



# Ethiopian power sector Progress briefing Washington DC

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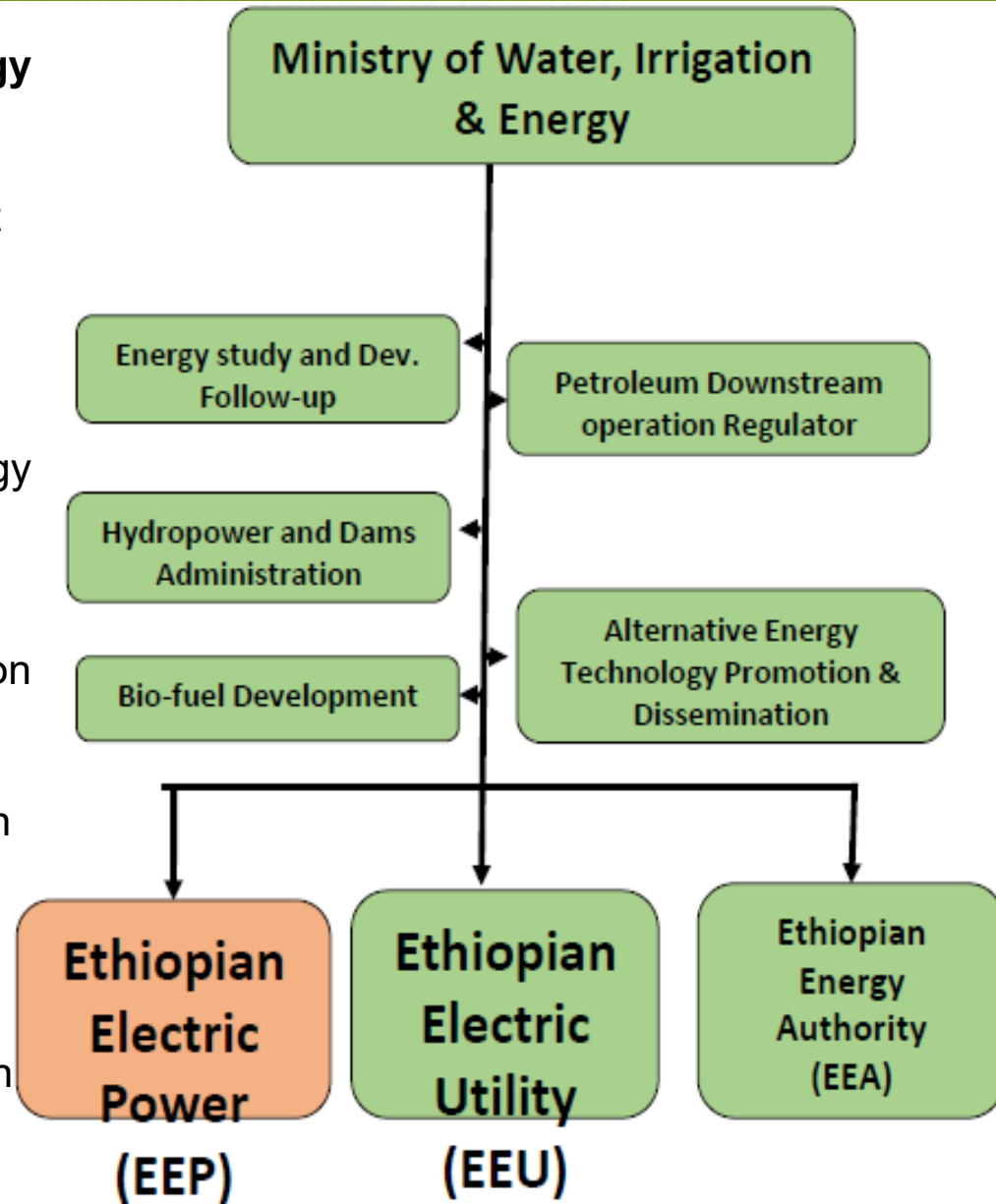
# Brief Facts about Ethiopia

- Ethiopia, in the Horn of Africa, is a rugged, landlocked country split by the Great Rift Valley. With archaeological finds dating back more than 3 million years . Land of Lucy – origin of human.
- It is bordered by Djibouti, Eritrea, Kenya, Somalia, South Sudan, Sudan, and Somalia. **Ethiopia** covers an **area** of 1,126,829 km<sup>2</sup>
- Population : More than 105 Million
- Federal State
- Addis Ababa is the Capital city of Ethiopia
- Prime Minister: Abiy Ahimed ( Won 2019 Nobel Peace prize)
- Only country never colonized in Africa.
- 13 months of sunshine in a year
- Has own unique calendar in a world



