The Role of Renewable Energy in Myanmar’s Future Energy Mix

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Tint Lwin Oo, Deputy Director,
Hydro and Renewable Energy Planning Branch,
Department of Electric Power Planning
tintlwinoo204@gmail.com
Electricity Master Plan and Policies

- **Myanmar Energy Master Plan (ADB + MOE(NEMC))**
  - To provide the supply strategies through viable energy mix scenarios
  - To secure the stable and reliable energy supply in the long term view
  - To ensure the efficient use of energy resources,
  - To create effective investment environment,
  - To employ innovative technologies
  - To minimize the environment and social impacts.

- **National Electricity Master Plan (JICA+MOEP) (Currently under updating)**
  - To formulate the national electricity plan up to 2030/31
  - To get the stable and strong power system
  - To get the least cost energy
  - To transfer technical to the counterparts

- **National Electrification Plan (WB+MOEP+MOLFRD)**
  - To electrify the whole country in 2030-31
  - Approved on Nov,2015
  - Implement solar home(500000 HH)and mini grid(35000HH) up to 2020-2021

- **“Renewable Energy Policy”** prepared by Department of Research & Innovation is under pending
National Energy Policy of Myanmar

- no National level Management Institution after NEMC (National Energy Management Committee)
- National Energy Policy with ten salient points is under reviewing

The main points on Renewable Energy Sector,

- In extraction and utilization of natural resources,
  - To minimize the environmental impacts
  - To invite the local and foreign investments
  - To carry out CSR
- for defining the energy pricing
  - To observe the ASEAN and international energy pricing policy
  - To ensure stable and fair price for consumer
  - To guarantee the economic benefits for energy producers and energy distributors
- In getting more generation,
  - to generate electricity not only from hydro, renewable and thermal power plants but also from other available energy resources.
- To be planned for increasing of reserved power
- To be fulfilled electricity demand of off-grid areas
Current Energy Mix by Capacity

- **Coal**: 3% (120 MW)
- **Hydro**: 61% (3221 MW)
- **Gas**: 36% (1919 MW)

May, 2017
Demand Forecast for 20 years period (2011-2030)

- conducted by the assistance of JICA

Demand Forecast Results

- Low Case
- High Case

3075 MW (23.5.2017)
Demand Forecast for 20 years period (2011-2030)

National Electricity Master Plan (Previous Version)

Conducted by the assistance of JICA

**Target**

- 50% to be Electrified in 2020
- 75% to be Electrified in 2025
- 100% to be Electrified in 2030

### 2015-2016

- 3,158 MW (63%)
- 1,623 MW (32%)
- 120 MW (3%)
- 101 MW (2%)

### 2020-2021

- 4,721 MW (54%)
- 1,969 MW (22%)
- 1,623 MW (32%)
- 120 MW (3%)
- 101 MW (2%)

### 2030-2031

- 8,896 MW (38%)
- 4,758 MW (20%)
- 2,000 MW (9%)
- 7,940 MW (33%)

### 2035-2036

- 2015 MW (2%)
- 8,815 MW (50%)
- 120 MW (3%)
- 101 MW (2%)

### 2040-2041

- 50% to be Electrified in 2020
- 75% to be Electrified in 2025
- 100% to be Electrified in 2030
To achieve System stable and Secure energy

Which resources should be filled or suitable?

Can RE generate to Full fill Power shortage?

If can, Is Power System stable?

If not, may it need realistic Generation Mix?

REs are rapidly expanding on global Level. We need to study technical knowhow.
Hydro Power Resources Potential in Myanmar

**Resources**

- **Total**: 108,000.00 MW
- **Already Investigated**: 46,330.55 MW (302 Nos)
  - < 10MW: 231.25 MW (210 Nos)
  - 10 MW ~ 50 MW: 806.30 MW (32 Nos)
  - > 50 MW: 45,293.00 MW (60 Nos)
- **Already Installed**: 3,231.50 MW
  (3% of Resources)
  (7% of Investigated)

### Region Numbers of Potentials Capacity (MW)

<table>
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<tr>
<th>Sr</th>
<th>Region</th>
<th>10~50 MW</th>
<th>&gt;50 MW</th>
<th>Capacity (MW)</th>
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<td>538.0</td>
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<td>3</td>
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<td>12</td>
<td>&lt;10MW</td>
<td>210</td>
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<td>231.25</td>
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</table>

**Total**: 302, 46,330.55 MW
Existing Hydropower Plants

- Thapanzeik (30) MW
- Sedawgyi (25) MW
- Kinda (56) MW
- Myinhtar (40) MW
- Thauk Ye Khat (2) (120) MW
- Mone Chaung (75) MW
- Kyeeon Kyeeewa (74) MW
- Kabaung (30) MW
- Phyu Chaung (40) MW
- Kun Chaung (60) MW
- Yenwe (25) MW
- Zaungtu (20) MW

