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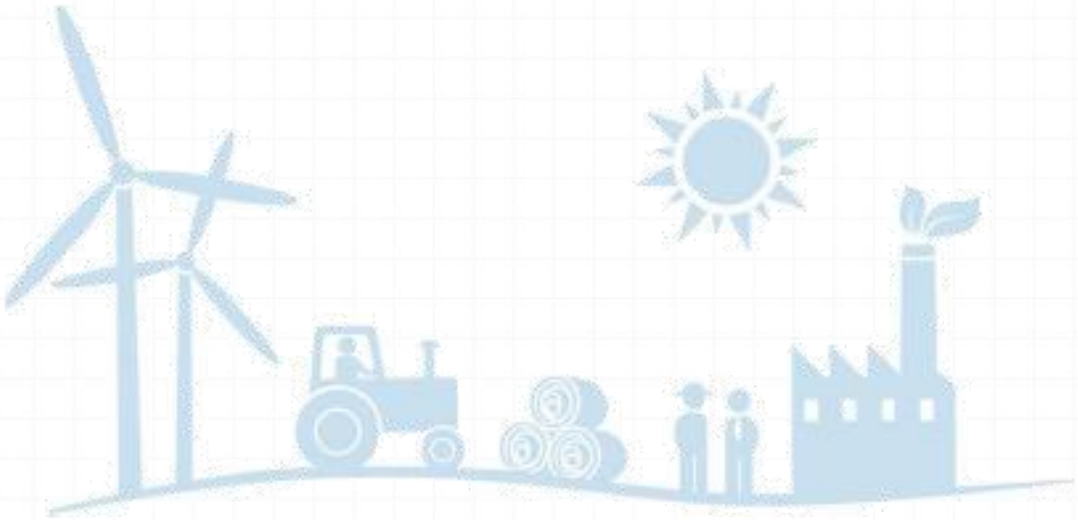
Towards SE4ALL in Developing Countries: Adressing energy access, energy security and climate changes simultanously



Mr. Martin Lugmayr, Sustainable Energy Expert
Energy and Climate Change Branch
United Nations Industrial Development Organization

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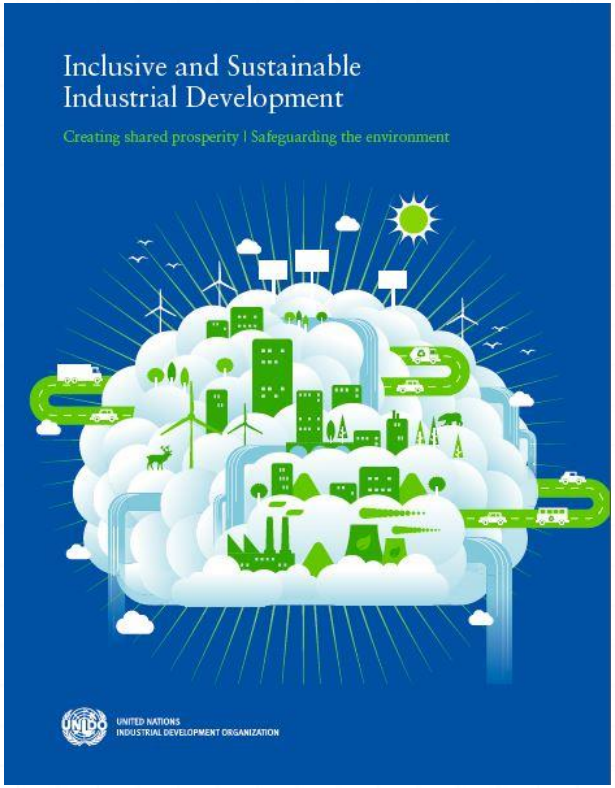
UNIDO History

- July 1961: Centre for Industrial Development (CID) created within Department of Economic and Social Affairs (DESA) by Economic and Social Council (ECOSOC)
- Nov 1966: UNGA Resolution 2152 (XXI) established UNIDO as an autonomous body, to “promote and accelerate the industrialization of the developing countries”
- 1985: UNIDO became a specialized agency of the UN

UNIDO's Mandate

- UNIDO's Mandate of ***Inclusive and Sustainable Industrial Development focuses on three main thematic areas:***

- **Poverty reduction through productive activities**
- **Trade capacity-building**
- **Energy and environment**



ISID aims to achieve equitable and sustainable social, economic and environmental growth whilst mainstreaming women and youth

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Why industrial development and UNIDO?

- Lasting and sustainable poverty reduction in urban and rural areas
- Job and wealth creation through productive activities
- Diversification of economy and integration in global value chains
- Increased productivity through technology progress
- „Revival of industrial policy in Europe (raise industrial production share of EU GDP to 20% by 2020.
- Significance of Industry for development in Austria
- Need for inclusive, sustainable and low-carbon industrial development – link to energy (costs, climate)

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Developing and transformation countries face three interrelated energy challenges:

Energy poverty and affordability

Energy security and reliability

Climat change mitigation and adpation

How to satisfy the investment needs in energy infrastructure to ensure energy access and energy security and to avoid GHG emissions at the same time?

Energy Challenges in Developing Countries:

Low Access to modern, affordable and reliable energy services

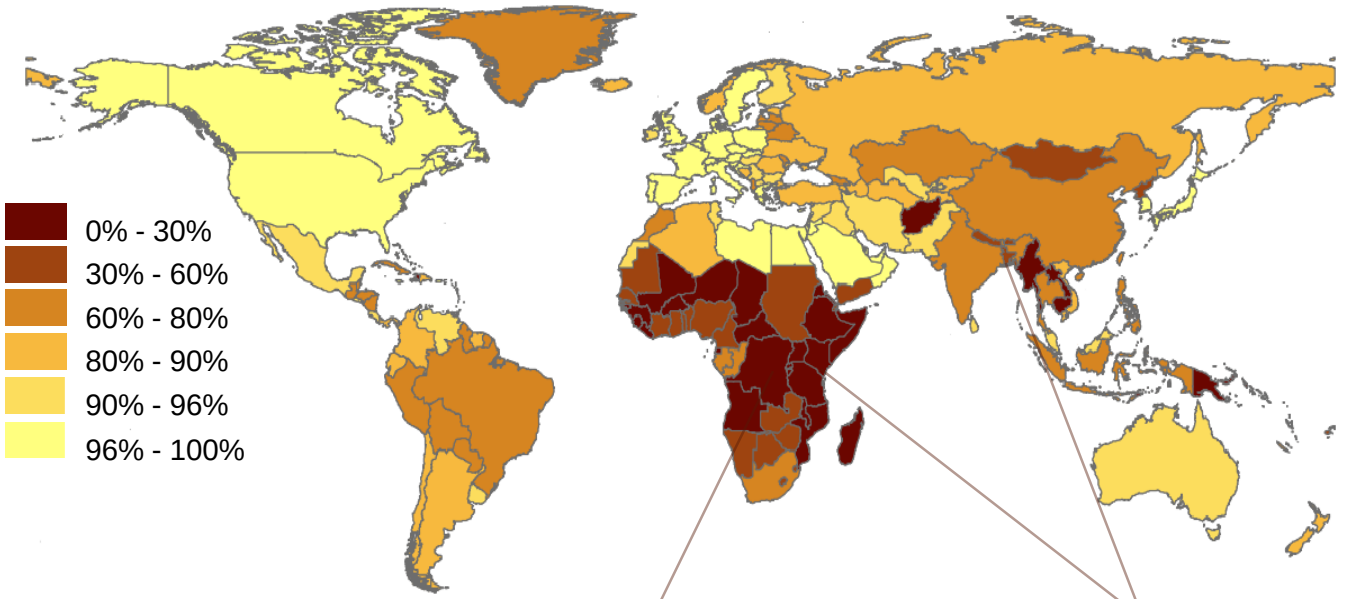
- ✓ **Progress over the last 30 years** particularly in East Asia and Latin America;
- ✓ Today **still 2,4 billion people withouth access** to modern energy services;
- ✓ In BAU scenarios **1,4 billion without access in 2030** (mainly in Africa, South Asia);
- ✓ DCs representing **80% of the global population consume 30% of the energy**;
- ✓ Globally around **90% with access to electricity in urban and 60% in rural areas**;
- ✓ **In Sub Sahara Africa 51% with access in urban and 8% in rural areas**;
- ✓ **Migration to urban centers** challenges the electricity systems (e.g. slums);
- ✓ **Reliance on traditional biomass energy** is particularly high in Sub Sahara Africa;
- ✓ The poor spend more income for poor-quality energy services than the better-off;
- ✓ **High vulnerability of the poor to fuel price fluctuations** (e.g. cost of transport);
- ✓ **Low private sector interest to invest** in low-return markets (e.g slums, rural);
- ✓ The lack of access to modern, affordable and reliable energy services is interrelated with a **variety of economic, social, environmental and political problems** (e.g. indoor-pollution, social unrest, low productivity of industry, poor public services)