# Ethiopian Power Sector institutional and regulatory Framework

- **Ministry of Water Irrigation And Energy**
  - its responsibilities fall into three broad categories
  - Resource assessment and development
  - R & D
  - Regulatory and policy
  - It supervises
- **Ethiopian Energy Authority EEA**
  - Regulatory body for electricity and Energy Efficiency
- **Ethiopian Electric power EEP**
  - Mandated for Generation, Transmission and substation construction and operation
  - Bulk energy sale
- **Ethiopian Electric Utility EEU**
  - Mandated for 66/45 KV sub transmission and substation operation
  - Distribution network construction and operation
  - Energy retail
  - Implementation of National Electrification Program





# Energy sector policy

The Energy policy envisages to meet the following broad objectives:

- Giving high priority to RE Development and follows **climate resilient green economy strategy**
- Considers **Hydropower as the backbone of the country's energy generation** and maximize its utilization ;
- Promoting and enhance other renewable energy sources development such as **solar, wind, geothermal** and bio-mass to increase RE mix there by Improving security and reliability of energy supply and be a regional hub for renewable energy.
- Enhancing **regional and global cooperation** in the energy sector to ensure exchange of know-how, information and transfer of technologies
- **Strengthening cross boarder energy trade.**
- Increasing access to affordable and adequate modern energy.
- Promoting efficient, clean, and appropriate energy technologies and conservation measure.
- Improving the **energy efficiency of systems** and operations.
- **Strengthening energy sector governance** and build strong energy institution
- Ensuring environmental and social safety and sustainability of energy supply and utilization, and gender mainstreaming.
- Ensuring Capacity building and technology transfer
- Strengthening Energy Sector Financing.
- Exploring for natural gas and other hydrocarbon fuels
- Encourages **Public-Private Partnership** in energy generation



# Energy regulations and strategies

- Energy proclamation (810/20213)
- Energy Regulation
- Geothermal resource Development proclamation (981/2016)
- Public private partnership proclamation (1076/2018)
- National Electrification strategy
- Ethiopian Climate Resilient Green Economy strategy



# Indigenous Resources

Resource	Unit	Exploitable Reserve	Exploited Percent
Hydropower	MW	45,000	<5%
Solar/day	kWh/m <sup>2</sup>	Avg. 5.5	<1%
Wind: Power Speed	GW m/s	1,350 > 6.5	<1%
Geothermal	MW	7000	<1%
Wood	Million tons	1120	50%
Agricultural waste	Million tons	15-20	30%
Natural gas	Billion m <sup>3</sup>	113	0%
Coal	Million tons	300	0%
Oil shale	Million tons	253	0%



# Renewable energy potential and geographical Distribution

## Hydro

- Ethiopia's plentiful hydropower resources are distributed in **nine major river basins** and their innumerable tributaries is estimated to generate an economically affordable energy of about 260 TWH.
- However, less than 5 % of the potential has been exploited so far.

