogador Express GUELIZ, Marrakesh, Morocco

PRESENTATIONS
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- **Africa**, Mr. Crispen Zana, Senior Energy Advisor, African Union Commission
- **West Asia**, Ms. Radia Sedaoui, Chief Energy Section, ESCWA

Session 2: National Efforts on Sustainable Energy and Climate Change
- **UNDP**, Ms. Bahareh Seyedi, Policy Specialist, UNDP
- **India**, Mr. Hafeez Rehman, Senior Director, The Energy and Resources Institute
- **Brazil**, Mr. Marcio Schittini Pinto, Director, Ecometano
- **Ethiopia**, Mr. Tsegaye, Lemma Samson, Director, Solar Energy Foundation
- **Bolivia**, Mr. Roberto Ayala, Project Manager, PHOCOS

Session 3: Developing Capacities and Accelerating Innovation
- Developing capacities at all levels to advance SDG 7 and address climate change
  - Ms. Richenda Van Leeuwen, Senior Energy Expert
- Accelerating Innovation: Nexus between energy and other SDGs
  - Mr. David Bank, Chair, We Care Solar
- UN HABITAT energy work and the New Urban Agenda
  - Vincent Kitio, Chief Urban Energy Unit, UNHABITAT

Session 4: Implementing SDG7 and the 2030 Agenda
- Towards 2030: Global Vision, Policies, and Path Forward
  - Mr. Luis Gomez Echeverri, Senior Research Scholar, International Institute for Applied Systems Analysis (IIASA)
- Role of UN-Energy in supporting SDG 7 and developing capacities
  - Mr. Ivan Vera, Secretary of UN-Energy, UN DESA
- Accelerating SDG7 implementation: Strategic focus for the UN system
  - Mr. Minoru Takada, Team Leader (Energy), UN DESA
- Renewable energy and climate change
  - Elizabeth Press, Director, IRENA
• **Session 1: Regional Efforts on Sustainable Energy and Climate Change**

• **Africa**, Mr. Crispin Zana, Senior Energy Advisor, African Union Commission
Sustainable Energy Initiatives and Programs in Africa

Presented at the Expert Group Meeting on SDG 7 & its Role in Mitigating impacts from Climate Change
Organized by UNDESA – Div. for Sustainable Dev.
in cooperation with UNDP Morocco & UNEnergy
13 November – 14 November 2016 –
Hotel Mogador Express GUELIZ
Marrakech, Morocco

by Crispin Zana, Senior Energy Advisor,
African Union Commission
Africa EU Energy Partnership at a Glance

The AEEP is a long-term framework for strategic dialogue on energy issues between Africa and the EU

- Established in 2007, under JAES strategy
- Political framework for strategic energy dialogue
  - High Level Meetings
  - Stakeholder Dialogue
  - Thematic Workstreams
  - Monitoring Progress of the AEEP 2020 targets
- Capacity support to African Counterparts
Basic Information on Africa

- Total population - 1,086,000,000
- Area - 30,244,049 sq.km. (11,677,239 sq. ml)
- Africa is divided into five regions – North, West, Central, East & South.
- It is also divided into eight Regional Economic Communities (RECs)

- Most recent reliable data in 2012 show 516m Africans had access to electricity – leaving 570m without.
- Growing at an average rate of 28.9m per year as measured in 2010-2012 (increase of 6.1% p.a.)
Background of the Mapping Exercise

- Increased focus on the energy sector in Africa in the lead up to COP21, resulted in new initiatives coming from the environment sector.

- Investments in energy sector are recently being prioritized catalysing multiple new international initiatives and donor programs.

- AEEP conducted a “Road to COP 21” consultative discussion series with key stakeholders to discuss coordination.

- AEEP was mandated by stakeholders to conduct a mapping exercise to better understand better “who is doing what” and promote inter and intra-sectoral coordination.
Summary

- **Objective:** present information about donor initiatives promoting sustainable energy in Africa in a systematic approach, allowing for better coordination and results
- “Lifting the fog” from the African Energy sector to reveal overlaps, potential synergies and gaps
- Key input to coordination efforts but also useful for the cooperation of practitioners and national governments
- Exercise undertaken through a phased consultative approach:

  **Phase 1**
  - Methodology validated by key stakeholders
  - SAIREC

  **Phase 2**
  - Data validated by the initiatives themselves
  - IRENA GA, PIDA Week, COP 21

  **Phase 3**
  - Analysis and recommendations derived through workshops with key stakeholders
  - Launched at AEEP’s Second Stakeholder Forum
Results: Geographic distribution of ODA

- Focus on several North and East African countries
- Central Africa receives least energy ODA

ODA flows to the energy sector in Africa by region, 2009–2013 (in million USD)
Results: High level of private sector involvement versus relatively low level of civil society participation

African partners involved in selected initiatives and programs
Results: Scope for more programs on cooking energy

- **Renewables**: 98%
- **Energy efficiency**: 52%
- **Non-Renewables**: 41%
- **Electricity**: 93%
- **Heating & Cooling**: 36%
- **Cooking energy**: 34%

Sectors covered by selected initiatives and programs.
Results: Skill development is the least common type of technical assistance

Types of technical assistance provided by the selected initiatives and programs
Tracking developments in the African energy sector

• 80% of electric power in Africa is generated from fossil fuel
• Over 80% of African population depends on biomass for cooking

Renewables:
• **Hydroelectric power (HEP)** remains the dominant RE technology supplying African grids. Between 2010 and 2015, 2,174MW of HEP capacity was added bringing the total to 35.18GW by end of 2015.

• **Solar** capacity has enjoyed exponential success installed capacity at end-2015 was 1,546MW, compared with 103MW in 2010.

• **Wind power** since 2010, 2,132MW of wind power has been added, more than doubling the 2010 capacity of 1,120MW and a project pipeline suggests of adding 5,000MW by 2020 if 43% of the planned projects are completed on time.

• **Other renewable technologies** show that some biomass in 2015 had capacity – 950MW compared for geothermal with 554MW – geothermal capacity is anticipated to increase in 2017-18 because of the GRMF.
Next Steps for Coordination

- Consultative process and engagement of key stakeholders has resulted in the Mapping Analysis Report commanding authority in both the environment and energy sector
  - Actively used and promoted by: NEPAD, RECP, Power for All, DFID among others
- Recommendations were adopted by the Stakeholders at the Second Stakeholder Forum, and a commitment to increase coordination efforts among actors
- Mapping to contribute to the Africa Renewable Energy Initiative and AEEP supporting coordination between environment and energy ministries and stakeholders
- Database to be digitalized in 2017 and include bilateral and national efforts
- Key input in to a coordination effort pioneered by the AUC, AfDB and NEPAD
Thank you for your attention!

