The Role of Community Participation in Decentralized Energy Solution in Part of Thanlwin Watershed:
A Case of Community –owned Energy Solution in Ywar Ngan Area, Southern Shan
Outline

• A brief overview of Myanmar Energy Master Plan 2030
• Community-owned energy situation in twelve villages of Ywar Ngan Tsp, Southern Shan
• Potential alternative options
• Conclusion
Myanmar’s power sector reality

A) **National grid**: about 35% of the country area, have been developed under the centralization National grid.

B) **Off grid**: thousands of decentralized isolated mini-grids operated by local entrepreneurs, but most people remain without electricity.

C) **IPP for export**: about 46,000 MW of hydro power projects have been targeted for export.
Power consumption reaches peak in November

Submitted by Eleven on Thu, 11/23/2017 - 19:09
Writer: Sithu Aung

Myanmar’s power consumption reached its highest level at 3,189 megawatts (MW) on November 21, up 387 MW or a 13.8 per cent increase over the same period last year, said Dr Tun Naing, deputy minister for electricity and energy.
Myanmar power sector being shaped by foreign donors

<table>
<thead>
<tr>
<th>Sector Planning</th>
<th>Legal and Regulatory</th>
<th>Financial Sustainability</th>
<th>Transmission &amp; Distribution</th>
<th>Generation</th>
<th>Rural Energy</th>
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<tr>
<td>Analytical Basis for Strategic Decisions</td>
<td>EITI 1 Application Support (WB)</td>
<td>Financial Viability Action Plan (WB)</td>
<td>Distribution Improvement in Yangon (JICA)</td>
<td>New GTCC 2 for MEPE &amp; EPPs, PPP 3 Transactions (WB)</td>
<td>Off-grid power Program (ADB)</td>
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<td>Energy Master Plan for NEMC (ADB, Japan/JFPR 4)</td>
<td>Electricity Law &amp; Electricity Regulation (ADB Norway)</td>
<td>Strengthening Financial Management (Multi-donor)</td>
<td>4-region Distribution System Improvement (ADB)</td>
<td>Donated GT and Generators (ADB)</td>
<td>Rural Electrification Project (WB)</td>
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<td>Rural Electrification Law (AD)</td>
<td>Economic Valuation of Natural Gas in domestic mkt. (ADB)</td>
<td>Advisor for Yangon Electricity Supply System (JICA)</td>
<td>YESB-Corporatization Support through Investment and Advisory Support (WBG)</td>
<td>Environmental and Social Safeguard and Conservation (ADB)</td>
</tr>
</tbody>
</table>

Source: JICA, National Electricity Master Plan

1) EITI: Extractive Industries Transparency Initiative
2) GTCC: Gas Turbine Combined Cycle
3) PPP: Public Private Partnership
4) JFPR: Japan Fund for Poverty Reduction Program
5) GOT: Government of Thailand

Source: DEP
- 2.5-3.0 GW of new generation capacity will be needed only for modest, residential needs
- More will certainly be needed for commercial, industrial, other demands.
- This is approximately doubling current generation (~2.7 GW)

**Generation Capacity Needs**

<table>
<thead>
<tr>
<th>State</th>
<th>New Connections</th>
<th>Proposed Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ayeyarwady</td>
<td>1,082,000</td>
<td>395</td>
</tr>
<tr>
<td>Bago</td>
<td>688,000</td>
<td>251</td>
</tr>
<tr>
<td>Chin</td>
<td>112,000</td>
<td>41</td>
</tr>
<tr>
<td>Kachin</td>
<td>115,000</td>
<td>42</td>
</tr>
<tr>
<td>Kayah</td>
<td>27,000</td>
<td>10</td>
</tr>
<tr>
<td>Kayin</td>
<td>379,000</td>
<td>139</td>
</tr>
<tr>
<td>Magway</td>
<td>811,000</td>
<td>296</td>
</tr>
<tr>
<td>Mandalay</td>
<td>722,000</td>
<td>264</td>
</tr>
<tr>
<td>Mon</td>
<td>258,000</td>
<td>94</td>
</tr>
<tr>
<td>Nyapitaw</td>
<td>98,000</td>
<td>36</td>
</tr>
<tr>
<td>Rakhine</td>
<td>977,000</td>
<td>357</td>
</tr>
<tr>
<td>Sagaing</td>
<td>909,000</td>
<td>332</td>
</tr>
<tr>
<td>Shan</td>
<td>504,000</td>
<td>184</td>
</tr>
<tr>
<td>Taninthayi</td>
<td>325,000</td>
<td>119</td>
</tr>
<tr>
<td>Yangon</td>
<td>208,000</td>
<td>76</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7,216,000</strong></td>
<td><strong>2,636</strong></td>
</tr>
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</table>

**Demand Forecast Results**

The maximum power demand in Myanmar will vary from the minimum at around 9,100 MW to the maximum at 14,542 MW by 2030, forecasted based on macro analysis.