## Wind

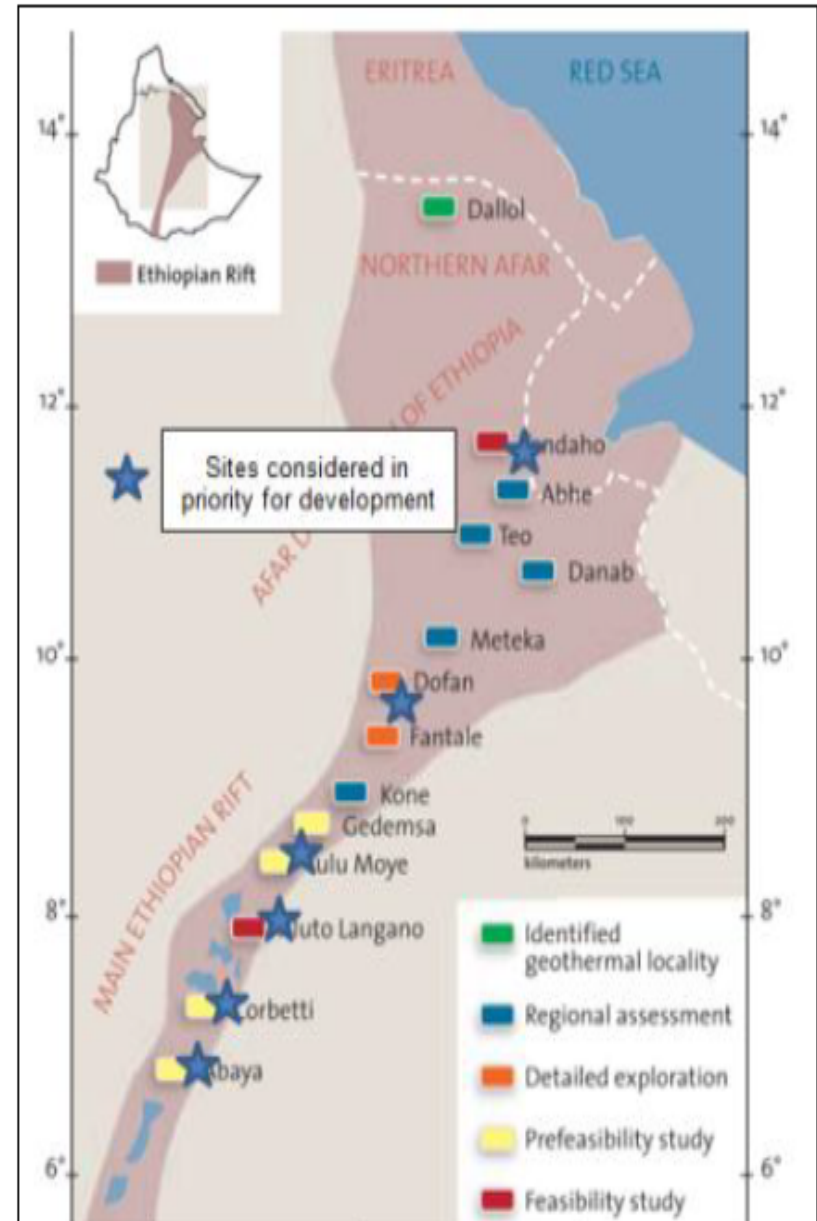
- Ethiopia has total wind energy resource reserve of 3,030 Giga Watt and the potential exploitable quantity of is 1,350 Giga Watt.
- For technical and economic reasons appropriate wind regions for grid-based electricity generation are those with wind density of 300W/m<sup>2</sup> (wind speed 6.5 m/s) and above. Ayisha in the Eastern part of the country has good potential.

## Solar

According to the revised Master Plan, Ethiopia's average solar energy potential is 5.5 KWh/m<sup>2</sup>/day and mainly **centralized in the north part of the country** in Tigray and Afar regions.

## Geothermal

- The **best** perspective areas are distributed **along the Ethiopian Rift valley** system which runs for more than 1000 km from the Afar depression, at Red Sea to the Turkana depression southwards (NE-SW to N-S direction).





# Current status of Electric Energy Development in Ethiopia



**Generation  
4300 MW**

**Transmission  
12,825KM**

**Substation  
145**

**Distribution  
150,000km**

**Customers  
3.2M**

**Totally Generation plants under  
Construction and commissioning  
stage**

**> 8,000 MW**

- **Grand Ethiopian Renaissance dam**
- **Koysha dam**
- **Genale Dawa dam**
- **Aysha wind etc**





## Overview of Electrification in Ethiopia Before 2005

- The electrification rate was very low, below 10% access.
- Only about 690 cities and towns were electrified in the country
- The access was also non-uniform, i.e. It was limited to Addis Ababa and big towns around central part of Ethiopia
- The large population of Ethiopia (about 90%) were without any access to modern Energy.
- Government of Ethiopia(GOE) realized that lack of access to modern energy is a severe constraint to development.