Crispen Zana, Senior Energy Advisor, African Union Commission
zanac@africa-union.org
Coordinating and Aligning Initiatives to Meet the AEEP Targets

**AEERP Targets**

- Achieve by 2020

**Monitoring**

- Have an overview

**Mapping Results**

**Reports**

- Key policy recommendation

**Forum to Coordinate Partnership**

**Website**

**ODA Distribution**

**Coordination Platform**

**Ownership**

**Facilitating Team**

1. Continental Level
2. Regional Level
3. National Level

**Heat**

- Electricity

**Key Instruments**

- AEEP
- IPPE
- Recip
- Euei
- PDF
- EPN
- ADF
- ECF
- AEF
- ASEF
- AECF

**AFREA**

- Africa 50
- Electrifi
- AREF
- CTF
- SREP
- Africa Power Vision
- PRG
- PDA
- ITF
- SE4ALL
- TAF

**AFRICA ENERGY AFRICA**

**ENERGY AFRICA**

**RECP**

**EUEI PDF**

**ACP-EU**

**NEPAD**

**ADFD END**
• **West Asia**, Ms. Radia Sedaoui, Chief Energy Section, ESCWA
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Ms. Radia Sedaoui
Chief, Energy Section
Sustainable Development Division
Energy Access in the Arab Region

- Many countries in the region are not able to provide adequate energy services for a significant portion of their population.

- About 54 million people in the Arab region (excluding South Sudan) have no access to the electrical grid, and about 48 million people are relying on biomass for cooking.

- The problem of refugees in the Arab region, where there are 11 million, representing approximately 54% of the world average.

- Lack of energy services aggravates the cycle of extreme poverty in the rural areas, and some peri-urban locations, resulting in poor social and economic conditions.

- Women and children suffer the most from the limited access to energy services; health, safety, and environmental problems usually associated with the use of inefficient solid fuels in households.

- Unemployment rate remains the highest in the world.
Historically low rate of energy use and carbon emissions, the Arab world which constitutes 5% of the world’s population, emits just under 5% of global carbon emissions,
- Except for Saudi Arabia, no single Arab country is responsible for more than 1% of global emissions.
- INDCs (or post-2020 climate action plans) were submitted by 19 countries, 3 missed INDCs (Libya, Palestine & Syria).
Challenges facing the Arab region (1/4)

It is a fragile area with more than 90% of the land classified as arid or hyper-arid (or desert) and the remaining classified as dryland highly subject to degradation and thus to desertification.
Primary Energy mix: World & Arab Region

Primary Energy Supply shares by fuel, Arab region & World, 1990, 2014

<table>
<thead>
<tr>
<th></th>
<th>Arab region 1990</th>
<th>World 1990</th>
<th>Arab region 2014</th>
<th>World 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil</td>
<td>66%</td>
<td>37%</td>
<td>52%</td>
<td>33%</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>30%</td>
<td>19%</td>
<td>43%</td>
<td>24%</td>
</tr>
<tr>
<td>Coal</td>
<td>1%</td>
<td>25%</td>
<td>1%</td>
<td>30%</td>
</tr>
<tr>
<td>Others</td>
<td>2%</td>
<td></td>
<td></td>
<td>13%</td>
</tr>
</tbody>
</table>

(Hydro, Renewables & Nuclear)
Oil production and proved reserves by region, 2015

Oil Production by Region - 2015

- NON OECD excluding Arab: 42%
- Arab: 32%
- OECD: 26%
- MENA Oil marketed Production, 2015: Export, 69%; Domestic Consumption, 31%

Oil Proved Reserves 2015

- NON OECD excluding Arab: 42%
- Arab: 15%
- OECD: 15%

Data Source: BP2014, EIA2014

Note: Values in the pie chart do not sum to 100% due to rounding.
Natural Gas production and proved reserves by region, 2015

Natural Gas Production-2015

Arab 16%

OECD 37%

NON OECD excluding Arab

MENA Gas marketed production, 2015

Export, 29%

Domestic Consumption, ...

Natural Gas Proved Reserves 2015

Arab 30%

NON OECD excluding Arab 59%

OECD 11%

Data Source: BP2014, EIA2014

Note: Values in the pie chart do not sum to 100% due to rounding.

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Arab countries Proven Oil & Gas reserves

Source: OAPEC, BP 2014
Energy intensity by region

Energy Intensity by region, 2010 (kg of oil equivalent/PPP GDP)

- Energy intensity is often used as a proxy for energy efficiency, but it is not a perfect indicator as it is influenced by a range of other factors, such as changes in economic structure and climatic conditions.

Data Source: World Bank World Development Indicators database; and IMF staff calculations.
Note: PPP = purchasing power parity.
Economic value of fossil-fuel consumption subsidies by fuel for the top 25 countries, 2013

Note: MER = market exchange rate.

Source: IEA the New Policies Scenario WEO2014
Top 20 Gas Flaring Countries 2007-2012

Context
- Billions of cubic meters of natural gas is flared annually at oil production sites

Economics
- Waste of energy resources that could support economic growth

Environment
- Release of millions of tons of CO2 to the atmosphere, affecting climate change efforts

Source: Global CCS Institute, 2014

20 countries account for more than 80 percent of gas flaring.
Sustainable Energy in the Sustainable Development Agenda 2030
Regional Convening Power for Intergovernmental Mechanisms
- Works with LAS, IRENA and other regional entities on shaping a regional Sustainable energy strategy, including RE, and on providing Arab countries with key insights regarding the position that RE can have in their energy mix.
- Adopts an approach of cooperation with national institutions, at policy and strategy level to help Arab countries develop harmonised energy policies with SDG #7.

Capacity building, knowledge sharing:
- Provides capacity building material and workshops in relevant sustainable energy topics, including RE, to help shaping sustainable energy policies.
- Provides a channel of knowhow and ideas transfer to the Arab region through its cooperation with the other UN Bodies and international energy community.

Conducting studies & Advisory Services:
- Publishes studies, guidebooks and reports that provide information material and policy analysis that can help in shaping RE policy options including local RE manufacturing.
- Provides technical assistance to countries, upon request, including formulating RE policies.

Informing Regional Processes for Global Negotiations & National Action:
- As a Forum for exchanging experiences on RE policy development between Arab countries, providing international benchmarking and promoting best practices.
- Through its Energy Committee, ESCWA provides a convening ground for addressing, at a regional level RE policies development.
ESCWA Activities in Relevance to the SDG 7 & SE4All

**Implementation Approach**
- Intergovernmental Com. on Energy & WP 2016 - 2017
- Publications, reports, fact sheets, EGMs, ...

