Malaysia updates on RE programme

29 March 2017
48th APEC EGNRET, JEJU ISLAND, SOUTH KOREA
Today, oil and gas accounts for 80.1% of the primary energy supply in Malaysia.

**Primary Energy Supply**
- Oil: 36.7%
- Natural gas: 43.4%
- Coal: 16.6%
- Hydroelectric: 3.3%

**80.1%**

**Final Energy Consumption**
- Transportation: 46.6%
- Industry: 25.2%
- Agriculture: 2%
- Non Energy: 11.9%
- Commercial & Residential: 14.3%

*Source: National Energy Balance 2014*

*Note: *Refers to commercial energy only excluding hydro*
Installed capacity by sources

RE: 16.4% (including hydro)
Electrification rate: Peninsula 99.8%, East Malaysia 93%

Source: Malaysia National Energy Balance 2014
# Overall Energy Policy

## Major Energy Policies

**To meet the energy challenges**

<table>
<thead>
<tr>
<th>Policy</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National Petroleum Policy (1975)</strong></td>
<td>Efficient utilization of petroleum resources Ensuring the nation exercises <em>majority control</em> in the management and operation of the industry</td>
</tr>
<tr>
<td><strong>National Energy Policy (1979)</strong></td>
<td>Supply Objective: Ensure <em>adequate, secure and cost-effective</em> energy supply. Utilization Objective: Promote <em>efficient utilization of energy</em> and eliminate wasteful and non-productive usage Environmental Objective: Minimize <em>negative impacts</em> to the environment.</td>
</tr>
<tr>
<td><strong>National Depletion Policy (1980)</strong></td>
<td>To prolong the life span of the nation’s oil and gas reserves</td>
</tr>
<tr>
<td><strong>Four-fuel Policy (1981)</strong></td>
<td>Aimed at ensuring <em>reliability and security</em> of supply through <em>diversification</em> of fuel (oil, gas, hydro and coal)</td>
</tr>
<tr>
<td><strong>Five-fuel Policy (2001)</strong></td>
<td>Encourage the utilization of renewable resources such as biomass, solar, mini hydro etc Efficient utilization of energy</td>
</tr>
</tbody>
</table>
## Major Milestones in RE Policy Development

### 8th Malaysia Plan (2001 - 2005)
- RE as the 5th Fuel
- 5% RE in energy mix

### 9th Malaysia Plan (2006 – 2010)
- Targeted RE capacity to be connected to power utility grid:
  - 300 MW – Peninsular Malaysia; 50 MW - Sabah
- Targeted power generation mix:
  - 56% natural gas, 36% coal, 6% hydro, 0.2% oil,
  - 1.8% Renewable Energy
- Carbon intensity reduction target: 40% lower than 2005 levels by 2020

### RE Status as of Dec 2016
- Connected to the utility grid (as of 2015): 5,400 MW (which include large hydro)
- Off-grid: >500MW (private palm oil millers and solar hybrid)
- All RE including hydro – > 5,400 MW
Strategic Thrusts of the National RE Policy & Action Plan 2010

Strategic Thrust 1
Introduce Legal and Regulatory Framework

Strategic Thrust 2
Provide Conducive Business Environment for RE

Strategic Thrust 3
Intensify Human Capital Development

Strategic Thrust 4
Enhance RE Research & Development

Strategic Thrust 5
Create Public Awareness & RE Policy Advocacy Programs
Renewable Energy Legislations

- Renewable Energy Act 2011

- Sustainable Energy Development Authority Act 2011
  - Enabled the establishment of SEDA Malaysia
  - Launched the Feed-in Tariff Mechanism, 1\textsuperscript{st} Dec 2011
  - Establish the RE Fund to finance the FiT (1\% levy to electricity consumers, 1.6\% from 1\textsuperscript{st} Jan 2014)
## RE Targets under FiT, RE Policy Action Plan 2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Cumulative RE Capacity</th>
<th>RE Power Mix (vs Peak Demand)</th>
<th>Cumulative CO₂ avoided</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>985 MW</td>
<td>5.5%</td>
<td>11.1 mt</td>
</tr>
<tr>
<td>2020</td>
<td>2,080 MW</td>
<td>11%</td>
<td>42.2 mt</td>
</tr>
<tr>
<td>2030</td>
<td>4,000 MW</td>
<td>17%</td>
<td>145.1 mt</td>
</tr>
</tbody>
</table>

Note; Target is being revised, to include other initiatives.
## New additional RE Quota (beyond FiT) (launched in 2016)