- Improving access to electricity is thus essential for poverty reduction.
- To break the limitation of low access, the Federal Democratic Republic of Ethiopia, launched an ambitious electrification program, Universal Electricity Access Program (UEAP) in July 2005



## Achievements of UEAP

- An impressive electric infrastructure development
- Construction and upgrading of 58 substations and construction of 1395km, of 132kv and 522km of 230kv transmission lines completed.
- Totally, 7012 towns and villages are electrified through out the country.
- Local Capacity building in construction and manufacturing sectors
- Job opportunities for citizens



# National Electrification program

## Last mile paradox



- The expansions of the networks have not been accompanied by an equal effort to increase HH Connectivity, Pointing to the need for review and conducting modification on an ongoing basis which we have found necessary to resolve the last mile paradox.
- In 2015 with the Support of World bank, the GOE had conducted a Sector wide review and gap analysis and Challenges of the National Electrification Program had been appreciated by comparing the context underpinning the Ethiopian Electrification Program and best Practices of other Countries.
- Based on gap analysis conducted a National Electrification strategy (NES) was formulated in 2016.
- The NES has Supported Ethiopia to effectively manage the sector transition and better organize, Plan and implement a more rapid expansion of electricity services to Urban and rural HHs, businesses and Public services throughout Ethiopia.
- Following the release of the Ethiopian National Electrification Strategy (NES) and reflecting on its recommendation, Ethiopian's first National Electrification Program (NEP1) was launched in 2017.