**Energy Access & Energy Security**
- Policies, cleaner technologies, Market, for Conventional & Non-conventional energy resources
- Regional Interconnections
- Electricity Grids/Natural Gas Supply
- Water-Energy-Food Nexus

**Energy Efficiency (EE)**
- EE in key Sectors: Power, Transportation, Industry
- EE Standards & Specifications and indicators
- Regional Initiatives to Upscale EE in Arab Member Countries

**Renewable Energy (RE)**
- Support RE Development
- Technology/Policiesplementation Schemes, R&D
- Access to Energy Services in Rural Areas (improving living conditions)
- Regional cooperation/integration: Local Manufacturing, Market, R&D

**Climate Change Mitigation**

Program Mandated by ESCWA Committee on Energy & LAS Arab Ministerial Council for Electricity
Regional initiative related to RE $ EE that targets the Arab Region

• The League of Arab States “Arab Guideline for Improving Electricity Efficiency and Rationalize its Consumption at the End User". This guideline was approved during the twenty sixth meeting of the executive bureau of the Arab Ministerial Council for Electricity on 23/11/2010 (resolution number 195), and is the basis for the work being led by LAS (with MED-ENEC and RCREEE support) to help the different countries in the region develop their National Energy Efficiency Action Plan (NEEAP).

• The Pan-Arab RE Strategy 2030 adopted at the Third Arab Economic and Social Development Summit (2013) in Riyadh calling for the deployment of RE technologies in the region, and the subsequent road map developed by the League of Arab States to implement the Pan-Arab RE Strategy 2030 based on approved national targets.
Renewable energy potential in the Arab region

- Wind speed suitable for the production of electricity in various locations of many countries
- High Solar Irradiance

- Vast desert lands, semi-flat, and mostly uninhabited.
- Pilot and commercial projects, industrial potential, Technical staff and Cheap labor.
- Official interest in RE/ Plans and Policies to diversify the energy mix.
- A tool to reduce emissions.

source: MAKE, MENA Wind Power Outlook, 2 April 2015, Joffery Dupuy, P. 8
Contribution of RE sources in electricity produced in the Arab region

Electricity Produced by Source

- **83.68%** Oil/Gas
- **11.62%** RE (Wind, Solar)
- **2.66%** Others
- **0.48%** Hydro
- **1.56%** Coal
- **2.5%** Nuclear

Global level: RE 19%, out of which 9% traditional biomass, 4% Hydro, 4% Geothermal power, solar heating and modern biomass, 2% wind, solar & biofuel, Nuclear’s share is 2.5%.
Contribution of RE in Electricity Production

Total RE capacity, including Hydro: 13,622 MW
RE with out hydro: 2,556 MW
### Commercial Deployment of RE in the Arab Region

<table>
<thead>
<tr>
<th>Modern Biomass</th>
<th>Wind Turbines</th>
<th>Solar energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fermentation/Digestion</td>
<td>• On Shore Wind Turbines / Connected large scale projects.</td>
<td>• Photovoltaic (PV) systems for electricity, lighting, wireless communications, advertising..., storage system, connected to the network, off grid</td>
</tr>
<tr>
<td>• Gasification</td>
<td>• Small wind turbines capacity, about 100kw Or less</td>
<td>• Concentrated solar Power (electricity, water desalination)</td>
</tr>
<tr>
<td>• Biogas extraction (waste, landfills, sewage treatment plants) to produce electricity</td>
<td>• Dual systems (wind / diesel, wind / PV)</td>
<td>• Solar Water Heating (SWH)</td>
</tr>
<tr>
<td>• Production of biofuels (Residues of some crops, oily trees)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Other RE applications in the Arab region

<table>
<thead>
<tr>
<th>Application</th>
<th>Deployment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Solar water heating systems</strong> (household &amp; domestic, ...)</td>
<td>• Widely spread in most countries</td>
</tr>
<tr>
<td>• Industrial processes (water / steam heat production)</td>
<td>• Pilot / Demo Projects</td>
</tr>
<tr>
<td>• Solar drying of agricultural crops, oven / Solar cooker</td>
<td>• Promoted to a certain extent</td>
</tr>
<tr>
<td><strong>Off grid PV systems</strong></td>
<td>• Widespread trade within numerous countries</td>
</tr>
<tr>
<td>• Lighting, wireless communications, advertising / signboards ......</td>
<td>• Revolutionary experiments</td>
</tr>
<tr>
<td>• Pumping / water desalination</td>
<td>• Limited Experience</td>
</tr>
<tr>
<td>• Dual systems (cells / winds ..)</td>
<td></td>
</tr>
<tr>
<td><strong>Small scale Wind turbines (&gt; 100 Kw)</strong></td>
<td>• Deployed for water pumping purposes (early stage)</td>
</tr>
<tr>
<td>• Pumping / water desalination</td>
<td>• Limited</td>
</tr>
<tr>
<td>• Dual systems for lighting / water pump (wind / diesel, wind / PV, ..)</td>
<td></td>
</tr>
<tr>
<td><strong>Modern Biomass</strong></td>
<td>• In some countries</td>
</tr>
<tr>
<td>• Briquettes ( crops waste) for rural ovens, charcoal ...</td>
<td>• Widespread in some countries</td>
</tr>
<tr>
<td>• Biogas (methane) + compost (agricultural and animal waste, landfills)</td>
<td>• Limited (Egypt, Jordan)</td>
</tr>
<tr>
<td>• Water and sewage plants to produce biogas and generate electricity for the treatment plant</td>
<td>• Limited (Sudan and Egypt)</td>
</tr>
<tr>
<td>• Biofuel (ethanol) from some crops</td>
<td></td>
</tr>
</tbody>
</table>
Solar Energy Technologies for Electricity Production

Photovoltaic (PV)
- Mono Crystalline
- Poly Crystalline

Concentrated Solar Power (CSP)
- Central Tower Receiver
- Parabolic Troughs
- Stirling Dish
- Flat Plate Collectors (Fresnel Reflector)
Share of Electricity Production from RE (Continued)

(B) Solar Thermal Power Plants (MW)

- **Morocco**: 180 MW
- **UAE**: 100 MW
- **Algeria**: 25 MW
- **Egypt**: 20 MW

**Total installed capacity by end 2015**: around 325 MW

**Experiences**: field measurements, civil and electromechanical works, components assembly, installation, operation and maintenance

**Local manufacturing**: manufacturing of steel structure (Egypt's case), cables and wires, ...
Total installed capacity at the end of 2015: around 213MW

Experiences: feasibility studies, tender documents, assembling the components of the system, installation, operation and maintenance.

Manufacturing: system structure, production of panels, electronic devices, glass, cable and wires. ...
Total installed capacity by end 2015: around 2018 MW

Experiences: Environmental and Feasibility Studies, Wind Atlas, field measurements, civil and electromechanical works, installation, operation and maintenance.

Local manufacturing: metal towers, transformers, cables and wires, .....
RE Contribution in improving Living Conditions in Rural & Remote Areas

RE Application - Photos Speak up

- Ground water, Morocco
- Increase knowledge
- Security and activity by night, Egypt
- PV system, a remote village, Egypt
- Health care center, a remote community, Egypt
- SMEs project: Crops solar dryer, Morocco
- A private house with PV system, Tunisia
Wind Farms for Electricity Production in the Arab Region

Tetouan Wind Station, Morocco

Zaafarana Wind Station, Egypt

Tafila Wind Station, Jordan

Sidi Daoud Wind Station, Tunisia
### Context for policy development

- **Political Support**: is key factor of success for Policy development and implementation.
- **Good policies**: are key catalysts for EE & RE development and essential for generating / attracting Investments.
- **Policy frameworks**: should be complete, make economic sense and be implementable.
- Policy development should **engage all stakeholders**.
- **Objectives and Guiding Principles of the Policy**: must enjoy a minimum level of consensus amongst stakeholders.
- Each country has its realities, and must develop their **own business models** to facilitate implementation of the Policy.