- Chipwinge (99) MW
- Dapein (1) (240) MW
- Shweli (1) (600) MW
- Yeywa (790) MW
- Myogyi (30) MW
- Nancho (40) MW
- Zawgyi (2) (12) MW
- Zawgyi (1) (18) MW
- Upper Paunglaung (140) MW
- Kengtawng (54) MW
- Paunglaung (280) MW
- Baluchaung (1) (28) MW
- Baluchaung (2) (168) MW
- Baluchaung (3) (52) MW
- Shwegyin (75) MW

(27) Plants

- State Own (21)
- JV/BOT (3)
- BOT (2)
Existing Small Hydropower Stations

Small Hydropower Station (Off Grid)

- **32 Stations**, **33327 kW** of installed capacity
  - Largest Station is NantKhamKha (Kachin State)
    - Installed capacity is **4750 kW**
  - Smallest Station is Palettwa (Chin State)
    - Installed capacity is **50 kW**

Nant Kham Kha
- 4750 kW (Francis turbines)
  - Kachin State

Htwesaung
- 164 kW (Francis)
  - Chin State

Nga sitva
- 1000 kW (Francis)
  - Chin State

NanLap
- 480 kW (Francis)
  - Shan State
Planned Solar Power Projects

- Nabuaing (Myingyan) 150 MW
- Wundwin (Meikgtila) 150 MW
- Shwemyo 10 MW
- Sagaing, Mandalay 880 MW
- Min Bu 170 MW
- Thapyaysan 100 MW

Total: 1460 MW

MoU Stage (990 MW)
PPA finished (470 MW)
### Planned Floating Solar Projects

- **Land Cost**: No.
- **Installation Cost**: Higher compared to land-based systems.
- **Evaporation Rate**: Reduce 70%.
- **Efficiency of Solar Panel**: Increase.
- **Water Quality of Dam**: Improve.
- **Cleaning of Solar Panel**: Easy.
- **Installation Time**: Less.
- **TL & SS to access Grid**: No Need.

#### Floating Solar Pilot Project

- **Location**: Phyau Township, Bago Region
- **Dam Type**: Rock fill Dam
- **Annual Rainfall**: 2500mm
- **Storage Capacity**: 1190 million Acre/ft
- **Installed Capacity**: 100 kW
- **Collaborated Organization**: Norway Power Co., Ltd.
- **Site Survey**: 31.3.2017

**Proposal**
- **Phase 1**: 100 kW
- **Phase 2**: 5900 kW
- **Phase 3**: Depend on FS
Planed Wind Power Projects in Myanmar

MoU finished (6508 MW)

MoA finished (30 MW)

Total: 6538 MW

Chin, Rakhine, Ayeyarwaddy, Yangon
3648 MW

Rakhine, Ayeyarwaddy, Yangon
830 MW

Chaung Thar
30 MW

Shan, Kayah
1000 MW

Tanintharyi, Mon, Kayin
1000 MW
Potential Biomass Energy

- 52.5% of total land area covered with forest potential available annual sustainable yield of wood fuel 19.12 million Cubic Ton

- Large amount of waste to generate energy (large city such as Yangon, Mandalay, etc.)

Pilot Project

- Yangon creates about 1,600 tones of garbage every day
- Yangon City Development Committee (YCDC) built a small waste-to-energy plant
- Jointed by Japan’s Ministry of Environment
- Constructed by JFE Engineering (Japan)
- Located in Shwepyithar Township, Yangon
- Commission in March, 2017
Challenges for RE

- **Legal Framework**
  - Electricity Regulatory Authority (ERA) was not founded.
  - Tariff Regulation was not established yet.
  - Renewable Energy Policy was not established yet.
  - Feed-in-Tariff?

- **Tariff**
  - Government Subsidize
  - Difficult to Increase Tariff
  - Tariff proposed could be high comparing to the current tariff.

- **Technical**
  - Intermittent condition
  - Myanmar National Grid System is not strong
  - Prior to solve to put into grid
  - Need new Based Load Power Stations and T/L & S/S.
In Myanmar, Electric Power Sector plays a vital role for the development of the Nation.

Since 37.8% of household are electrified, the rest of household need to electrify first.

Need to establish realistic generation mix to get the smart power system.

Opportunities to invest in renewable energy sector (installed capacity of hydro and renewable energy in 2030 will be 10896 MW, approximately (47%) of total capacity).

Since Myanmar has adequate energy resources and private sector has already invested in Power Sector, and hence we are willing to invest more by the local and foreign investors.

Need to study how to overcome the large RE connect to Grid on developed countries
Thank you very much
For
your Attention