# National Electrification Program

## Achievement of NEP 1



- NEP 1 is addressing last mile paradox problems
- ELEAP ( National electrification program of Ethiopia financed by World Bank) is supporting the implementation of the NEP 1, with a focus on scaling-up electricity connections in areas within the network reach. ELEAP has three pillars:
  - **Pillar 1 (densification)** as well as increasing access to specific targeted off-grid technologies
    - **About 160,000 HHs are connected up to know and procurement of service drop materials for about 1M HHs connections is in progress**
  - **Pillar 2 (public programs supporting stand-alone solar systems and mini-grids).**
    - **12 pilot solar mini grids contract is signed and implementation under way.**
    - **25 additional solar mini grids which is financed by AfDB and GOE is under design and bid preparation stage**
    - **250 solar mini grids solar under feasibility study stage.**
  - **Pillar 3** is focused on **sector capacity and institutional reform**. While national energy planning is often focused on increasing the supply of electricity, limited attention is given to gender and citizen engagement aspects, for example women's employment issues, gender-based violence, public consultation on service quality or re-training staff to adopt consumer-centered approaches.
    - **EEU conduct institutional review on GBV**
    - **Conducted training on GBV**
    - **approved social horsemint code of conduct**
    - **Approved SH grievance redress mechanism/GRM/**



## Current Grid & Off Grid Connection Status

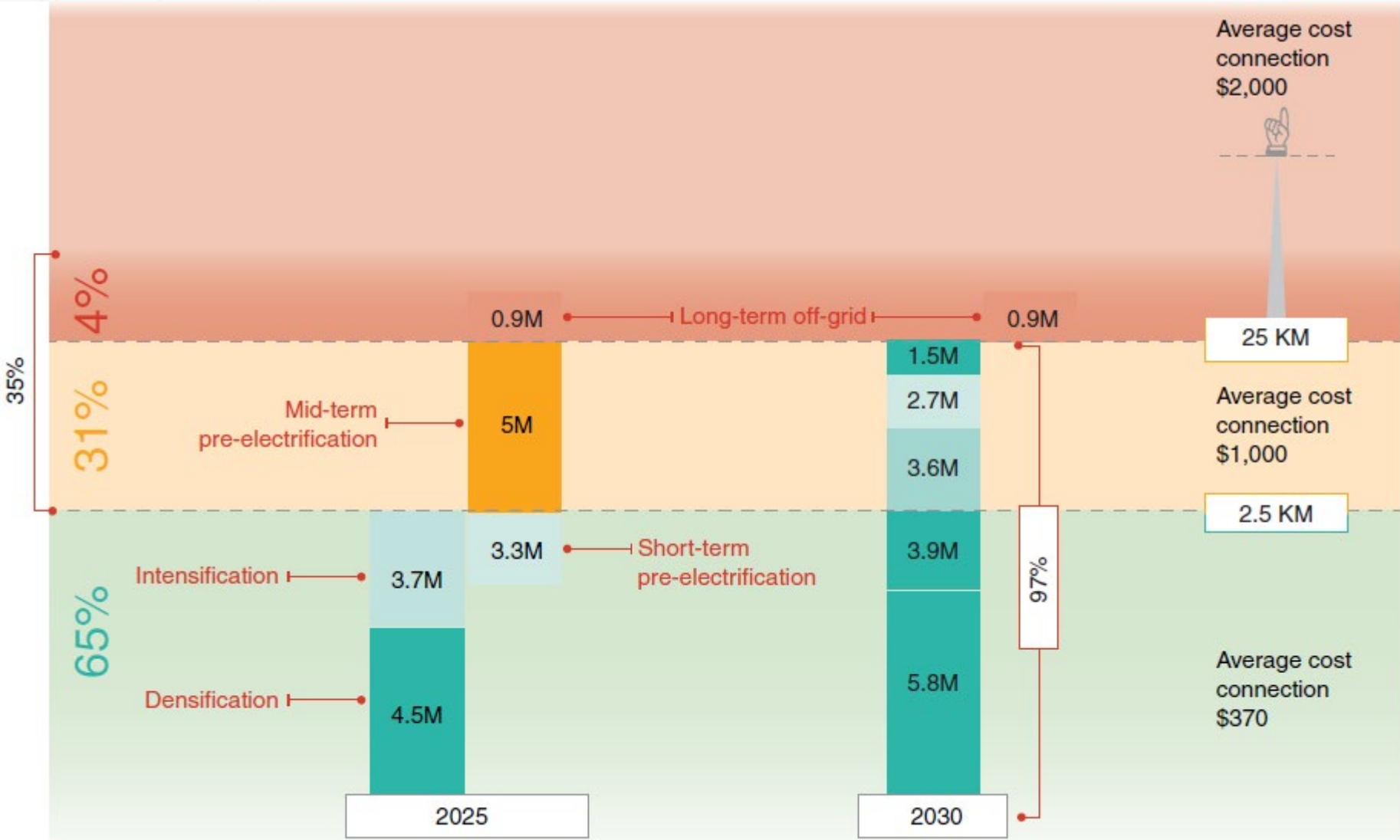
No	Connection Types	Total House Hold Connected (in Millions)	Access Rate
1	Grid	6.6	33 %
2	Off- Grid	2.2	11 %
Total		8.8	44 %