<table>
<thead>
<tr>
<th>No</th>
<th>Programme</th>
<th>Year</th>
<th>(MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Net-metering</td>
<td>2016-2020</td>
<td>500</td>
</tr>
<tr>
<td>2.</td>
<td>Large scale solar (1 to 50MW)</td>
<td>2017-2020</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>1500 MW</strong></td>
<td></td>
</tr>
</tbody>
</table>

- NEM is “in-direct connection behind the meter”
- Consumer to self-consume first
- Only excess energy flow to grid
### RE (under FiT) Status as of Dec 2016

<table>
<thead>
<tr>
<th>NO</th>
<th>SOURCE</th>
<th>Percentage (%)</th>
<th>CAPACITY (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Biogas</td>
<td>7</td>
<td>31</td>
</tr>
<tr>
<td>2.</td>
<td>Biomass</td>
<td>18</td>
<td>75</td>
</tr>
<tr>
<td>3.</td>
<td>Small Hydro</td>
<td>7</td>
<td>30</td>
</tr>
<tr>
<td>4.</td>
<td>Solar PV</td>
<td>68</td>
<td>284</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>420 MW</strong></td>
</tr>
</tbody>
</table>
## Target based on technical potential

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>2011</td>
<td>110</td>
<td>20</td>
<td>60</td>
<td>9</td>
<td>20</td>
<td>219</td>
</tr>
<tr>
<td>2015</td>
<td>330</td>
<td>100</td>
<td>290</td>
<td>65</td>
<td>200</td>
<td>985</td>
</tr>
<tr>
<td>2020</td>
<td>800</td>
<td>240</td>
<td>490</td>
<td>190</td>
<td>360</td>
<td>2,080</td>
</tr>
<tr>
<td>2025</td>
<td>1,190</td>
<td>350</td>
<td>490</td>
<td>455</td>
<td>380</td>
<td>2,865</td>
</tr>
<tr>
<td>2030</td>
<td>1,340</td>
<td>410</td>
<td>490</td>
<td>1,370</td>
<td>390</td>
<td>4,000</td>
</tr>
<tr>
<td>2035</td>
<td>1,340</td>
<td>410</td>
<td>490</td>
<td>3,700</td>
<td>400</td>
<td>6,340</td>
</tr>
<tr>
<td>2040</td>
<td>1,340</td>
<td>410</td>
<td>490</td>
<td>7,450</td>
<td>410</td>
<td>10,100</td>
</tr>
<tr>
<td>2045</td>
<td>1,340</td>
<td>410</td>
<td>490</td>
<td>12,450</td>
<td>420</td>
<td>15,110</td>
</tr>
<tr>
<td>2050</td>
<td>1,340</td>
<td>410</td>
<td>490</td>
<td>18,700</td>
<td>430</td>
<td>21,370</td>
</tr>
</tbody>
</table>

**Assumptions, RE Technical potential:**

**Biomass (EFB, agriculture):** 1,340 MW will be reached by 2028.

**Biogas (POME, agriculture, farm):** 410 MW will be reached by 2028.

**Mini-hydro (not exceeding 30 MW):** 490 MW will be reached by 2020.

**Solar PV (grid-connected):** unlimited.

**Solid waste (RDF, incineration, sanitary landfill):** projection of 30,000 tonne/day of Solid Waste as projected by KPKT, followed by 3% annual growth post 2024
**RE Challenges**

**Hydropower**
- High initial capital outlay; longer time to recoup investment
- Long development time (7 years or more)
- Potential sites are located in remote areas
- Complication in permits application (>21 permits)

**Biomass**
- Difficulty obtaining long term fuel (EFB, PKS) supply commitment
- Boiler reliability and maintenance issue
- Most POMs are located in remote areas

**Geothermal Power**
- High risk; high initial investment cost for study & exploration
- Potential site in remote areas; far from existing transmission lines
Solar PV
- Reliability issue
- Intermittent source
- Large footprint (~4 acres/MW)
- Relatively high cost (> RM0.50 / kWh)
- Requires energy storage to improve reliability

Wind Power
- Constant wind is needed; dependent on location.
- Reliability issue
- Intermittent source
- Requires energy storage to improve reliability
RE Initiatives Way Forward

- FiT is for kick-start. Solar PV will end in 2017, while others will be until 2025.

- To revise national targets – existing target was based on FiT (limited fund), to include large scale and net-metering.

- Ramp-up Renewable Energy capacity through:
  - Large Scale Solar PV (1 to 50MW sizes), Launched in 2016, total of 1000MW by 2020
  - Net-Metering including self-consumption, Launched in 2016, total of 500MW by 2020

- To explore the possibility of wind energy (both onshore & offshore).
Thank you

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