### Barriers and Challenges in the Arab Countries

- **Lack of adequate regulatory framework** for the power generation sector in some countries, provide no basis for EE&RE policy development.
- **Lack of institutional frameworks** for mobilizing and engaging the various stakeholders.
- **In the absence of strong political will**, some stakeholders may override the process of the application texts of the policies influencing implementation of RE projects.
- **Lack of technical expertise** and systems capabilities.
Natural Gas with or w/o CCS: Cleanest fossil fuel Lowest emission of CO2

Source: IGU based on CERA
Kuwait reduced flaring to 0.2 bcm/year while it increased by almost 300% in Iraq to reach 12 bcm/year

Source: EIA
Large Scale CCS projects by country and lifecycle

Data Source: Global CCS Institute, 2015

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Sustainable Future

- Effective Policy Reforms
- Renewable Energy
- Smart Energy Management System
- Public & Private Partnerships
- Financing mechanisms
- Economic Diversification
- Higher Education Institutions
- Methane management
- Zero Gas flaring
- Fuel switching to Natural Gas
- Deployment of CCS
- Improving R&D, technology transfer
- Energy Efficiency
- Economic Diversification
THANK YOU

Ms. Radia Sedaoui
Chief, Energy Section Sustainable Development Division
sedaoui@UN.org
• **Session 2: National Efforts on Sustainable Energy and Climate Change**

• **UNDP**, Ms. Bahareh Seyedi, Policy Specialist, UNDP
Delivering Sustainable Energy in a Changing Climate
Drawn from experience in over two decades

<table>
<thead>
<tr>
<th>Total Delivery 2000-2015</th>
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</thead>
<tbody>
<tr>
<td><strong>ENERGY ACCESS</strong></td>
</tr>
<tr>
<td>US$ 550 million</td>
</tr>
<tr>
<td>137 Countries</td>
</tr>
<tr>
<td><strong>ENERGY EFFICIENCY</strong></td>
</tr>
<tr>
<td>US$ 600 million</td>
</tr>
<tr>
<td>101 Countries</td>
</tr>
<tr>
<td><strong>RENEWABLE ENERGY</strong></td>
</tr>
<tr>
<td>US$ 728 million</td>
</tr>
<tr>
<td>124 Countries</td>
</tr>
</tbody>
</table>
Sustainable Energy Strategy for 2016-2021

- Recognizes social, economic and environmental challenges linked to energy
- Fully aligned with SDG7
- Focus on Energy Access; Energy Efficiency; Renewable Energy (also covered transport and sustainable cities)
- Strong link with Climate Change agenda and the Paris Agreement
UNDP’s approach/theory of change

- SEDF... 
  - ...unlocks constrained capital...
  - ...transforms markets...
  - ...and tackles challenges

Derisking instruments:
- Policy
- Financial

Barriers:
- Regulatory
- Technical
- Financial
  - Informational

Access
- Social
- Economic
- Environmental

Renewables
UNDP IN ACTION
As of September 2016

CURRENTLY
25 sustainable energy projects
9

Being implemented or developed in
113 countries

with over US$ 1 billion
in grant financing

and US$ 5.9 billion
in co-financing
Funds from the Global Environment Facility (GEF) make up 99% (US$ 171,616,959.79) of Vertical Trust Fund energy investment over the past four years.
UNDP’s Current Energy Projects per Region 2016

- Europe and the CIS: 57
- Arab States: 24
- Asia and the Pacific: 69
- Latin America and Caribbean: 37
- Africa: 71
- Global: 4
UNDP’s Work on Sustainable Energy in Africa, 2012-2015

Over the past 4 years, UNDP implemented

- **95** Sustainable Energy Projects
- **38** Countries
- **23** million tCO₂eq directly reduced
- **3.3** million people benefiting
- **3,472** Communities impacting

Empowered lives. Resilient nations.
Portfolio breakdown of projects by Thematic Area (2016)

- **Energy Access**: 37%
- **Energy Efficiency**: 45%
- **Renewable Energy**: 18%

*Out of the 97 energy access projects, 88 projects (90.7%) are renewable energy based energy access projects.*
Sustainable Energy is essential for achieving Sustainable Development

SDG Goals

| SDG | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| No. of Energy projects contributing to achieve other SDGs | 223 | 205 | 119 | 113 | 104 | 87 | 259 | 235 | 249 | 143 | 91 | 242 | 250 | 138 | 222 | 197 |

*Percentage of UNDP’s on-going Energy projects contributing to achieve individual SDGs
Development benefits around the world in 2015

- In Africa, UNDP’s energy activities reduced 10 MILLION tons CO2 emissions which is equivalent to 4.3 MILLION tons of coal burnt.
- In Zambia, UNDP benefitted 1.5 million people with energy access and improved energy efficiency by installing solar PV panels at health care clinics.
- In Asia Pacific, provided over 800,000 people with sustainable and affordable access to energy through improved cook stoves, solar lamps, solar PV panels or solar heaters.
- In Europe and CIS, directly benefited 812,000 people, improving energy efficiency in residential buildings or by installing street lighting systems, helped equip over 3,000 private and public buildings including health centers, schools and municipality buildings with sustainable energy technologies.
- In the Arab States, benefited 138,335 people, through interventions such as the reconstruction of electricity distribution infrastructure or installation of solar water pumps or panels in fragile states.
- In Palestine, enabled at least 3,000 students in Palestine to return to rehabilitated schools and educational facilities through improved energy access.
- In Latin America, strengthened capacities in 14 countries to develop energy related policies, laws and strategies such as national energy plans or strategies, but also INDCs, national energy efficiency standards or sectorial strategies.
THANK YOU!
• **India**, Mr. Hafeez Rehman, Senior Director, The Energy and Resources Institute
Energy Scenario in India and SDG7 Pathway

Dr Ibrahim Hafeezur Rehman
Adjunct Professor, TERI University
Senior Director- TERI Europe
OVERVIEW

• Existing Energy Scenario
• SDG 7
• Objectives
• Indias Nationally Declared Commitments
• NDC Drivers
• Financial implications of meeting SDGs
• Key Challenges
Energy Scenario

- Per capita energy consumption increased from over 2000 to over 8000.
- 18% of the world’s population, uses only 6% of the world’s primary energy.
- By 2016 total energy production 670 Mtoe.
- 25% of projected global energy demand to come from India
- Energy demand/capita (2040) - still 40% below world average
- Over 50% of new generation capacity (2040) - from renewables and nuclear

Source: MoP, 2016; IEA 2016
Energy Access Scenario

- 240 Million without access to electricity
- 700 Million dependent on traditional wood stoves

- At the All-India level
  - 55.3% rural households and 92.7% urban households use modern electricity as a primary source of energy for lighting
  - 31.4% households, both rural and urban combined, use kerosene

- Alternate energy based *decentralised electricity sources* serve a small population of un-electrified / poorly-electrified HHs

Source: Census of India, 2011
Electricity vs Kerosene
Reliance based on nature of HH

In both urban and rural areas, households engaged in casual labour tend to have limited access to grid electricity.

