

# Experience with Grid and Off-grid Rural Electrification in Myanmar

By

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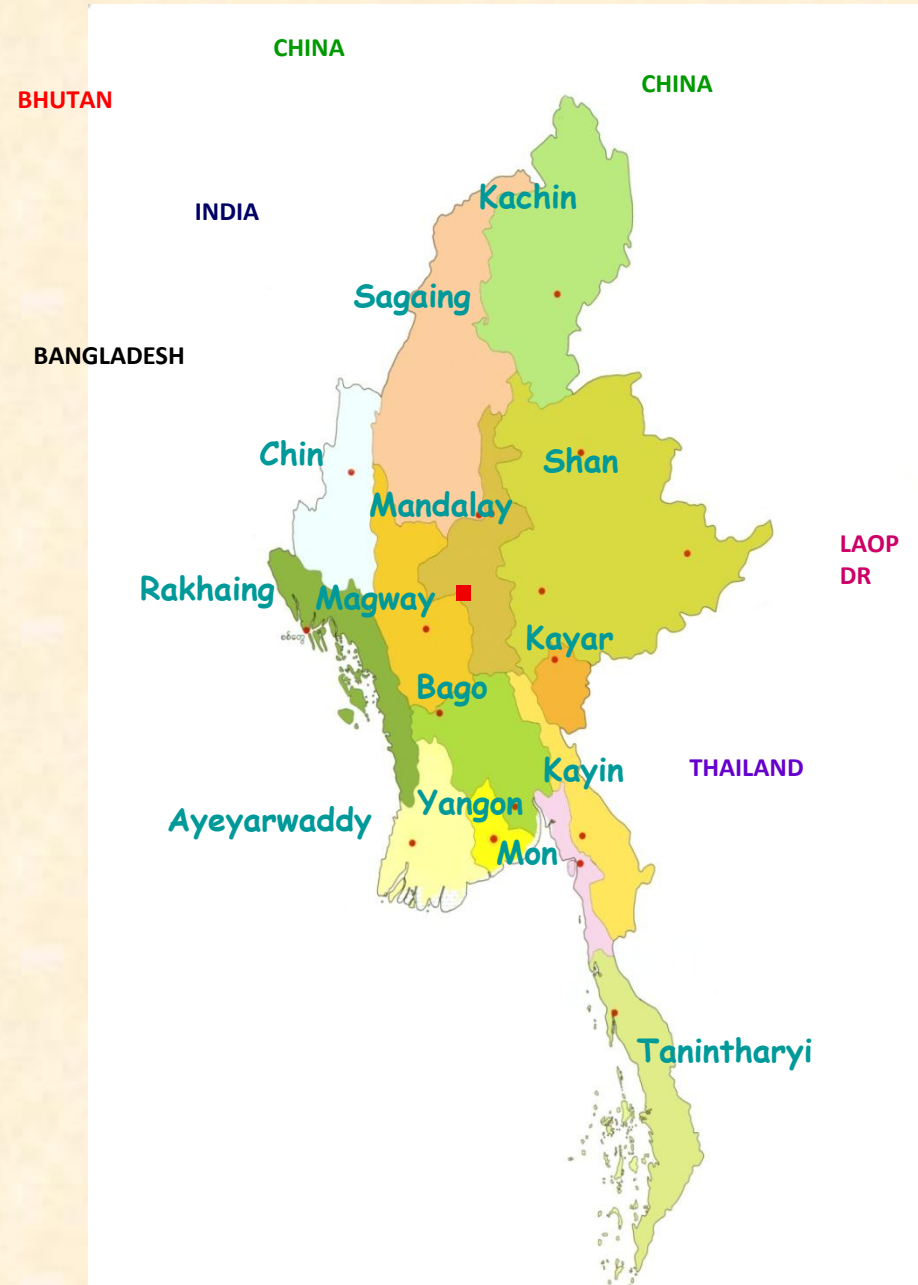
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# COUNTRY PROFILE