## Grid and Off-grid connection program for universal access (2019–2025.C)

No	Connecti on Types	Total to Be Connected ( In Million House Holds	Total Access Rate to be achieved
1	Grid	15.1	65 %
2	Off Grid	8.1	35 %
Total		23.2	100 %



# National Electrification program NEP 2 integrated grid and off grid components

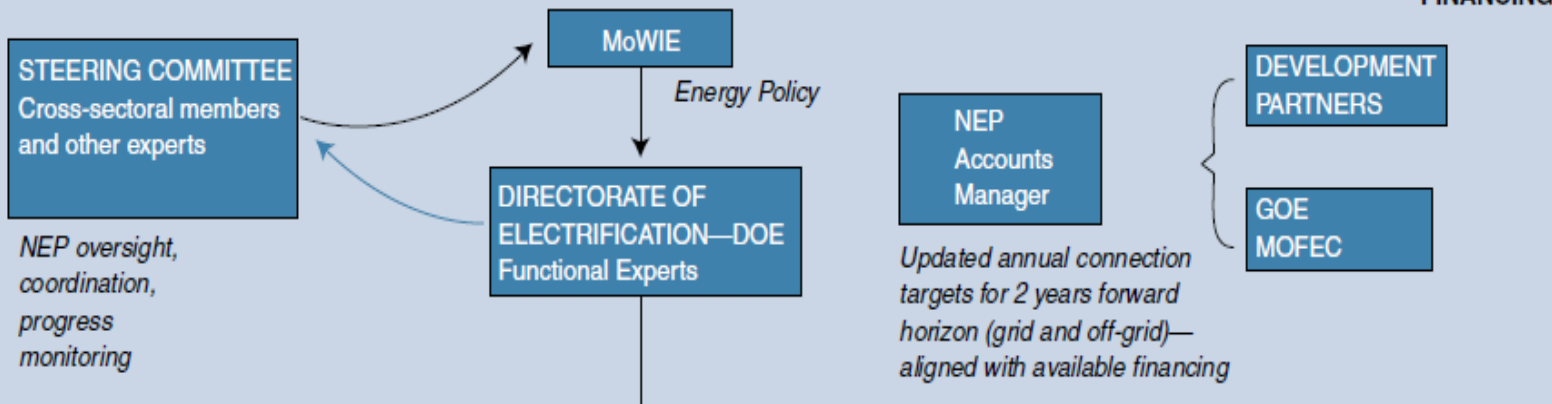




# National Electrification program NEP implementation framework



## POLICY

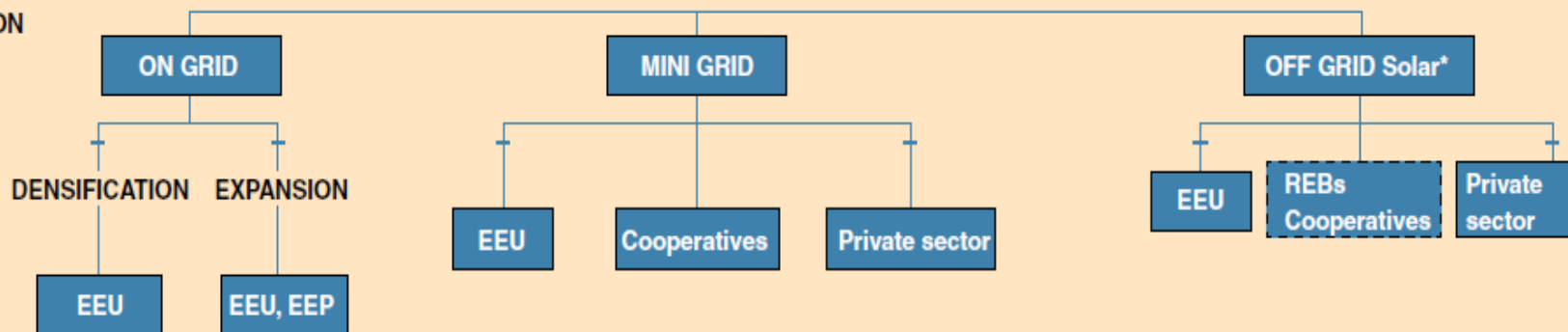


## LICENSING & REGULATION (grid & off-grid)

*Economic, technical, social, environmental regulation and safeguards*



## IMPLEMENTATION



## BENEFICIARIES

HH, communities, health and education facilities, water systems, public institutions, industries and businesses



# National electrification program

## Financing requirement



- **The National Electrification of Ethiopia is being financed by GOE and Development partners**
- **Since the launching UEAP, a total budget of ETB 16.6 Billion in local currency and USD 496.7 M in foreign currency has been utilized**  
**Total equivalent to USD 1.07Billion**
- **The foreign currency component is financed by development partner institutions like (World Bank , AfDB, BADEA, OFID, Kuwait fund, Saudi fund, bilateral institutions.**
- **The financing requirement to implement NEP 2 is estimated:**  
**USD 4.65 Billion**





## To effectively implement NEP 2 and achieve 100% Electric access by 2025, EEU has also embarked on substantial institutional capacity reforms.



- Implementation of ERP system to improve efficiency of internal process and customer service delivery
- Rehabilitation and upgrading of existing distribution networks to improve electric supply reliability, electric power loss reduction and to create additional network capacity to connect new business and HHS.
- Implementation of SMART metering (AMI and CRM) to increase energy reading accuracy and improve revenue collection efficiency and reduce technical energy losses.
- Implementation of IFRS and FAIR system to ensure proper accounting and financial Management.
- Development of Geo spatial platform to enhance Planning and system designing capabilities.
- Tariff adjustment