Probable reasons: lack of proper supply, lack of proper documentation for a connection, migrant nature of labour, among others.

The poorest of poor are also the most energy poor.

Source: NSSO 68th Round (2011-12); TERI Presentation Niti Aayog
Energy Use for Lighting
Income based consumption

MPCE-class wise Lighting Energy Use (RURAL)

MPCE-class wise Lighting Energy Use (URBAN)

Share of electricity in household fuel expenditure (%)

96% Urban HHs pay INR 87.20 on per capita basis
74.2% Rural HHs pay INR 25.11 on per capita basis

But 4% Urban + 25.8% Rural HHs still lack access to electricity services

Source: NSSO 68th Round (2011-12); TERI Presentation Niti Aayog
### Cooking Energy Access Scenario

<table>
<thead>
<tr>
<th>Type</th>
<th>% of usage in India</th>
<th>Efficiency</th>
<th>Emission</th>
<th>Challenges</th>
</tr>
</thead>
</table>
| Improved Biomass Cook stoves              | 4%                  | 40%        | NO2, CO, PM, black carbon (BC), and organics like PAHs | • Effective financing or subsidies maybe necessary  
• Require frequent training on usage  
• Technology standardization (geography/Fuel) |
| Biogas                                    | 0.4% 1 million households | 55%        | CO2 neutral, does not emit greenhouse gases   | • Little Technology Advancements  
• Contain Impurities  
• Not Attractive on Large Scale |
| Electricity based cooking (Induction or Electrical) | 0.2% 300 thousand households | Electrical-74% Induction-84% | Does not produce any emissions. | • Necessity of adequate Electricity supply,  
• Specialized cookware is an issue.  
• Sophisticated technology/after sale issue |
| LPG & PNG                                 | 17.5%               | 64%        | Very low CO2 emission.                        | • Fossil fuel (finite resource)  
• Markets not developed (remote area)  
• Absence of adequate infrastructure/supply chain  
• Irregular supply  
• Unaffordable for BOP mass |
| Traditional Biomass cookstove             | 70% Over 160 million. | 17%        | Emission of greenhouse gases-CO2, CO, CH4, N2O, CH3Cl emission. | • More fuel used  
• Inefficient  
• Health Hazards |

Source: TERI Divisional Presentation on ICS, 2016
Electricity Access: What happens in GTF

Spread of rural households across electricity access tiers

- Tier 0: 71%
- Tier 1: 25%
- Tier 2: 4%
- Tier 3: 0%

Un-electrified households in Tier 0

Reasons for not having an electricity connection - Uttar Pradesh

- Unavailability of infrastructure: 27%
- High connection cost: 73%
- High monthly expenses: 62%
- Unreliable/Unsuitable supply: 59%
- Lack of Awareness: 59%
- Other reasons: 25%

<table>
<thead>
<tr>
<th>Tier</th>
<th>Tier 0</th>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Tier 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity</td>
<td>54%</td>
<td>7%</td>
<td>4%</td>
<td>NA</td>
</tr>
<tr>
<td>Duration</td>
<td>5%</td>
<td>40%</td>
<td>96%</td>
<td>NA</td>
</tr>
<tr>
<td>Reliability</td>
<td>33%</td>
<td>44%</td>
<td>9%</td>
<td>NA</td>
</tr>
<tr>
<td>Quality</td>
<td>25%</td>
<td>29%</td>
<td>15%</td>
<td>NA</td>
</tr>
<tr>
<td>Affordability</td>
<td>-</td>
<td>46%</td>
<td>-</td>
<td>NA</td>
</tr>
<tr>
<td>Legality</td>
<td>-</td>
<td>21%</td>
<td>-</td>
<td>NA</td>
</tr>
</tbody>
</table>

Source: CEEW Report, September 2015
Electricity Access: Key Attributes

Based on level of **MPCE classes** and the access to energy for lighting – certain attributes remain unmet with declining MPCE classes.

To enable transition towards universal electricity access – it is important to prioritize and address attributes that ensure at least basic consumptive needs are fulfilled.

Source: Global Tracking Framework

Key Concerns In Poorly Electrified Regions

Dissatisfied customers ➔ Increasing number of defaulters ➔ Shrinking markets ➔ Reduced viability and profitability of distributed generation business models ➔ Failure to deliver access to modern electricity services
Specific Challenges – Energy Access

Supply

- Finance
- Infrastructure
- Reach
- Market Barriers

Demand

- Affordability
- Availability / Accessibility of Energy Options
- Limited Power Supply Options
- End-use Perceptions

Investment Capital; Revenue Recovery
- Under capacitated power distribution infra;
- Inefficient set ups to ensure continuity of providers;
- Quality of Power Supply – reliability, voltage, duration;
- Remote geographical locations; Difficult terrains
- Limited market penetration – absent last mile agents;

Low return on Investments

Income driven choices;
- Limited flexible payment options for energy;
- Lack of low cost and user-friendly technologies;
- Limited capacity options to serve seasonal demand variations (productive / consumptive use);
- Rostering; Load Shedding;
- Lack of awareness & acceptance of alternate options
- Lack of trust on providers (poor after sale services)

Source: TERI Presentation to Nitti Aayog, 2016
Due to the low quality of Indian coal, continuing the BAU scenario will require India to import coal from South Africa, Austria and other countries.

This will increase India’s energy insecurity due to high dependence on foreign imports.

Increasing market prices of coal and falling prices of renewable energy costs further provide a rationale for India to choose alternative energy sources beyond fossil fuels.
Renewable Energy (Other than Large Hydro) Scenario

Target 175 GW by 2022

Grid Connected Capacity (in MW)

Off Grid/Captive Power (MW)

Source: MNRE, 2016
Energy intensity Scenario and challenges

• Per capita CO2 from increased 0.69 in 1990 to 1.58 in 2014 - Still per capita CO2 emission is 1/3rd of global average
• New coal-fired plants -Nearly 50% of the net coal capacity added globally.
• India’s reliance on oil imports - above 90% by

Source: RIS, 2016
7.1 By 2030, ensure universal access to affordable, reliable and modern energy services. 1.2 to 1.1 and 3 bn to 2.9

7.2 By 2030, increase substantially the share of renewable energy in the global energy mix - required annual growth rate of 7.5%

7.3 By 2030, double the global rate of improvement in energy efficiency – required annual 2.6% drop
• Universal access to energy by 2030. Will be achieved in physical terms but challenge is in real delivery terms
• A 33%-35% decrease in emissions intensity of GDP by 2030 (compared to 2005). This will be overachieved under current policies
• 40% non-fossil power generation capacity target by 2030. This target is in line with current policies.

