Myanmar Energy Outlook:
A Country Report from EAS Energy Saving Potential Project 2013

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Economic Research Institute for ASEAN and East Asia
Introduction to ERIA

The formal establishment of ERIA was agreed upon by all the leaders at the 3rd East Asia Summit.

Establishment of ERIA approved by 3rd EAS, Nov 21, 2007

“13. We agreed to the establishment of the Economic Research Institute of ASEAN and East Asia (ERIA) ..... focuses on research topics of strategic interest to the EAS countries ....... practical policy recommendations to further regional integration and strengthen partnerships in East Asia.”

ERIA’s research focus include wide-ranging policy areas from Trade/Investment to SMEs, Human Resource development, Infrastructure, Energy, etc.

Following the agreement at the 3rd EAS meeting, formal agreement to endorse the status of ERIA as an International Organization was concluded on December 30, 2008 between the Indonesian Government and ASEAN Secretariat.

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Outline of the Presentation

• Research Background
• Methodology
• Myanmar Energy Situation
• Myanmar Energy Outlook: BAU
• Myanmar Energy Outlook: APS
• Myanmar Power Sector
• Conclusions and Policy Implications
• Appendix: Key Assumptions and Input Data
EAS energy co-operation

East Asia Summit (EAS)

EAS Energy Minister Meeting (EMM)

Energy Cooperation Task Force (ECTF) (2nd EAS, 2007)

EMM 2011, Brunei: ERIA Energy Unit (Apr. 2012)

Energy Efficiency and Conservation Work Stream (Japan)

- Energy Efficiency Roadmapping (2010-present)
- Energy Security Index (2011-present)
- Optimum electricity power infrastructure (2012-present)
- Smart urban traffic (2012-present)
- Energy access in Myanmar (2012-present)
- Strategic usage of coal (2012-present)

Bio-fuels for Transport and other Purposes Work Stream (The Philippines & India)

- Benchmarking of Biodiesel Fuel Standardization (2007-present)
- Sustainability Assessment of Biomass Utilization WG (2007-present)
- Market Potential of Biofuels (2011-present)
- Sustainability assessment of geothermal use (new)

Energy Market Integration Work Stream (Singapore & Australia)

ERIA EMI Working Group (2009-present)
Research Concept

ECTF/EMM → Energy Saving Goals & Action Plans (policy)

ERIA WG → LEAP Models: Energy Outlooks BAU & APS

Macro Assumptions
- GDP, Population
- Crude oil price

Energy Development Plans
- Energy mix (nuclear, biomass, etc)
- Power generation
- Fuel mix
- Thermal efficiency

APS: Alternative Policy Scenario
EEC promotion case applying the goals and action plans

Energy saving potential = BAU-APS
Overview of Myanmar Energy Situation I

• Endowment
  – Four months of heavy monsoon and abundant sunshine all year round: Wind, Solar and Hydro energy
  – Proven reserve: 210 million barrels of crude oil; 20 tcf / 560 bcm of natural gas; 711 million metric tons of coal

• Energy Supply and Demand
  – Total primary energy consumption (TPES): 6.0 Mtoe in year 2010
  – 3,460 MW of installed power generation capacity
    • Generated 7.5 TWh of electricity in year 2010
  – A net export of energy: natural gas and coal; but imports 50% of its crude oil requirement

16/12/2013
Overview of Myanmar Energy Situation II

**TPES (Mtoe)**
- Coal: 0.4 (7%)
- Oil: 1.8 (30%)
- Natural Gas: 1.4 (23%)
- Other: 2 (33%)

**Power Generation (TWh)**
- Coal: 0.7 (9%)
- Natural Gas: 5.1 (68%)
- Hydro: 1.7 (23%)
Myanmar Energy Outlook (BAU): Final Energy Demand

Final Energy Demand by Sector

Sectoral Share
Myanmar Energy Outlook (BAU): Final Energy Demand

Final Energy Demand by Fuel

Fuel Share

16/12/2013
Myanmar Energy Outlook (BAU): Primary Energy Consumption

Final Energy Demand by Source

Share of Primary Energy Source

Coal  Oil  Natural Gas  Hydro  Others

Coal  Oil  Natural Gas  Hydro  Others
Myanmar Power Sector: Fuel Mix for Generation

Fuel Demand by Source

Share of Fuel

1990 2010 2020 2035

Coal Oil Natural Gas Hydro Others

1990 2010 2020 2035

Coal Oil Natural Gas Hydro Others
Myanmar Energy Outlook (APS): Final Energy Demand

Final Energy Demand by Sector: BAU vs. APS

- Industry: -5.9%
- Transport: -3.0%
- Others: 0%
- Non-energy: 0%

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Myanmar Energy Outlook (APS): Primary Energy Consumption

Primary Energy Consumption by Source: BAU vs. APS

- Coal: +1%
- Oil: -2.8%
- Natural Gas: -3.6%
- Hydro: 0%
- Others: 0%

Mtoe

2010  2020 BAU  2020 APS
Total Savings of Primary Energy Consumption

Primary Energy Consumption

- 1990
- 2010
- 2020 BAU
- 2020 APS

Saving: 0.2 Mtoe

Mtoe
Reduction in Carbon Emissions

Evolution of Carbon Emissions

- Reduction: 0.2 Million Ton
- Reduction: 3.4%

Million Tons

1990 1990 2010 2020 BAU 2020 APS
Power Generation Thermal Efficiency of Myanmar

- Coal BAU
- Coal APS
- Natural Gas BAU
- Natural Gas APS

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Conclusions and Policy Implications