Global Energy Access Situation

One in five people on the planet (Around 1.3 billion) lack access to electricity

Twice that number lack access to clean cooking or heating

Electrification Rates



Base of the pyramid consumers pay the highest cost for electricity and energy access, e.g. lighting typically accounts for 10 to 15% of total household income

2.6 billion people without clean cooking facilities, nearly 40% of the world's population rely on wood, coal, charcoal, or animal waste to cook their food

Over the past four decades, **the gap between energy supply and demand in Africa has widened**

Of the 1.3 billion people without electricity, over 95% live in Sub-Saharan Africa or in Developing Asia

Source - SE4ALL 2014

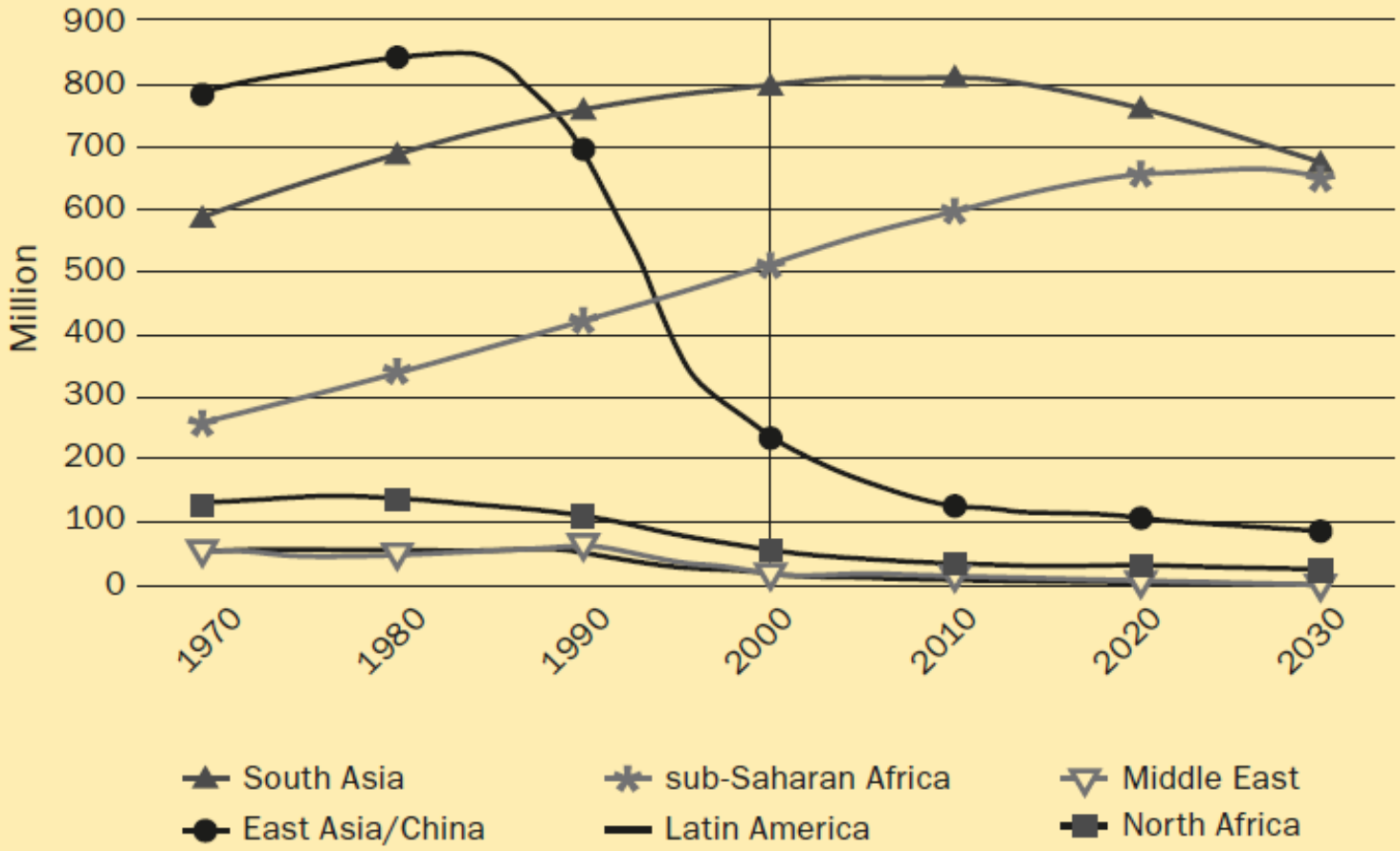


Figure: BAU forecast of number of people without access to electricity 1970 – 2030 (according to UNDP, ESMAP, 2005)