**Results of Demand Forecast**

<table>
<thead>
<tr>
<th>Region/State</th>
<th>FY2012</th>
<th>FY2030</th>
<th>FY2012</th>
<th>FY2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kachin</td>
<td>21</td>
<td>185</td>
<td>21</td>
<td>140</td>
</tr>
<tr>
<td>Kayah</td>
<td>8</td>
<td>162</td>
<td>8</td>
<td>130</td>
</tr>
<tr>
<td>Kayin</td>
<td>13</td>
<td>165</td>
<td>13</td>
<td>135</td>
</tr>
<tr>
<td>Chin</td>
<td>3</td>
<td>90</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>Mon</td>
<td>45</td>
<td>418</td>
<td>45</td>
<td>338</td>
</tr>
<tr>
<td>Rakhine</td>
<td>10</td>
<td>243</td>
<td>10</td>
<td>180</td>
</tr>
<tr>
<td>Shan</td>
<td>103</td>
<td>355</td>
<td>103</td>
<td>288</td>
</tr>
<tr>
<td>Sagaing</td>
<td>98</td>
<td>349</td>
<td>96</td>
<td>282</td>
</tr>
<tr>
<td>Taninthayi</td>
<td>52</td>
<td>290</td>
<td>52</td>
<td>235</td>
</tr>
<tr>
<td>Bago</td>
<td>131</td>
<td>646</td>
<td>131</td>
<td>523</td>
</tr>
<tr>
<td>Magwe</td>
<td>106</td>
<td>293</td>
<td>106</td>
<td>238</td>
</tr>
<tr>
<td>Mandalay</td>
<td>457</td>
<td>2,731</td>
<td>457</td>
<td>2,203</td>
</tr>
<tr>
<td>Ayeyarwaddy</td>
<td>85</td>
<td>406</td>
<td>85</td>
<td>329</td>
</tr>
<tr>
<td><strong>Yangon</strong></td>
<td><strong>742</strong></td>
<td><strong>8,209</strong></td>
<td><strong>742</strong></td>
<td><strong>4,019</strong></td>
</tr>
</tbody>
</table>

**Results of Demand Forecast by region/state**

* Demand data of each region/state except Yangon were provided by ESE
** The demand for SEZ is included in industry demand, the data of which were provided by MOEP.
Conceptual Map of Power Generation Development Plan

Source: JICA, Final Report: The Project for Formulation of the National Electricity Master Plan in the Republic of the Union of Myanmar, December 2014..
Typical centralized planners’ mindset
Power availability under National Electrification Plan (NEP)

- **Numbers of household that will be able to access to the electricity**
  6.75 million

- **Methods**
  1. Connect with National Grid
  2. Connect with Mini Grid
  3. Powered by solar, mini hydro, wind, diesel and hybrid (diesel + solar etc.) as pre-electrification.

- **Electrify by National Grid**
  99% of the households that is 50 km range from National Grid under this plan

- **Mini Grid, Solar Home System and others**
  1% is from mini grid, solar and others.

- **Planned to electrify 100% of the country by 2030**

Source: Thuya Aung Bo, Deputy Chief Engineer, ESE, Presentation “NEP in Chin State” March 2017.
### Table 9.1-12 Development Cost of Revised Scenario 3

<table>
<thead>
<tr>
<th>Item</th>
<th>2020</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Generation</td>
<td>13.8</td>
<td>55.2</td>
</tr>
<tr>
<td>Power System</td>
<td>2.7</td>
<td>5.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16.5</td>
<td>60.8</td>
</tr>
</tbody>
</table>

Note 1: Cost is not calculated from present value.
Note 2: O&M cost and Fuel cost is included.
Note 3: Transmission and Substation is included.