Source: TERI Presentation on INDCs, 2016
**NDCs - Main Drivers**

**Reduction levers**

- **Energy**
  - Non-fossil
    - Wind
    - Solar
    - Other
  - Energy efficiency
    - Buildings
    - Industry
    - Transport
  - Fuel shifts
    - Transition to Natural Gas
    - Transport (NG/ biofuels)

- **Non energy**
  - Other
    - Aforestation

**Corresponding national targets**

- Wind: 60 GW by 2022
- Solar: 100 GW by 2022
- Biomass: 10 GW by 2022
- Nuclear: 15 GW by 2032
- E.g. Energy Conservation Building Code
- E.g. Perform, Achieve and Trade Scheme
- E.g. Vehicle fuel efficiency standard
- #Gas4India campaign
- 20% blending of biofuels
- Additional (cumulative) carbon sink of 2.5 to 3 billion tonnes of CO₂ equivalent through additional forest and tree cover by 2030.

1 LULUCF: Land Use, Land Use Change and Forestry

Source: TERI Presentation on INDCs, 2016
• Over $400 Billion as capital investment in production
• Reduces the fossil fuel component from 60% to 50% the -increases to over $500 Billion of capital investment
• Net-zero emissions by 2050, - by 2030 it must reduce fossil fuel energy component from 50% to 27% -cost $675 Billion as capital investment.
• Overall finance required is estimated at $854 billion with an expected gap of $406 billion.

Source: TARA, DA, 2015
### Conclusion

#### SDG 7.1
- Close to 100% village electrification
- Household electrification at around 60%

#### SDG 7.2
- Non fossil fuel 40% of total installed capacity by 2040
- 175 GW-Renewable Power by 2022

#### SDG 7.3
- A 33%-35% decrease in emissions intensity of GDP by 2030

### Indicative Challenges
- Investment Capital & revenue recovery; Under capacitated infra;
- Issues with quantity and quality of power; remote locations & difficult terrain; Low return on Investments

### Pathways/Initiatives
- Deendayal Upadhyaya Gram Jyoti Yojana,, Efficient Household Lighting Programme; Off grid programme including rural micro grids,

### SDG 7.1
- Close to 100% village electrification
- Household electrification at around 60%

### SDG 7.2
- Non fossil fuel 40% of total installed capacity by 2040
- 175 GW-Renewable Power by 2022

### SDG 7.3
- A 33%-35% decrease in emissions intensity of GDP by 2030

### Indicative Challenges
- $ 200 Billion needed; Off gird and grid synergy

### Pathways/Initiatives
- Jawahar Lal Nehru National Solar Mission.; Generation based incentive for wind; Viability Gap Funding; Accelerated depreciation for solar; National Clean Energy Fund ; Preferential Tariff; Renewable Purchase Obligations & Certificates; Debt Inst &FDI

### Indicative Challenges
- Inefficient functioning of the Power sector; low cost power to key groups

### Pathways/Initiatives
- Energy Conservation ACT- BEE ;
- UDAY; Building energy codes;
- Standard and labelling of appliances;
- Creation of institutional set up; Energy conservation fund ; DSM, NMEE, DISCOMS Capacities; NMEE part NAPCC 2008
• Brazil, Mr. Marcio Schittini Pinto, Director, Ecometano
OVERALL NATIONAL EFFORT ON SUSTAINABLE ENERGY AND CLIMATE CHANGE IN BRAZIL

Expert Group Meeting on Sustainable Development Goal 7 & its Role in Mitigating Impacts from Climate Change

November 2016
HIGHLIGHTS

• GREENER WHEN COMPARED TO 2015
• +77% GROWTH IN WIND ENERGY (10GW INSTALLED + 7 UNDER CONSTRUCTION)
• +400% GROWTH IN RESIDENTIAL SOLAR (+5,500 CONNECTIONS vs 293 IN 09/2014)
• +45% GROWTH IN THERMAL SOLAR
• +18.6% ETHANOL FUEL USE AND -9.5% GASOLINE FUEL USE

• RENEWABLES IN ELECTRICITY = 74.6% (‘14) -> 75.5% (‘15)
• RENEWABLES IN FUELS = 18% (‘14) -> 21% (‘15)
• ENERGY RELATED EMISSIONS: 485MM TCO2 (‘14) -> 462MM TCO2 (‘15)
AGENDA

1. FINANCING
2. ELECTRICITY
3. FUELS
BRAZIL DOES NOT INVEST ENOUGH

FIGURE 12. GLOBAL NEW INVESTMENT IN RENEWABLE ENERGY BY REGION, 2004-2015, $BN

New investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals.
Source: UNEP, Bloomberg New Energy Finance
BRAZIL BARELY ENJOYS THE SUSTAINABILITY FINANCING EXISTING ENVIRONMENT...

TOTAL ANNUAL VALUE OFFERED IN GREEN BONDS
Millions of U.S. dollars

2010: $3,893
2011: $1,231
2012: $3,102
2013: $11,027
2014: $36,211
BRAZILIAN ELECTRIC SECTOR PROVIDES DIFFERENT “GREENING” INCENTIVES
<table>
<thead>
<tr>
<th>Country</th>
<th>Electricity Price (USD/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>0.37</td>
</tr>
<tr>
<td>Brazil</td>
<td>0.35</td>
</tr>
<tr>
<td>Jordan</td>
<td>0.34</td>
</tr>
<tr>
<td>Philippines</td>
<td>0.33</td>
</tr>
<tr>
<td>Germany</td>
<td>0.31</td>
</tr>
<tr>
<td>Italy</td>
<td>0.28</td>
</tr>
<tr>
<td>Japan</td>
<td>0.25</td>
</tr>
<tr>
<td>Chile</td>
<td>0.21</td>
</tr>
<tr>
<td>France</td>
<td>0.21</td>
</tr>
<tr>
<td>United Kingdom</td>
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</tr>
<tr>
<td>Mexico</td>
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<tr>
<td>United States</td>
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<td>South Africa</td>
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<td>Canada</td>
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<td>India</td>
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<tr>
<td>Thailand</td>
<td>0.11</td>
</tr>
<tr>
<td>China</td>
<td>0.08</td>
</tr>
<tr>
<td>UAE</td>
<td>0.07</td>
</tr>
</tbody>
</table>

**RENWABLES HAVE THE MISSION TO REDUCE PRICE AND INCREASE ENERGY EFFICIENCY**
2015/2016: NET METERING REGULATION + SHORT TERM PRICE SUBSIDY = RESIDENTIAL SOLAR BOOM
MIXED PRICING STRATEGIES SIGNAL GROWTH SIZE