Energy Challenges in Developing Countries

- **Energy security concerns**

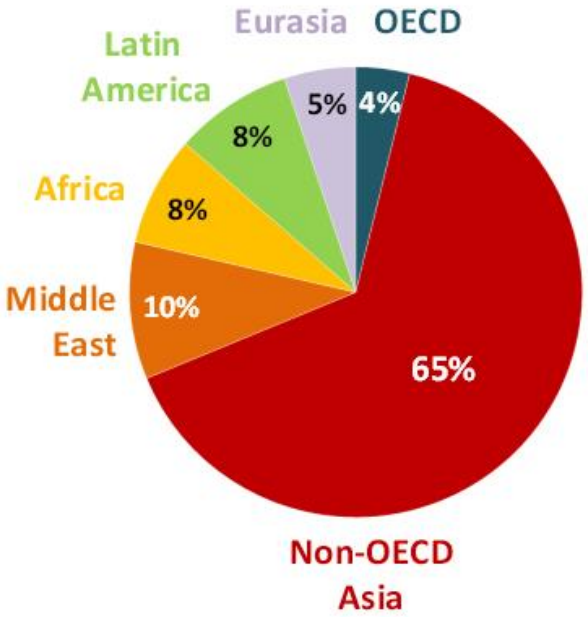
  - ✓ It is projected that **by 2030 cities will consume 73% of the global energy**;
  - ✓ **80% of the global energy supply by fossil fuels** (coal, oil, gas);
  - ✓ Gap between **rising urban energy demand**, lack of generation capacity and investment capital;
  - ✓ **High technical and commercial transmission losses** in some DCs (up to 40%);
  - ✓ High vulnerablity of DCs due to **dependence on imported petrolium products**;
  - ✓ Some DCs spend **up to 40% of their GDP on fossil fuel import** (e.g. Pacific);
  - ✓ Limited oil and gas reserves to satisfy the global demand;
  - ✓ **No functioning regional electricity and gas markets** in most DC regions;
  - ✓ Situation in some DCs seriously hampers the social and economic development ;
  - ✓ Very high electricity tariffs and generation costs in some DCs;
  - ✓ Urban population and private sector suffer from **load shedding and power cuts** (e.g. high costs of back-up diesel generators);
  - ✓ **Low interest of investors due to high risk and market entry costs;**

The engine of energy demand growth moves to South Asia

WORLD ENERGY OUTLOOK 2013

Primary energy demand, 2035 (Mtoe)

Share of global growth 2012-2035



China is the main driver of increasing energy demand in the current decade, but India takes over in the 2020s as the principal source of growth

Source: World Energy Outlook 2013

Energy Challenges in Developing Countries

- **Climate Change mitigation/adaptation and other negative externalities**
  - ✓ In BAU scenarios a **doubling of pre-industrial levels of GHG emissions** is very likely and would lead to a **rise of global temperatures between 2˚ C to 6˚ C**;
  - ✓ **DCs would suffer from negative climate change impacts at most** (e.g. sea level rise, droubts, extreme whether events);
  - ✓ **66% of the global GHG emissions are caused by the energy sector**;
  - ✓ DCs representing **80% of the population account for 53.6%** of the global GHG;
  - ✓ **Up to 75% of the projected increase in GHG emissions by DCs;**
  - ✓ It is estimated that **cities would emit 76% of the global GHG in 2030**;
  - ✓ To **stabilize the global temperature at 2˚ C levels** the emissions would have to peak at latest in 2020 and to be reduced by 30% to 70% until 2050;
  - ✓ **Energy efficiency improvements and 30 to 50% renewable energy share** of global primary energy by 2050;
  - ✓ Needed **energy investments between 1,7 and 2,2 trillion USD per year;**
  - ✓ New investments determine GHG emissions for the next 20 - 30 years (or longer);

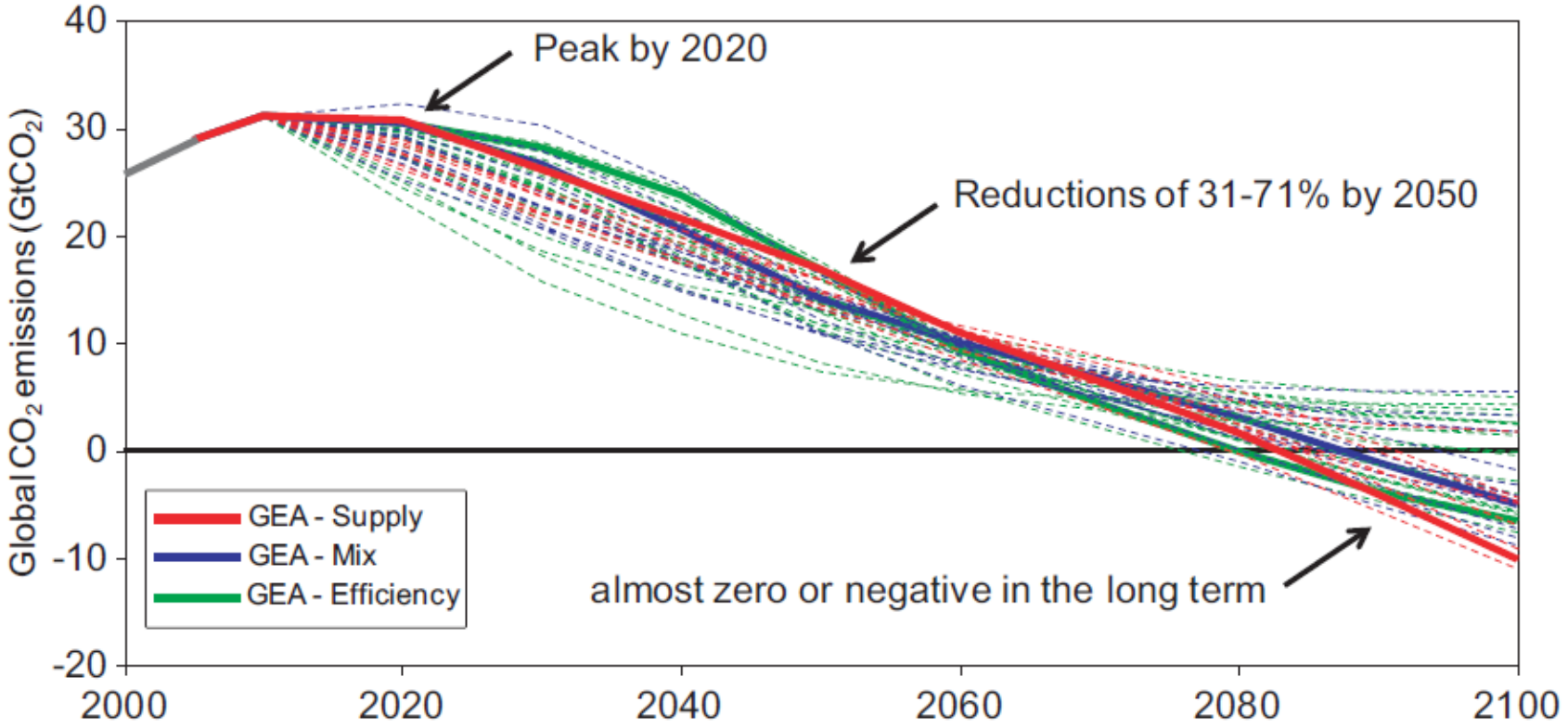


Figure SPM-2. | Development of global CO_2 emissions from energy and industrial sources to limit temperature change to below 2°C (with a success probability of >50%). Shown is that the emissions need to peak by around 2020 (or earlier) and decline toward zero during the following four to five decades. The later the peak occurs, the steeper the decline needs to be and higher the net "negative" emissions. The latter can be achieved through in the energy system through carbon dioxide capture and storage in conjunction with the use of sustainable biomass. Source: Chapter 17. For further details of the GEA pathways see the interactive web-based GEA scenario database hosted by IIASA: www.iiasa.ac.at/web-apps/ene/geadb.