The World bank: National Electrification Plan

Least-cost recommendation for 2030

- By 2030, the majority are grid connections
- This represents 7.2 million households
- Total cost is estimated at US $5.8 billion (US$800 per connection, average)
- This is additional cost to investments needed for generation & transmission

Percentage of electrified villages (>70% household access to electricity):

grid vs. off-grid/mini-grid

Data source: DRD, End of 2015-2016 FY 70% Rural Electrification Village, May 2016
38,560 Villages Remain to be Electrified

- Of villages already “electrified” potential remains for upgrades or hybridization of existing MHP and diesel mini-grids, enhancement for productive loads

- World Bank estimates by 2021, **5.5M households** will remain without access to the national grid, 1.3 million are in the remote areas of Chin, Kachin, Kayin, Shan, Rakhine, Taninthayi and Sagaing

- Assuming average 200HH/village, **27,500 villages** are expected to remain off-grid by 2021

- Average rural HH spends US $7/month on fuel and lighting, assume 2021 off-grid residential market totals **$462M annually**

- Mini-grid market size will depend on village profiles (number and distribution of HHs, presence of local enterprise) and opportunities for collocation with SHS and national grid

Status of Village Electrification

- National Grid 6,918
- Generators 13,088
- Micro-Hydro 2,426
- Remaining Villages 38,560
- Biomass/Solar Biogas 1,232

Data Sources: Department of Rural Development 2015; World Bank NEP PAD 2015; Consultant Analysis

Community Participatory Approach for Off-grid Energy Solution: Decentralized energy in off-grid Areas

• In Myanmar 70% are using electricity with off-grid solutions
• In the off-grid areas, there are many mini-grids in Myanmar operating with electricity generation from solar, mini hydro, diesel and biomass
• There are many forms of mini-grids in many different scales of generation and investment depending on capacity of local people

(1) community own mini-grids,
(2) Private own mini-grids and
(3) Donation from the donor agencies such as NGOs and INGOs
Socio-economic benefits

After the village has electrified with mini-hydro;

• Less cost for other fuel charges
• Some villagers can cook with electricity that it reduce cost of firewood
• There is more energy for their agriculture and farming businesses
• In some villages, there are small scale enterprises or machinery were set up
Community-owned System at Tatgone Village, Ywar Ngan
Myaing village
50KW minihydro
Community-owned System
Mying Village
Integrated Resources (Land, Water and Forest) Management by community
Community Participation and Management
Resources (Land, Water, and Energy) by community owned management
Resources Management and community participation
Local made small business
Local made workshop by small hydro system
RURAL PICO HYDRO ELECTRIFICATION SCENARIO
3MW Nam Khun, Kyaing Tong
Kyi Thien Family Co. & Kyaing Tong Energy Co., Ltd.
Renewable Energy Potentials for Myanmar
Solar and Wind potential

- Solar PV resources are concentrated in the central “dry zone” of Myanmar

- Attractive wind resources are located in coastal areas of Rakhine, Ayeryarwaddy, Mon and Tanintyari, the western portion of Central Region and scattered areas of eastern Shan

- Renewable projects to model include
  - “Scheduled” new entry: several advanced solar PV projects that already have PPAs, as well as promising solar PV and wind projects
  - “Candidate” new entry: hypothetical wind and solar projects entering on plausible parts of the grid, given underlying resource locations and other factors
  - wind projects were deemed to be a year or two behind solar PV, given need to collect and analyze meteorological tower data; therefore, not much wind enters by the target year of analysis (2020)

Source: USTDA study “Renewables Grid Impact Assessment” 2017
Solar Power Projects in Myanmar

Sagaing, Mandalay
880 MW
Asia Ecoenergy Development, Primus

Min Bu
170 MW
Green Earth Power (Myanmar) Co., Ltd.

Thapyaysan
100 MW
Jewwoo Lightech + Investconsult Group & New Energy GmbH

Nabuaing (Myingyan)
150 MW
Convalt Energy Myanmar Co., Ltd.

Wundwin (Meikgtila)
150 MW
Convalt Energy Myanmar Co., Ltd.

Shwemyo
10 MW
Thinkhaypa Energy Service+ JADE IT

MoU finished (990 MW)

PPA finished (470 MW)

Total: 1460 MW
Wind Power Projects in Myanmar

Chin, Rakhine, Ayeyarwaddy, Yangon
3648 MW
CTGI

Rakhine, Ayeyarwaddy, Yangon
830 MW
Asia Ecoenergy & Primus

Chaung Thar
30 MW
CTGI

Shan, Kayah
1000 MW
GK + Zeya

Tanintharyi, Mon, Kayin
1000 MW
GK + Zeya

Total: 6538 MW

MoU finished (6508 MW)
MoA finished (30 MW)
Conclusion

• Green alternative options renewable energy are great opportunities for Myanmar
• Need for broad-based participation at the policy and plan levels
• Important to have civil society engagement
• community participation in electricity development
• Need: supportive legal and regulatory framework to promote sustainable, economic
Thank You for your attention!!!