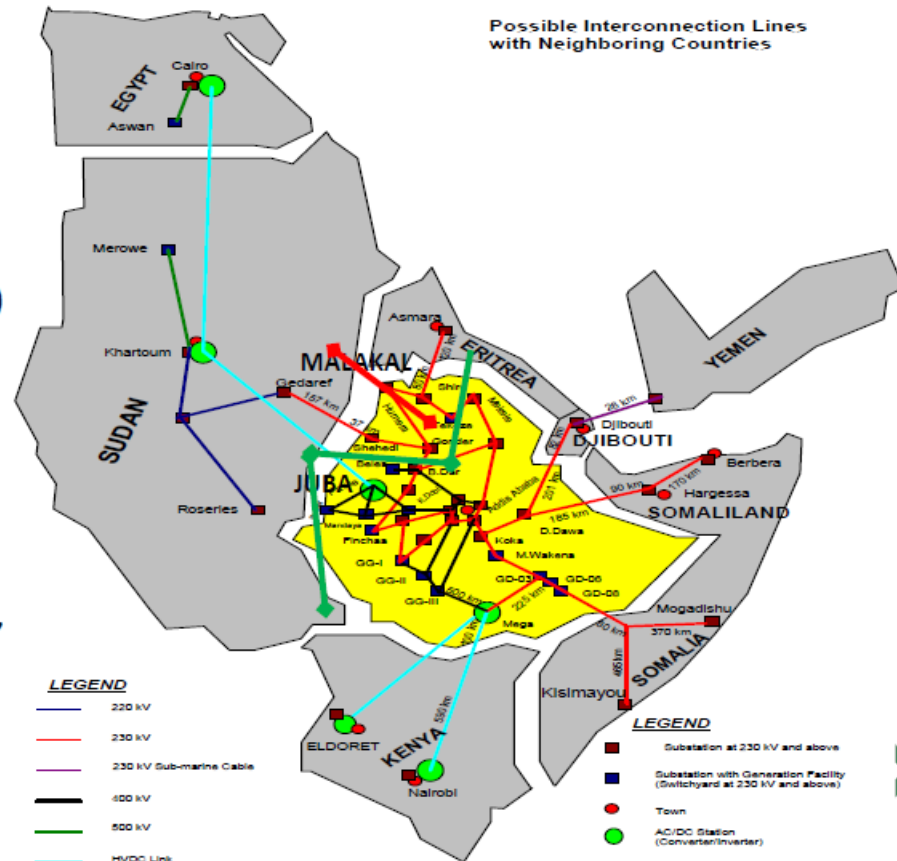


# Energy Export Market in Ethiopia

## Over view of existing and planned inter connections



- Ethiopia is already connected to Sudan, Djibouti and the Border towns of Kenya.
- Ethiopia – Kenya 500 KV D.C. line under construction (up to 2000 MW) ;
- Exports to Egypt 2000 MW and additional 1200 MW to Sudan are planned for implementation soon.
- MoUs signed to Exports to Tanzania, Rwanda, Burundi, South Sudan and Yemen





# Opportunities for private participation

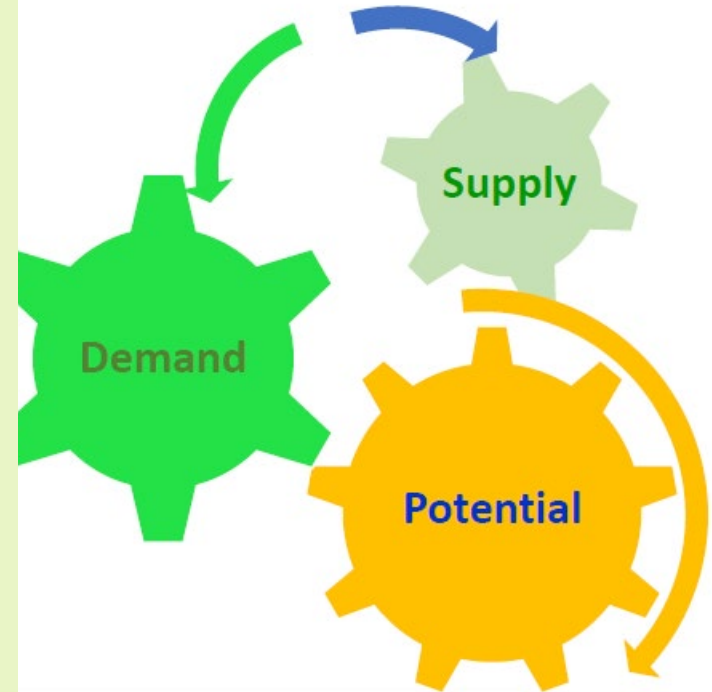


- Historically private participation in Ethiopian power sector was limited to supply of infrastructure materials , development of infrastructure on EPC modality and Consulting services
- **Under the recent Government reform initiatives private investors can be engaged in power sector:**
  - **through IPP investment modalities in power generation with out any limit through standardized energy auction scheme**
  - **Off grid solar (SHS,I institutional PVs), wind, solar and Hydro mini grids development and operation**
  - **EPC contract s (Distribution rehabilitation and upgrading projects, distribution automation and AMI projects, Solar mini grid projects etc)**
  - **Consulting**
  - **Manufacturing of infrastructure equipment and materials**
  - **Supply of technologies**



# Opportunities for private participation (Contd)

- Ethiopia's hydro potential 45GW constitutes 20% of Africa's technically feasible potential
- With this potential Ethiopia is Usually referred as a power house of Africa
- How ever Ethiopia has utilized less 5% of this potential
- Currently load / energy demand is growing at rate of more than 20% per annum: Major consumers :
  - Transport sectors ( Rail ways)
  - industrial parks development
  - Large scale housing program
  - agriculture and agro processing sector
  - National electrification ( from current 44% access to 100% access by 2025)
    - services sector etc
    - Power export Market
- Huge infrastructure investment requirement which could not be mobilized from public resources only
- Government is opening the opportunity for private sector to fill the gap





# Enabling legal and institutional frame works for IPP and PPA



With the overall intention of creating favorable investment environment and attracting private investment in the infrastructure development, GOE ;