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Global Agreements 2014-2015 on Energy and Climate Change

Post 2015 Development Agenda leading to SDGs

- Energy recognized as a SDG
- Inclusive and Sustainable Industrial Development (ISID) part of SDG on Energy

International Climate Agreement 2015

- Energy linking to Climate change
- Nexus of Energy-Water-Food-Health impacting Climate Change

Sustainable Energy for All (SE4ALL) Goals

- Regional Hubs
- Accelerator Programmes on Industrial Energy Efficiency and Renewable Energy
- High Impact Opportunities

Barriers for RE&EE Markets in developing and transformation countries (examples)

- **Insufficient policy, legal and regulatory framework** (e.g. laws, standards, incentives)
- **Lack of implementation capacities** on national and regional level
- **Lack of human capacities** (e.g. utilities, developers, banks, entrepreneurs, policy makers) and training institutions
- **Lack of local service and harware companies**
- **Lack of knowledge on the financial an technical feasibility** of RE&EE solutions (e.g. building codes, lighting and appliances)
- Insufficient RE&EE **resource assessments and market data**
- **Lack of risk-capital** for project development and investment capital due to small projects and high up-front/transaction costs
- **Lack of incentives and standard procedures** for IPPs and PPPs
- **Technical barriers** (e.g. limited feedstock, land availability, grid stability, extreme wheather events, river flow variations)

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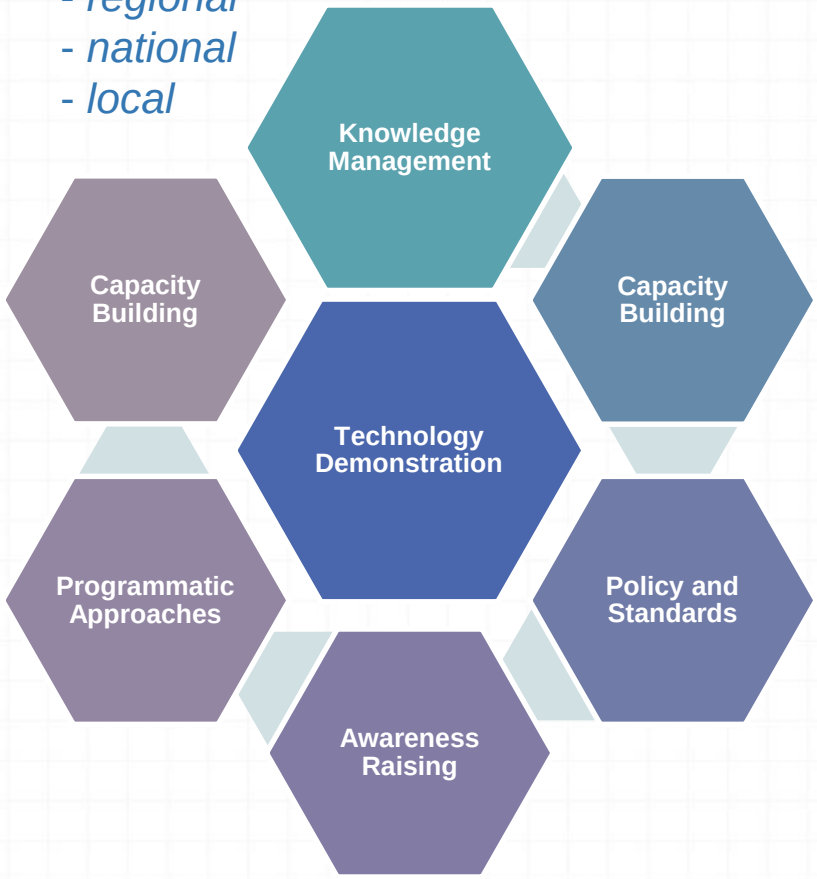
Core Building Blocks of UNIDO's ECC Program: Addressing the barriers for RE&EE

- global
- regional
- national
- local



- **Assist economies and particularly urban and rural industries to swith to modern, affordable, reliable and sustainable energy services**

- **Assist in building up sustainable energy industries and empower local private sector to take advantage of growing market and job opportunities**

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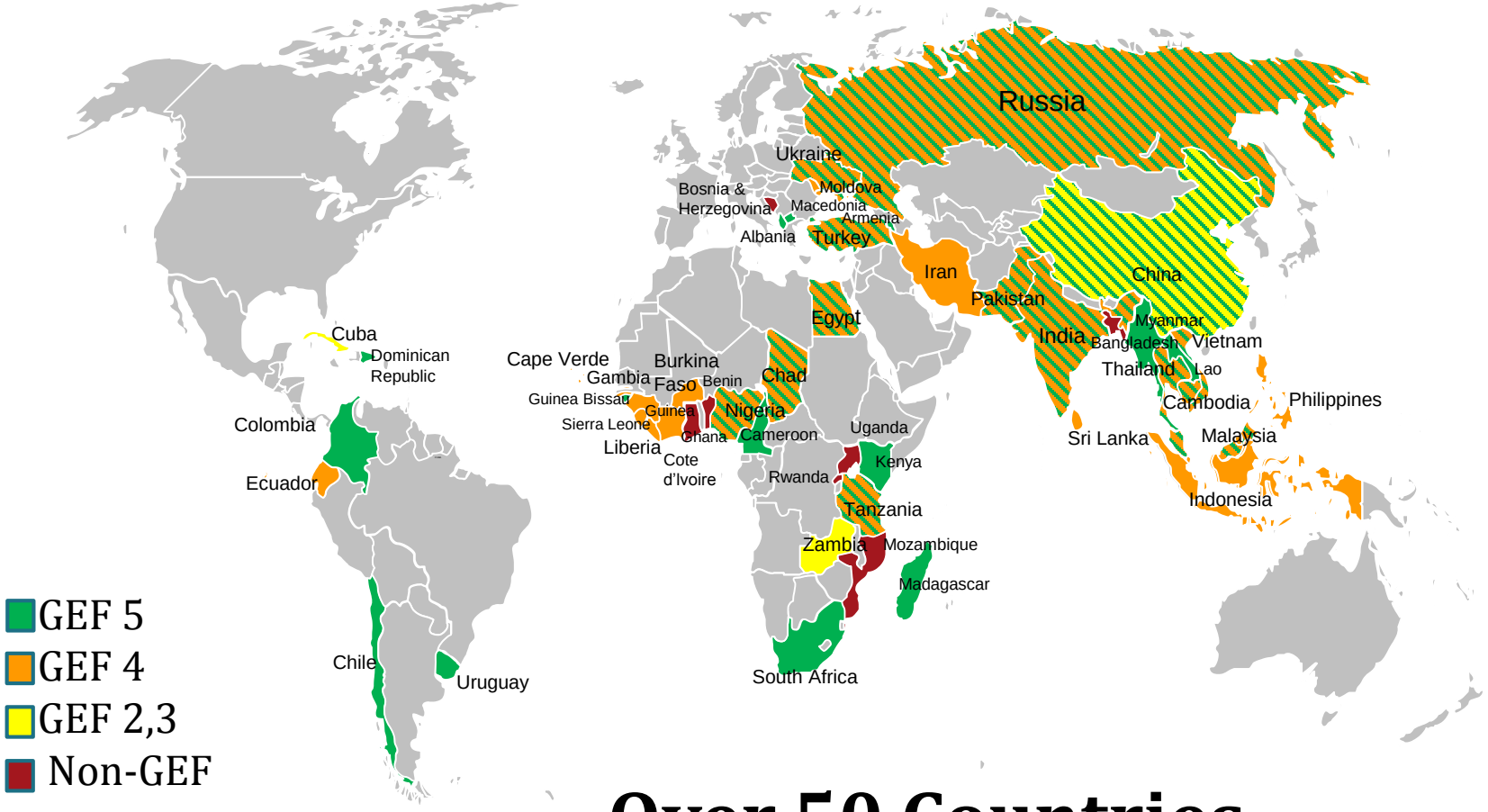
Energy Projects Footprint