• There is a need for a detailed and comprehensive energy sector assessment
  – Better energy statistics would be needed for better analysis of energy saving potential in Myanmar
• Needs to improve energy management practices for industrial and commercial sectors
• Requires an energy efficiency labeling program for energy service companies and appliances
• There should be an energy efficiency target for the rapidly expanding transport sector in addition to those in industrial, commercial and household sectors
• There is a need for a detailed policy mechanism for the renewable energy sector to implement the potential programs and projects
• Mid-term energy savings based on proposed measures in the APS are limited
Appendix
APPENDIX: Key Assumptions and Input Data

- Myanmar’s GDP is assumed to grow at an average annual rate of around 7.0 percent from 2010 to 2035, slowing from 1990-2010’s growth of 8.9 percent.
- Population is assumed to increase by about 1.0 percent per year from 2010 to 2035.
- Alternative policy goals and action plans in the APS scenario: submitted by the energy ministers during the 6th EAS Energy Minister’s Meeting (EMM) held in Phnom Penh, Cambodia on 12 September 2012
### Myanmar Energy Efficiency Initiatives

<table>
<thead>
<tr>
<th>SECTORS</th>
<th>EEC INITIATIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial</td>
<td>- Promote introduction of equipment and facilities with high energy conservation capacity.</td>
</tr>
<tr>
<td></td>
<td>- Develop energy statistics</td>
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<td>- Develop goals for voluntary action plans</td>
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<td></td>
<td>- Develop R &amp; D and AEMAS Program</td>
</tr>
<tr>
<td>Transportation</td>
<td>- Raise the fuel efficiency in terms of passenger-km, and km/liter, and</td>
</tr>
<tr>
<td></td>
<td>- Fuel substitution with biofuels</td>
</tr>
<tr>
<td>Electricity</td>
<td>- Develop technology transfer and renewable energy knowledge in rural area</td>
</tr>
<tr>
<td></td>
<td>- Assist sustainable renewable energy application in electricity generation</td>
</tr>
<tr>
<td>Household</td>
<td>- Labeling systems for buildings and appliances</td>
</tr>
<tr>
<td></td>
<td>- Develop demand side management programs</td>
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<td></td>
<td>- Thorough management of energy and other resources</td>
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</tbody>
</table>
Myanmar’s primary energy saving goal is to reduce energy consumption by 5 percent in 2020 and 10 percent in 2030, relative to the BAU scenario.

- In the industrial sector, improve energy efficiency by 10 percent against BAU and reduce energy related greenhouse gases by 2020.
- In the transport sector, have biofuel (E85, biodiesel) substitution of at least 8 percent by 2020.
- Increase the total installed power capacity of renewable energy to 15 percent by 2020.
- Improve energy efficiency in the commercial/residential sector by 8 percent by 2020.
Figure 12-6: Final Energy Demand by Sector, BAU and APS

<table>
<thead>
<tr>
<th>Sector</th>
<th>BAU '10</th>
<th>APS '10</th>
<th>BAU '35</th>
<th>APS '35</th>
<th>BAU '10</th>
<th>APS '10</th>
<th>BAU '35</th>
<th>APS '35</th>
<th>BAU '10</th>
<th>APS '10</th>
<th>BAU '35</th>
<th>APS '35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>2.0</td>
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<td>0.5</td>
<td>2.0</td>
<td>1.5</td>
<td>1.0</td>
<td>0.5</td>
<td>2.0</td>
<td>1.5</td>
<td>1.0</td>
<td>0.5</td>
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<tr>
<td>Transport</td>
<td>5.0</td>
<td>4.0</td>
<td>4.5</td>
<td>3.5</td>
<td>5.0</td>
<td>4.0</td>
<td>4.5</td>
<td>3.5</td>
<td>5.0</td>
<td>4.0</td>
<td>4.5</td>
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<tr>
<td>Others</td>
<td>3.0</td>
<td>2.5</td>
<td>3.5</td>
<td>3.0</td>
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<td>2.5</td>
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<tr>
<td>Non-Energy</td>
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<td>0.0</td>
<td>0.5</td>
<td>0.0</td>
<td>0.5</td>
<td>0.0</td>
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</tbody>
</table>

- Industry: -8.5% reduction
- Transport: -7.5% reduction
- Others: -9.2% reduction
- Non-Energy: 0.0% change

Appendix: APS by 2035 and Savings
Appendix: APS by 2035 and Savings

Figure 12-7: Primary Energy Consumption by Source, BAU and APS

- Coal: BAU 2010 - APS 2035, decrease by -13.2%
- Oil: BAU 2010 - APS 2035, decrease by -7.4%
- Gas: BAU 2010 - APS 2035, decrease by -24.9%
- Others: BAU 2010 - APS 2035, increase by +14.0%
Appendix: APS by 2035 and Savings

Figure 12-8: Evolution of Primary Energy Consumption, BAU and APS

-2.6 Mtoe, -10.8%