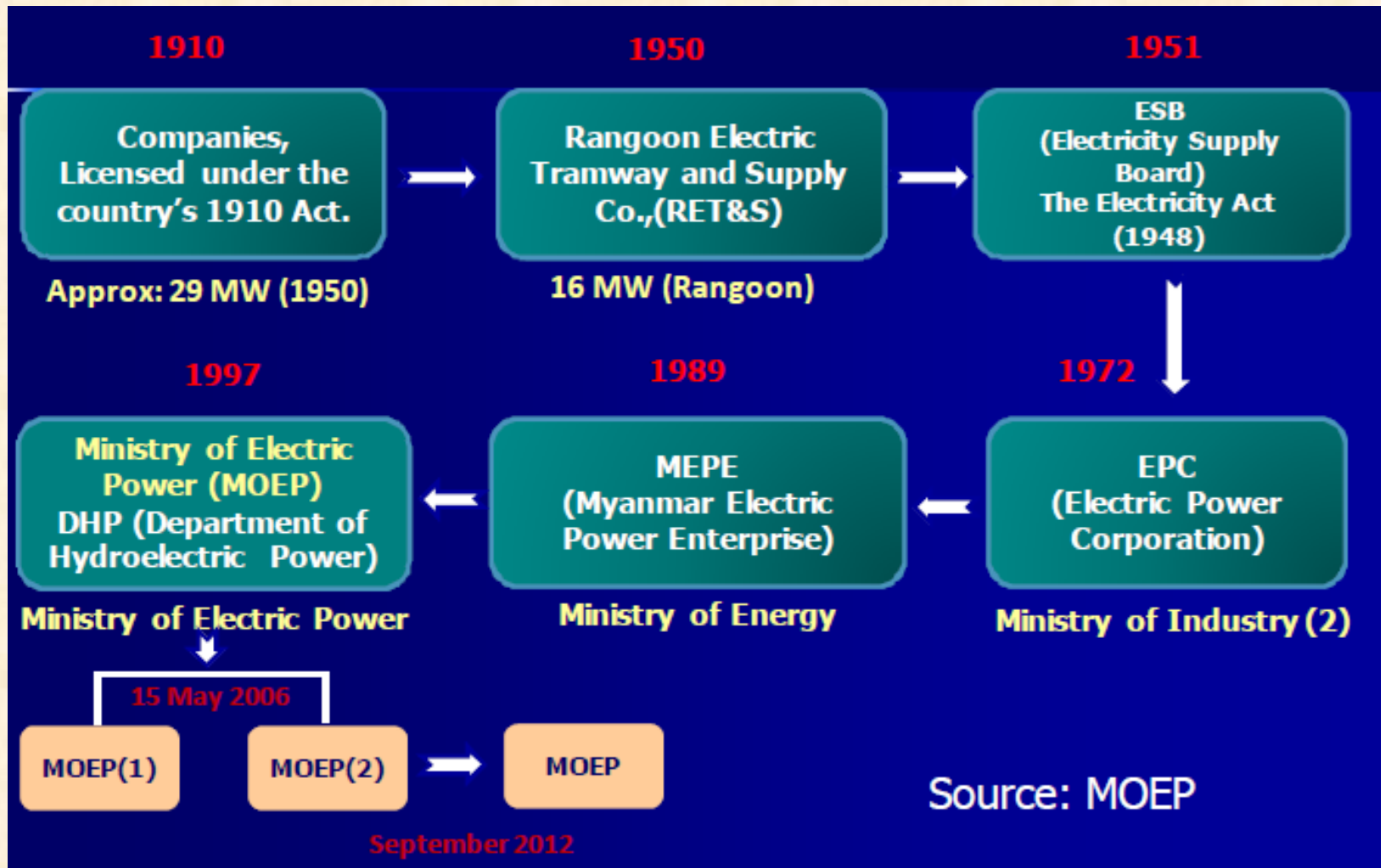


## Overview

- **Total land area:** 677,000 square km
- **Borders Countries:** China, Thailand, Lao PDR  
India & Bangladesh
- **Capital:** Nay Pyi Taw
- **Population:** 57 millions
- **State and Region:** 7 States and 7 Regions



# History of MOEP



## □ Rural Electrification Access

No. of inhabited villages	: 62218
Electrified villages (on-grid)	: 2765
Electrified villages (off-grid)	: 14195
Un-electrified villages	: 45258

## □ Five Year Plan by MOEP

2013-14	2014-15	2015-16
3575	4116	4793 (villages)

□ Total Installed Capacity	: 3614.9 MW
- Hydro (20)PPs	: 2780 MW
- Gas and Thermal	: 714.9 MW
- Coal	: 120 MW
□ Off-grid	
- Diesel	: 63.02 MW
- Mini-hydro	: 33 MW
- Biomass	: 3.72 MW
□ Maximum Demand for 2012	: 1850 MW
- Yangon Area	: 917 MW
- Mandalay Area	: 296 MW
- Nay Pyi Taw Area	: 96 MW
□ Power Generation in FY 2011/12	: 10450.16 GWh
- per capita consumption	: 131 kWh (WB,2009)