Over 50 Countries

Overall – Energy Projects Portfolio

Area	Numbers	Grant Amount US$ Mio
IEE	36	125.6
RRE	64	109.3
IEE & RRE	4	5.8
ECC-Total	**104**	**240.7**

54 Countries

15 projects in Least Developed Countries

Non-GEF portfolio

Area	Numbers	Grant Amount US$ Mio
IEE	3	6.8
RRE	25	13
IEE & RRE	4	5.7
ECC-Total	**32**	**25.5**

GEF portfolio

Area	Numbers	GEF-Grant US$ Mio	Co-financing US$ Mio
IEE	33	118.8	725.2
RRE	39	96.3	85.3
ECC-Total	**72**	**215.1**	**810.5**

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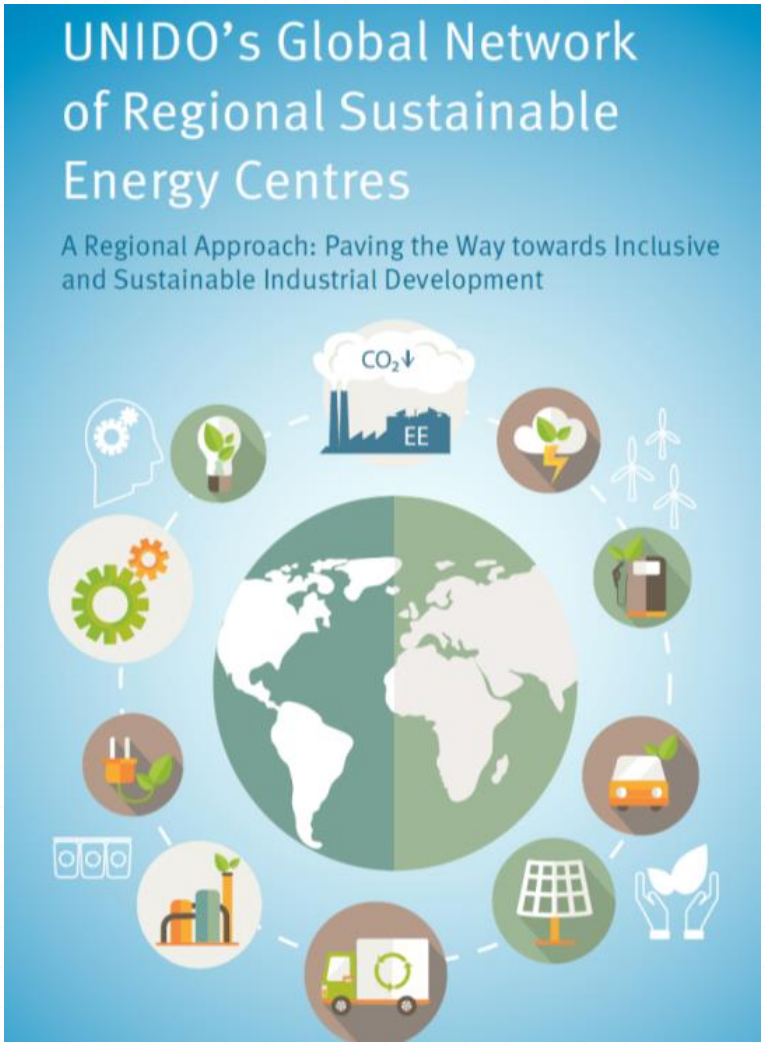
Global Network of Regional Sustainable Energy Centres – South-South Multi-Stakeholder Partnership to Support SE4ALL



ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE)

Southern African Centre for Renewable Energy and Energy Efficiency (SACREEE)

Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE)

Regional Centre for Renewable Energy and Energy Efficiency (RCREEE)

East African Centre for Renewable Energy and Energy Efficiency (EACREEE)

Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE)

supported by:

Austrian Development Cooperation

MINISTERIO DE ASUNTOS EXTERIORES Y DE COOPERACIÓN aecid

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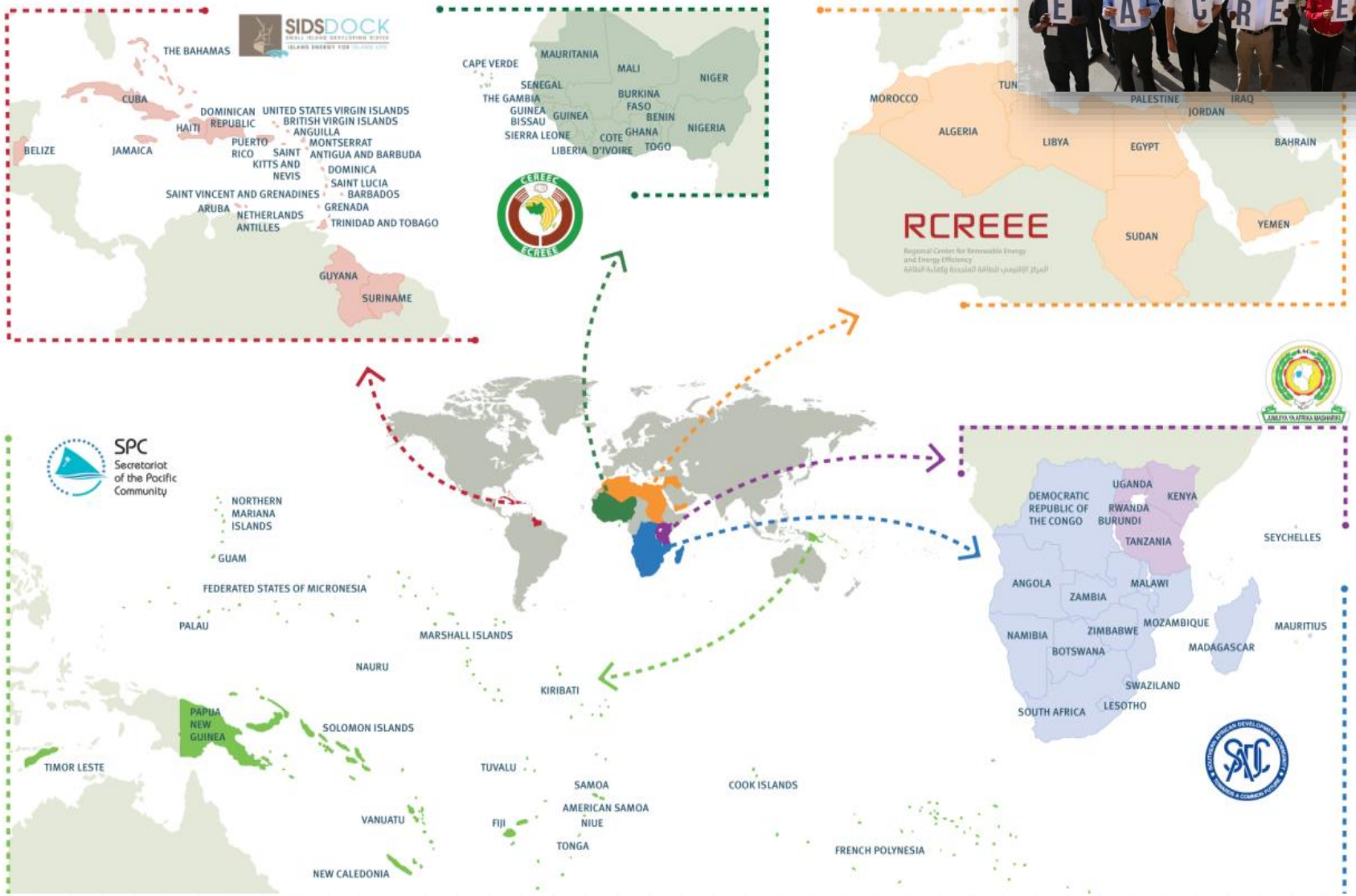
Supported by more than 50 Energy Ministers!