80% PRODUCTION GROWTH IN 5 YEARS

50% PRODUCTION GROWTH IN 10 YEARS
TREMENDOUS POTENTIAL: +400 ETHANOL PLANTS, LESS THAN 150 COGEN UNITS
AT THE END OF THE DAY CLOSE TO 70% OF TOTAL ELECTRICITY COMES FROM RENEWABLE SOURCES
OPPORTUNITY FOR DIESEL SUBSTITUTION AND BIG EMISSION REDUCTION CONTRIBUTION
FOSSIL X RENEWABLE; PRODUCTION X DEMAND
POORLY STRUCTURED BIODIESEL PROGRAMME, ALBEIT PRODUCTION INCREASE, THERE IS NO PRICE DECREASE
SUBSIDIES DO NOT HELP SUSTAINABLE GROWTH
CORRELATION TO SUGAR DOES NOT HELP, BUT TREND SHOWS MIXED STRATEGIES DO NOT HELP SUSTAINABLE GROWTH
ETHANOL: ALBEIT NEW DEMAND CYCLE = FLEX FUELS, PRICE DOES NOT DROP
THE MOST SIGNIFICANT RENEWABLE ENERGY GREENFIELD OPPORTUNITY IN THE WORLD
BIOMETHANE OPPORTUNITY

Biogás
52 Billion m³/year

BIOMETHANE
28.5 Billion m³/year

Diesel
60 Bi de litros
44% Substitutio

Gás Natural
39 Bi de m³
73% Substitutio

Biometano
IMPORTANT BENEFIT ON TRANSPORT + INDUSTRIAL EMISSIONS
Uma referência na produção de biogás

A Usina Dois Arcos, da EcoMetano, que produz biogás purificado (biometano) a partir de resíduos sólidos urbanos de oito municípios da Região dos Lagos, foi apresentada como estudo de caso no International Conference on Renewable Energy Gas Technology (Regatec) 2015. O evento reuniu em Barcelona, na Espanha, especialistas e empreendedores na produção de biometano por meio de conversão microbiológica e termoquímica de biomassa e resíduos de todo o mundo.

O investimento na usina foi de R$ 20 milhões, incluindo a instalação do aterro sanitário. A estimativa de produção é de cerca de 8 mil m³ de biometano/dia, chegando a 15 mil m³/dia em 2020. O aterro recebe aproximadamente 700 toneladas/dia de resíduos sólidos urbanos. No início, o biometano será fornecido em cilindros, como gás natural comprimido (GNC), para clientes industriais. Futuramente, a usina poderá ser ligada à rede de distribuição da CEG e da CEG Rio, concessionárias de gás canalizado do Estado.
CAPACITY TO FUEL CNG TRUCKS AND PIPELINE INJECTION
OVERALL NATIONAL EFFORT ON SUSTAINABLE ENERGY AND CLIMATE CHANGE IN BRAZIL

MARCIO SCHITTINI
marcio.schittini@ecometano.com.br
+55-21-3177-5900
• Ethiopia, Mr. Tsegaye, Lemma Samson, Director, Solar Energy Foundation
Expert Group Meeting on the Sustainable Development Goal 7 and its Role in Mitigating impacts from Climate Change
Organized by the Division for Sustainable Development of UNDESA, In Cooperation with UNDP Morocco and UN-Energy
13 November – 14 November 2016
Mogador Express GUELIZ
Marrakesh, Morocco
Sustainable energy and Climate Change activities in Ethiopia

- Population over 99 Million
- Urban 20% rural 80%
- GDP growth 9.6%
- Access to electricity Urban 23% rural 8%
Energy source for lighting % of HHs

(4 main regions, lighting Africa report)

1. Kerosene lamps 85.7%

2. Candles 0.8%

3. Dry cell battery lighting devices 65%

4. Car batteries 0.3%

5. Diesel generator (private) 0.3%
Over **14 million House holds** are without electricity access

The amount of dry cell batteries used and discarded annually by the rural households is estimated at **278 million units** (lighting Africa)

Based on the 2014 price of kerosene, it is estimated that over **235 million litres** are used each year for lighting by rural households. (Source. Lighting Africa report)

I am tired;
The country’s vision is to build a middle-income climate resilient green economy by 2025 through zero net carbon growth.

**CLIMATE RESILIENT (CR)**

- Climate change results in changes to weather which will impact across the whole economy.
- A climate resilient economy will be protected from the negative impacts of climate change and seek opportunities in a changing climate.
- Builds on and incorporates the Ethiopia’s Program of Adaptation to Climate Change (EPACC) and other relevant analysis.

**GREEN ECONOMY (GE)**

- Ethiopia is committed to be a middle income country by 2025 (USD $1000 GDP per capita)
- Development ambition is laid out in the Growth and Transformation Plan (GTP)
- A commitment to foster zero net carbon growth
- This low carbon growth create employment and provide wider socio-economic benefits.
• **Finance**

• Sources of finance for implementing the CRGE strategy will come from government, private finance, development partners, carbon trading schemes and financial mechanisms of multilateral environmental agreements.
Plans

• GTP II

✓ During GTP II, the implementation of the CRGE Strategy will continue and the post-2015 SDGs related to a green economy will be integrated in all sector activities. In agriculture, adapting to climate change and mitigating GHG emissions will be pursued through the enhanced productivity of the crop and livestock sub-sectors and protecting and rehabilitating forests.

✓ In the energy sector, renewable sources of energy such as geothermal, wind and solar, will form an increasing share of overall capacity. Leapfrogging to energy efficient technologies will be a key objective in the transport sector and the expanded industry sector. At the end of GTP II, the GoE anticipates reducing GHG emissions by 147 million metric tons.

✓ The growth of overall power generating capacity is projected to reach 17,347MW by the end of the GTP II,

✓ 3.6Mill lanterns and 400,000 SHS by 2025(rural electrification with renewables)

✓ 300 MW Feed in Grid Solar planned for different region

✓ 800MW of Wind power

✓ 1000MW GeoThermal
## Countries Potential

<table>
<thead>
<tr>
<th>Resource</th>
<th>Unit</th>
<th>Exploitable Reserve</th>
<th>Exploited (In-service)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro Power</td>
<td>MW</td>
<td>45000</td>
<td>&lt;5%</td>
</tr>
<tr>
<td>Solar</td>
<td>kWh/m2/day</td>
<td>4 - 6</td>
<td>„, 0%</td>
</tr>
<tr>
<td>Wind Power</td>
<td>GW</td>
<td>1300</td>
<td>.. 0% (171 MW)</td>
</tr>
<tr>
<td>Geothermal</td>
<td>MW</td>
<td>5000</td>
<td>.. 0% (7 MW)</td>
</tr>
</tbody>
</table>
- Ethiopia has started constructing a geothermal electric power generating capacity of 1,000 MW per year in the Rift Valley. The first phase, which will produce 500 MW per year, will be completed in 2018. The second phase, which will generate another 500 MW per year, will be completed in 2021.