- **Electrification Ratio in 2011** : 26 %
  - Yangon Region : 64 % (Max.)
  - Rakhine State : 6 % (Min.)
- **Electricity Tariff**
  - Households, domestic : 35kyats/kWh  
(4.1USCents/kWh)
  - Industry : 75kyats/kWh  
(8.8USCents/kWh)
  - Foreigners : 12USCents/kWh
  - Off-grid : 100 ~ 300 kyats/kWh  
(11.7 ~35.2USCents/kWh)

- Length of Transmission Lines : 9658.38 km
  - No. of Substations : 185
- Length of Distribution Lines : 27766.56 km
- Demand Forecast
  - 2011-12 1588MW (Increased rate – 15.8%)
  - 2012-13 1850MW (Increased rate – 16.49%)
  - 2013-14 2128MW (Increased rate – 15%)
  - 2014-15 2447MW (Increased rate – 15%)
  - 2015-16 2814MW (Increased rate – 15%)
- Future Power Generation
  - Hydro - 65 Nos. (38601 MW)
  - Coal - 2 Nos. (606 MW)

Small scale applications of renewable energy to provide RE are already in some rural areas of Myanmar. The schemes include mini-hydro, biomass and solar power. They are mostly operated by VECs (Village Electrification Committee). RE plays a key role in reducing “The Rural-Urban Divide”. The benefits are shown to be:

- Increased standard of living
- Improved security and hygiene
- Higher educational achievement
- Improved economic output from cottage industries
- Cheaper operational costs than diesel generated power
- Improved water supply through ability to pump



## □ Small Hydropower

- It can feed both on-grid and off-grid
- 32nos of small and mini-hydros (<100kW) by ESE
- more than 30nos of village hydro (<20kW) by private
- pico-hydros (<1kW) are installed and operated by local
- Myanmar has own technologies for small hydros
- Mini hydro power plant is installed at the drop structure which has enough water head and flowing water rate to generate hydro power.
- The required flow rate to operate turbine is as small as  $0.1 \sim 0.5 \text{ m}^3/\text{sec}$ .
- Propeller type turbine was selected for low head plant
- The working head is  $1.0 \sim 2.0 \text{ m}$ .



## □ Solar Power

- Electricity from the sun is quite abundant in most of the countries to meet basic electricity needs of a rural community.
- Myanmar is a land of plentiful sunshine, especially in central and southern regions of the country.
- Solar power can apply to RE with Battery Charging Stations (BCS) and Solar Home System (SHS)
- Generate only day time, output drops to half in cloudy days.
- BCS and recycling batteries have already been existed.
- Initial capital cost is high.



## □ Wind Power

- Output is changing time to time
- Generally, wind power potential is LOW.
- However, coasts of Rakhine and Tanintharyi, wind corridor inland and western edge of Shan State, have certain amount of wind power potential (<math><3\text{m/s}</math>)
- It should be suitable to use small capacity
- Due to the expensive initial cost, use of wind energy in Myanmar is at the very initial stage.



## □ Biomass Power

- In Myanmar, biomass includes firewood and charcoal, aged rubber trees, rice husk, bagasse (waste of sugar cane after squeezing), wood chips and sawdust from sawmills, cob and stalks of maize, bean stalks, reed, cow dung, etc.
- Rice husk, bagasse and wood chips are used for power generation.
- Myanmar has own technology for biomass gasification.
- If fuel (rice husk and wood chips) supply is secured, power generation would be adjusted to meet the demand up to about 50kW.
- It is important to locate the biomass plants near fuel sources
- Biomass Resources in Myanmar are:
  - Rice Husks :  $4,392 \times 10^3$  ton/yr
  - Lumber waste : 1.5 million ton/yr
  - Bagasse :  $2,126 \times 10^3$  ton/yr

**In conclusion, Electrification Ratio in Myanmar is lower than other neighboring countries.**

**Therefore, by adopting new Electricity Policy, the government is making effort to generate sufficient electricity and to reduce 'Rural-Urban Divide'.**

**Moreover, Myanmar possesses a plenty of renewable energy resources that can support the electricity for rural areas.**

**I believe that we will get the useful knowledge in acquiring the electricity of rural areas from the technicians who attend this workshop.**

**THANK YOU**