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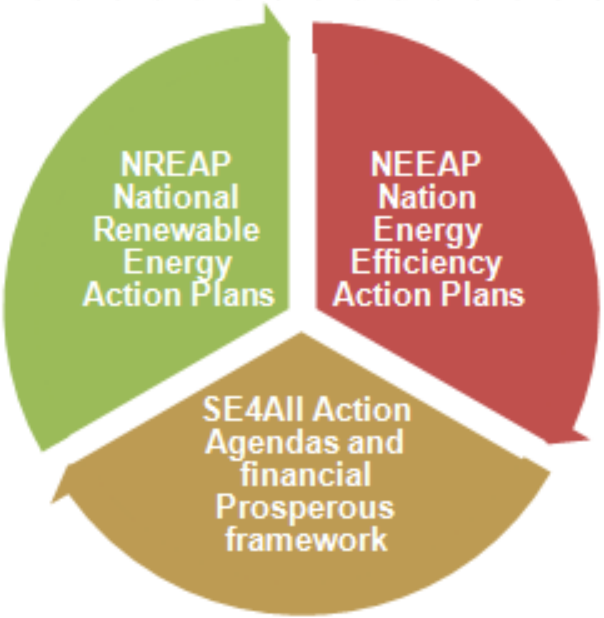
Regional Centres aim at up-scaling regional / national efforts to promote RE & EE markets through:

Case Study: ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE)

- Specialized Agency of the Economic Community of West African States (ECOWAS) to promote RE&EE
- Covering 15 Member States and 300 million energy consumers
- Established in 2010 with support of UNIDO, Austria and Spain
- Secretariat in Praia, Cape Verde

Regional RE&EE policy and SE4ALL implementation



- ECOWAS Renewable Energy Policy (EREP) incl. targets developed
- ECOWAS Energy Efficiency Policy (EEEP) incl. targets developed
- Adopted by ECOWAS Heads of State in June 2013
- ECREEE assists in the development and execution of the national action plans and SE4ALL Agenda in ECOWAS Members States

ECOWAS RE POLICY TARGETS BY 2020/2030

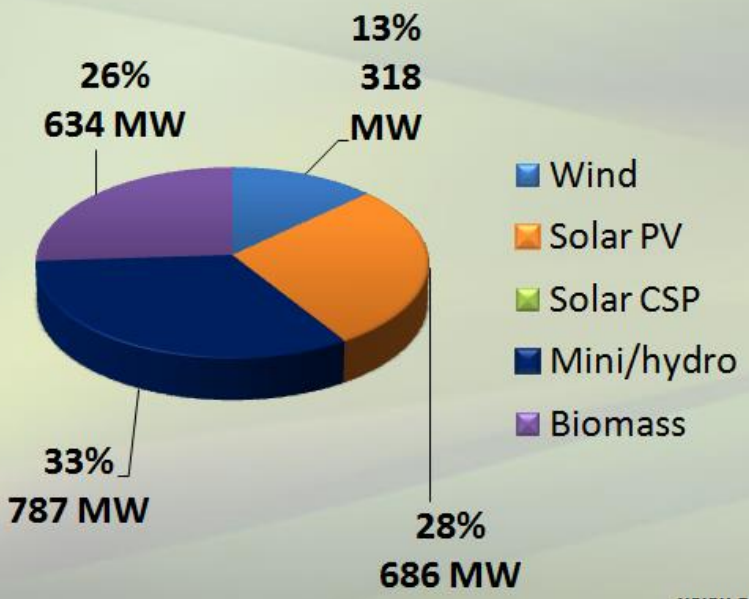
in MW of installed capacity	2010	2020	2030
Load forecast ECOWAS, in MW peak load	10,659	25,128	39,131
WAPP total RE capacity (medium and large hydro)	3,447	6,272	11,340
WAPP RE Penetration in % of peak load	32%	25%	29%
EREP renewable energy options in MW	**0**	**2,425**	**7,606**
EREP renewable energy options in % of peak load (excl. medium and large hydro)	0%	10%	19%
Total RE penetration (incl. medium and large hydro hydro)	**32%**	**35%**	**48%**

in GWh of produced electricity	2010	2020	2030
Load forecast ECOWAS – electricity demand in GWh	65,696	155,841	243,901
WAPP RE total production (medium and large hydro) in GWh	16,965	27,494	46,844
WAPP RE production Share (medium and large hydro)	26%	18%	19%
EREP renewable energy options – production in GWh	**0**	**8,350**	**29,229**
EREP renewable energy options - % of electricity demand (excl. medium and large hydro)	0%	5%	12%
RE production Share	**26%**	**23%**	**31%**

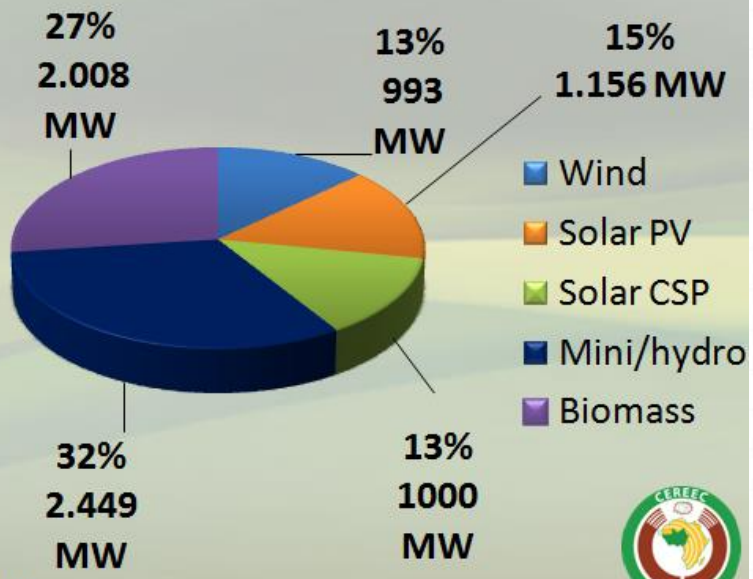
GRID-CONNECTED RE SCENARIO OF ECOWAS BY 2020/2030 (excl. medium and large hydro)

Individual countries decide on RE mix!