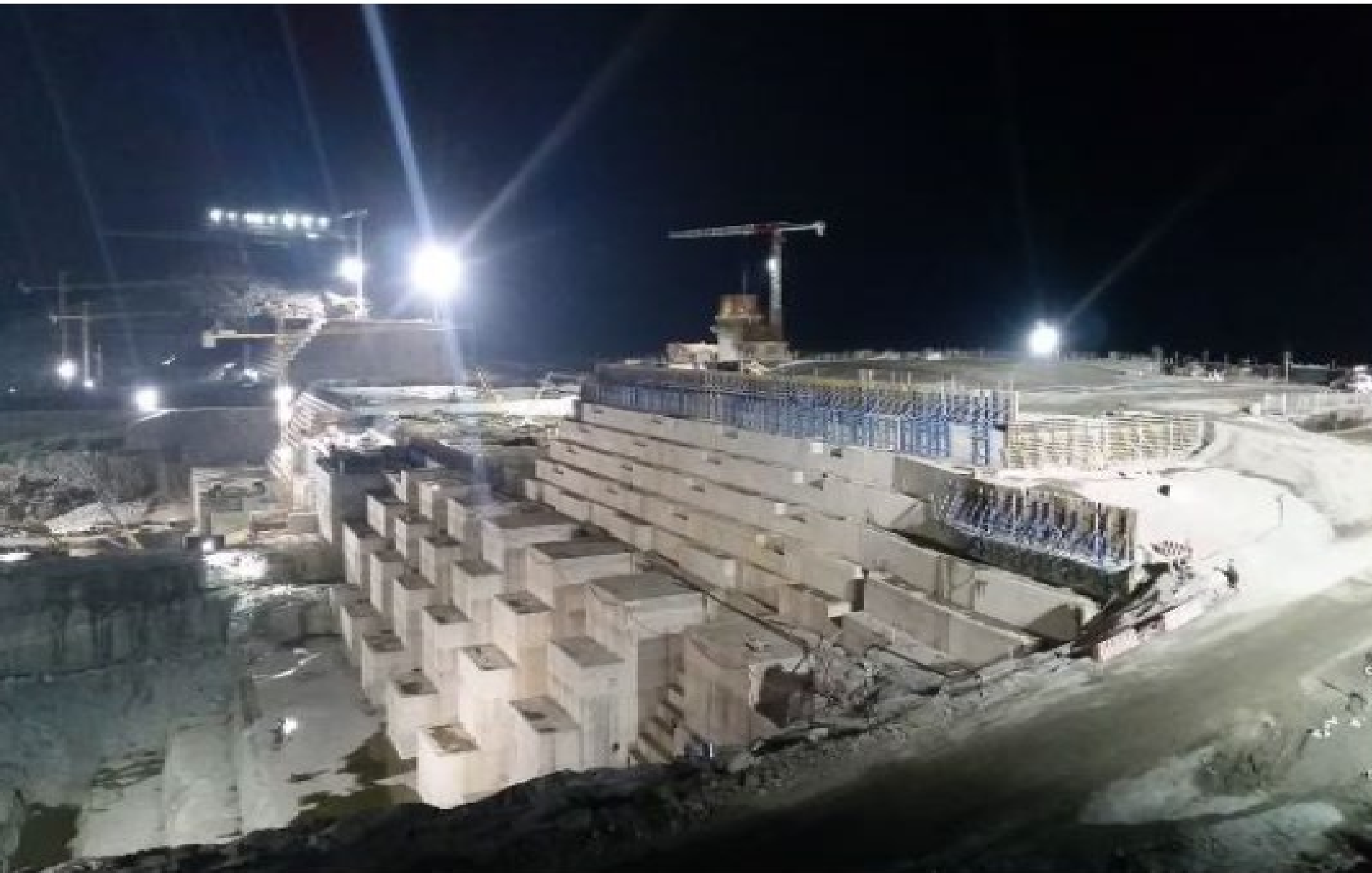
- Has developed and ratified by parliament PPPA law in 2018
- Following ratification of the PPP proclamation detailed directives and guidelines have been developed
- PPP Board has been set up and PPP directorate general (DG)-a unit (within Ministry of Finance) that looks after the operations and functions of PPP programs-has been established;
- PPP Teams have been created within the Contracting Authorities to help liaise with PPP DG; these all complete the institutional framework for PPP.

key elements of the PPP proclamation are:

- Scope and Application
- Roles and Responsibilities
- Process (Approvals, Procurement)
- Applicable Law, Possible government support



# Partial view Grand Ethiopian Renaissance dam under construction





# Installation of off grid PV system



Thank you



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