- 50,000 solar home Systems installed in 7 year instalment loan (REF)

- Close to 60,000 SHS and 1 million lanterns disseminated (by private companies and NGOs)

- The current GTP has a target to increase generation capacity to over 17,000 MW by 2020, with an overall potential of 35,000 MW by 2037,

- Hydropower current generation 3715 MW and ongoing projects with 8950 MW including GERD

- Wind installed capacity, 324 MW in total (51 MW Adama I, 120 MW Ashegoda, 153 MW Adama II)

- Ethiopia has started constructing a geothermal electric power generating capacity of 1,000 MW per year in the Rift Valley. The first phase, which will produce 500 MW per year, will be completed in 2018. The second phase, which will generate another 500 MW per year, will be completed in 2021.
Access To Electricity

Samson Tsegaye, Solar Energy Foundation
November 2016
Why not used or The Gaps

• Suppliers mostly based in big cities
• Rural settlements, difficult to access, very scattered
• Lack of awareness on available quality products
• Shortage of local stock
• Lack of professionals
Consumer Campaigns
by Lighting Ethiopia program of IFC

Samson Tsegaye, Solar Energy Foundation
November 2016
LIGHTING GLOBAL QUALITY VERIFIED PRODUCTS

SOLAR HOME SYSTEM KITS

FOSERA GROUP
LSHS 9800+Lamps+Panel

MOBILOTS
Mobisol Family SHS 19" TV

OMINIVOLT POWER CO. LTD.
OvCamp HS1-144, LB2244

AZUNI TECHNOLOGIES LTD.
Indigo Duo Solar Home System

PICO SOLAR PRODUCTS

ARLA DASSOL SOLAR ENERGY SCIENCE & TECHNOLOGY CO.
SSL200

BAREFOOT POWER LTD.
Barefoot Firefly/Firefly Mobile

GREENLIGHT PLANET INC
Sun King Home Eco

A LIGHT DESIGNS
A1 S20

Connect 600

Sun King Home Plus

SODAPOWER
Solar Home System

D20 S100

Sun King Pro 2

LITIO
Litio Solar Home System Kit

Sun King Home

FOSERA GROUP
Pico Solar Home System Family – PSHS 2800, PSHS 7000 and others

FREESPLAY ENERGY
Solar Energy Centre

GREENLIGHT PLANET INC
Sun King Pro All Night

FUTURA
Energy Station Plus

GREENLIGHT PLANET INC
Sun King Solo

INNOVA IMPLEX SUNLITE
JS90-MOB

GREENLIGHT PLANET INC
Sun King Mobile

INDIA IMPLEX SUNLITE
JS90-MOB

GREENLIGHT PLANET INC
Sun King Home

JGA ENERGY
Home Mate

GREENLIGHT PLANET INC
Sun King Pro All Night

JGA ENERGY
M-KOPA 3

GREENLIGHT PLANET INC
Sun King Solo

KIA SUNLITE INTERNATIONAL LTD.
AKARI

GREENLIGHT PLANET INC
Sun King Solo

KIA SUNLITE INTERNATIONAL LTD.
AKARI

GREENLIGHT PLANET INC
Sun King Mobile

MICROMARK
Compact LED Solar Light

GREENLIGHT PLANET INC
Sun King Mobile

MICROMARK
Compact LED Solar Light

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GREENLIGHT PLANET INC
Sun King Mobile

MICROMARK
Compact LED Solar Light

GREENLIGHT PLANET INC
Sun King Mobile

MICROMARK
Compact LED Solar Light
Challenges

• Unclear import procedure and Regulation of Solar equipments
• Lack of local quality testing facilities
• Different procedures from regional energy bureaus on implementing projects
• Access to finance and managing available finance
• Duplicated efforts by donor organizations
• Few genuine players for the sector
Affordability or Availability
• Solar Energy Foundation and activities and experiences
Why Solar for the Rural

- Kerosene lamp side effects, its cost and access to it
- Shortage of fire wood, which is already a cause of deforestation
- Water supply
- Health
- Education
- Information (Radio, TV)
- Distance to shops
- The only alternative for the rural’s from clean energies

Samson Tsegaye, Solar Energy Foundation
November 2016
STIFTUNG SOLARENERGIE-SOLAR ENERGY FOUNDATION

→ SEF was established in 2005 in Germany by the founder Dr. Harald Schutzeichel
→ Registered in Ethiopia as an international NGO in 2007

**Mission:** Poverty alleviation and creating a long-term sustainable solar market in Ethiopia

• Knowledge transfer, by train solar technicians and make them available for the developing solar market
• Creating Jobs
Our Projects

• Light For Education, I, II, III
• Scaling up Solar Energy Supply (Revolving Fund)
• Lighting Rural homes and community services
• Solar power installation for Health institutions
• Lighting Student Homes
Light for Education

REMA project approach

SHS installed free

Users saving small amount monthly which they used to spend previously for Kerosene

This saving is used for replacements (battery, lamps...)

Samson Tsegaye, Solar Energy Foundation
November 2016
Light for Education project, Cont...

- Elected community members are responsible for the saving collection
- Technicians, trained from the community and employed by the community, they are responsible for after sales service
- System will be removed if users defaulted for three consecutive months
- 2200 HH of REMA solar Village received solar lights
- Street lights installed in different spots
- Schools got solar lights for adult evening class
Solar water pumping, REMA

Water Disinfection
Our approach cont.

Scaling up solar energy supply (revolving fund)

• Different size solar systems distributed on credit & cash sales approach

• Credit facility (five, three, two years) for only fixed installed systems not for lanterns

ST 2
ST 10
Power Box
Media Box
DC TV
Our approach cont.

• We developed smart charge controllers for credit sales (PAYGO)
• Over 30000 different size Solar Lighting systems distributed
• Lighting Rural Homes and Community Services (Arso Amba)

✓ Users cover 25% of the material cost on cash and credit bases

✓ Over 700 House Holds electrified
Solar Power Installation for Health Institutions (36)
Lighting Student Homes

1000 Students from two elementary schools received one M300XL Niwa Solar Lantern
Solar Technicians Training Center

REMA, First Solar village North Shoa

Solar Valley, Tatek, Addis Ababa

22/11/2016

November 2016
Creating Jobs

recruitment

Training

Graduation

Job Creation

On job training
SOLAR SOLDIERS
Commitment

End User Training

Samson Tsegaye, Solar Energy Foundation November 2016
Challenges for local solar business

- Hard currency for import
- Finance, Loan from local and abroad
- Fake and copied products available in the market, and bad price competition
Suggestions to accelerate clean energy access and to reach SD goals

- TRUST
- Awareness
  - Distribution Network
  - After sales service
  - Product availability
  - Local Assembly and next step, from lanterns to SHS
- Proper training for technicians
- Establishing strong association of stakeholders

- 20 Million USD allocated for MFIs and Private companies through DBE as loan for renewable technologies from World Bank
Thank you

Switch the light on!

 hairstylist

Thank you