Installed RE Capacity 2020
2,425 MW



Installed RE Capacity 2030 – 7,606 MW



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Country Modelling

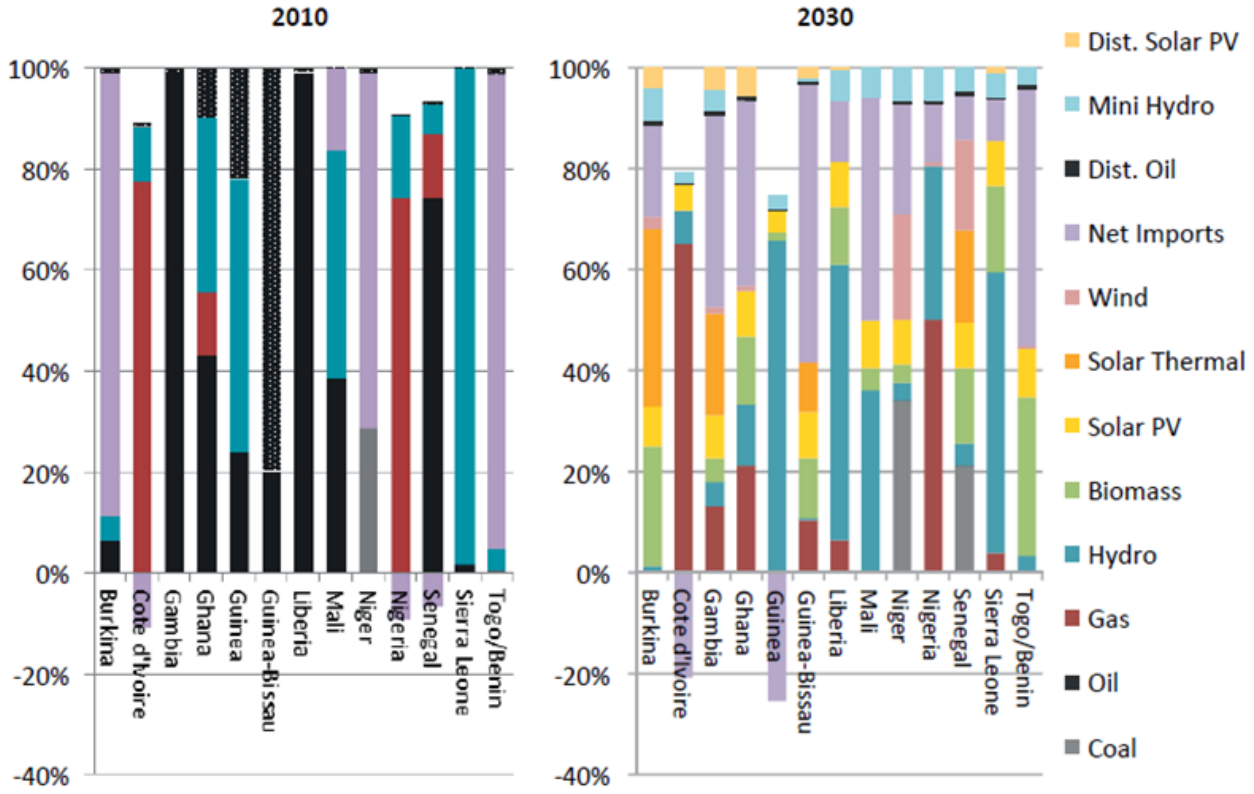
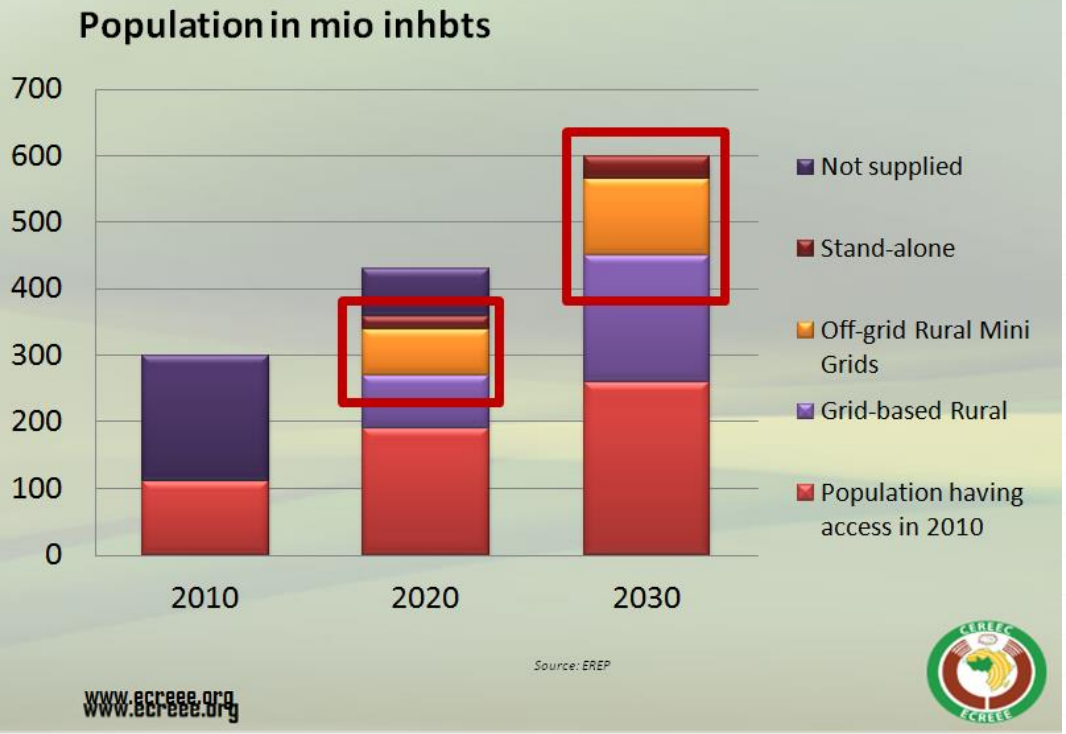


Figure 13. Electricity Production Shares by Country in 2010 and 2030 under the Renewable Scenario

The ECOWAS goal of the ECOWAS RE Policy

Rural RE Electricity Targets	2020	2030
Share of rural population supplied by mini-grids and stand-alone systems in %	22%	25%
Mini-Grids to be installed	60,000 3,600 MW	128,000 7,680 MW
Stand-alone systems	210,000	262,000
Investment (b€)		32,3



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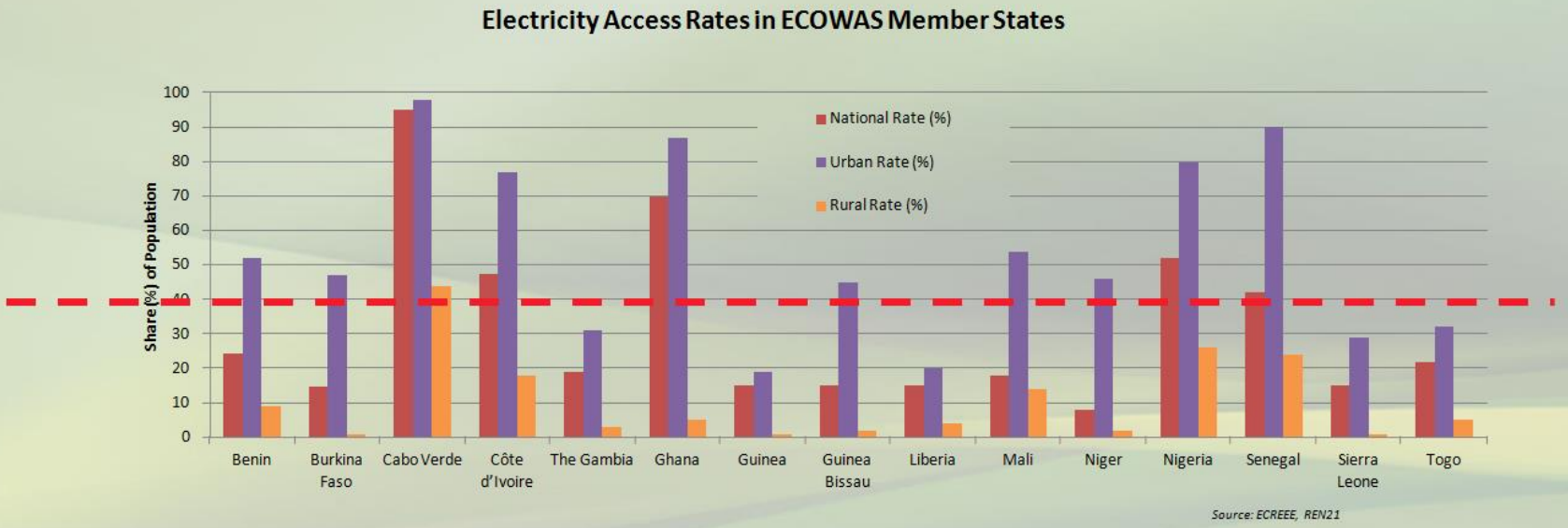
In the ECOWAS 42% of the population has access to electricity (8% if we consider only the rural population)



More than 175 million people with no access to improved electricity services

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GEF-5 RE project in Guinea Bissau:

Promoting renewable energy investments in the electricity sector

Results:

- Development and implementation of 2.5 MW of small to medium scale renewable energy projects (e.g. 300 to 500 kw PV hybrid mini-grids)
- Development of the bundled 19 MW hydro project Salthino to feasibility stage;
- Establishment of a national renewable energy policy framework and action plan;
- Strengthening of capacities of local training institutions and key energy market stakeholders to develop, install and maintain renewable energy systems;

COUNTERPARTS:

Ministry of Energy and Industry, ECREEE

BUDGET:

Total: US$ 9.2 million
US$ 1.7 million from GEF grant
US$ 7.5 million in co-financing

DURATION:

2014 to 2018

Cape Verde: Grid-Connected PV plants

RE Projects completed in 2010

2.5 MW Solar PV

Sal, Cape Verde, Commissioned October 1, 2010

5 MW Solar PV

Praia, Cape Verde Commissioned November 2, 2010

www.ecreee.org

Cape Verde: 25.5 MW of Wind Power installed

25,5 MW of Wind PowerCabeólica – PPP between AFC, Finnfund, InfraCo, Electra and the National Government of Cape Verde

2.5 MW Wind Farm
Boavista, Cape Verde, Commissioned in 2011

8 MW Wind Farm
Sal, Cape Verde, Commissioned in 2011

6 MW Wind Farm
Sao Vicente, Cape Verde
Commissioned November, 2011

10 MW Wind Farm
Santiago, Cape Verde
Commissioned November, 2011

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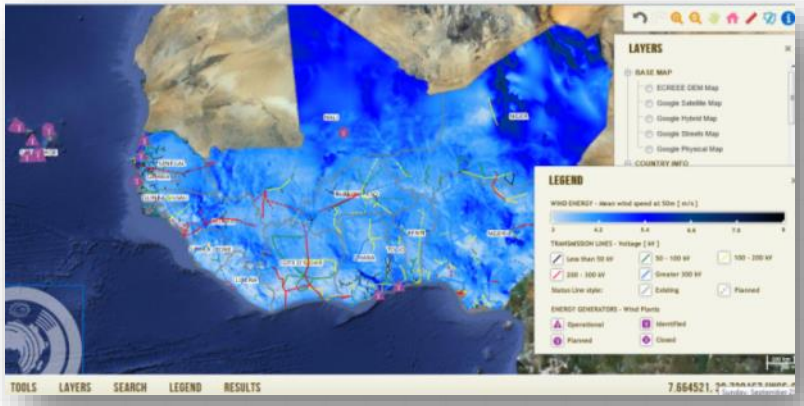
ECOWAS RE&EE Observatory (www.ecowrex.org)

- RE&EE market data for investors and developers
- GIS Maps on RE potentials, and other planning data (e.g. lines, roads, existing and planned stations and systems)
- Ongoing Initiatives (e.g. GEF, ACP-EU Facility, ECREEE)
- Country profiles and statistics
- Document library (e.g. studies, policies, project documents)



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Not a long time ago – access to modern, affordable and reliable energy services in Upper Austria (...)

(1884 in Steyr – first bigger city in the world with lighting provided partly by hydro power) *„Alle liefen wir in der Stube zusammen und kamen nicht aus dem Staunen heraus, so hell war alles im ganzen Haus - in jedem Raum gingen wir aufdrehen. Es war hell und überall noch heller* [...] *Wir gingen an diesem Abend alle lange nicht schlafen, denn wir mussten das Licht genießen. Mutter sagte: ‚Schade, dass ich schon so alt bin, jetzt wäre alles so leicht und schön bei diesem guten Licht.' [...] Nur ein Druck auf den Schalter, und alles war hell. [...] aber dann kam die Stromrechnung zu jedem Haus - nun schaute die Sache anders aus. Alle machten ein langes Gesicht - was hat das Petroleumflascherl gekostet, und was sollten wir jetzt zahlen!"*

(geb.1907) in Weyer: *„Als das erste Mal das Licht aufstrahlte, liefen mir die Tränen der Freude über die Wangen."*

(geb.1929) in Peuerbach: *„Ich musste als Lehrerin 1949/50 in Kriegwald, Gemeinde Julbach, meine Vorbereitungen noch bei Kerzenlicht schreiben."*

(geb. 1919) in Pettenbach: *„So erblickte ich eines Tages in Pettenbach ein kleines Plakat mit der Aufschrift, Koche elektrisch'. Ungläubig staunte ich über diese ominöse Ankündigung."*

THANK YOU

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