APEC Energy Demand and Supply Outlook 2006

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APEC Energy Demand and Supply Outlook

- **Coal** 2.8% p.a.
- **Oil** 1.7% p.a.
- **Natural Gas** 1.8% p.a.
- **Hydro** 2.0% p.a.
- **Nuclear** 1.9% p.a.
- **Biomass and New Energy** 0.9% p.a.

(Source) Asia Pacific Energy Research Centre (2006), “APEC Energy Demand and Supply Outlook”
Sectoral Contributions to the Incremental Growth by Source in APEC (2002-2030)

The power sector to lead coal demand, the transport sector to drive oil demand, and the power and industry sectors to increase natural gas demand

(Source) Asia Pacific Energy Research Centre (2006), “APEC Energy Demand and Supply Outlook”
Drivers for the APEC Energy Demand

- **Income Growth**
  - GDP per capita will grow at an annual rate of 3.5 percent.

- **Urbanisation**
  - By 2030, share of urban population will reach 68 percent of the total from 52 percent in 2003.
    - 26 million people per year will move from rural to urban cities.

- **Industrialisation**
  - Industry value added will grow by 4.5 percent per year, while GDP will grow by 4.1 percent per year.

(Source) Blackwell (2005)
Income Growth and Fast Pace of Motorisation: Passenger Vehicle per 1,000 Population (1980-2030)

(Source) Asia Pacific Energy Research Centre (2006), “APEC Energy Demand and Supply Outlook”
## Urbanisation and Residential Energy Demand in the Selected APEC Economies

### Urbanisation

<table>
<thead>
<tr>
<th>Region</th>
<th>Urban Population (Millions)</th>
<th>Share of Urban Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2003</td>
<td>2030</td>
</tr>
<tr>
<td>N. America</td>
<td>261</td>
<td>354</td>
</tr>
<tr>
<td>L. America</td>
<td>112</td>
<td>160</td>
</tr>
<tr>
<td>NEA Asia</td>
<td>146</td>
<td>159</td>
</tr>
<tr>
<td>SEA Asia</td>
<td>210</td>
<td>389</td>
</tr>
<tr>
<td>Oceania</td>
<td>22</td>
<td>29</td>
</tr>
<tr>
<td>China</td>
<td>504</td>
<td>878</td>
</tr>
<tr>
<td>Russia</td>
<td>105</td>
<td>94</td>
</tr>
<tr>
<td>APEC</td>
<td>1,360</td>
<td>2,063</td>
</tr>
</tbody>
</table>


(Source) APERC Internal Database
Share of Sectoral Value Added by Region (2002 and 2030)

Increasing Share of Service Sector across the Region

(Source) Asia Pacific Energy Research Centre (2006), “APEC Energy Demand and Supply Outlook”
**APEC Sectoral Energy Demand Outlook (2002-2030)**

*Commercial sector to grow at the fastest pace.*

<table>
<thead>
<tr>
<th>Sector</th>
<th>Absolute Level (Unit: Mtoe)</th>
<th>Annual Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>1,407</td>
<td>1,842</td>
</tr>
<tr>
<td>Transport</td>
<td>1,092</td>
<td>1,342</td>
</tr>
<tr>
<td>Commercial</td>
<td>382</td>
<td>470</td>
</tr>
<tr>
<td>Residential</td>
<td>938</td>
<td>1,008</td>
</tr>
<tr>
<td>Total</td>
<td>3,819</td>
<td>4,661</td>
</tr>
</tbody>
</table>

(Source) Asia Pacific Energy Research Centre (2006), “APEC Energy Demand and Supply Outlook”

(Note) Residential demand includes demand for electricity, gas, oil products, heat and biomass.
Demand and Production of Oil, Coal and Natural Gas (1980, 2002 and 2030)

Increasing Import Dependence for Oil and Natural Gas
Projected Tight Balance between Coal Demand and its Production by 2030

(Source) Asia Pacific Energy Research Centre (2006), “APEC Energy Demand and Supply Outlook”
### Rising Oil Import Dependency across the Region

<table>
<thead>
<tr>
<th>Year</th>
<th>APEC</th>
<th>Northeast Asia</th>
<th>Southeast Asia</th>
<th>North America</th>
<th>Oceania</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>36%</td>
<td>100%</td>
<td>19%</td>
<td>55%</td>
<td>26%</td>
<td>22%</td>
</tr>
<tr>
<td>2005</td>
<td>37%</td>
<td>100%</td>
<td>27%</td>
<td>53%</td>
<td>29%</td>
<td>34%</td>
</tr>
<tr>
<td>2010</td>
<td>38%</td>
<td>100%</td>
<td>35%</td>
<td>49%</td>
<td>42%</td>
<td>44%</td>
</tr>
<tr>
<td>2015</td>
<td>41%</td>
<td>100%</td>
<td>44%</td>
<td>51%</td>
<td>50%</td>
<td>46%</td>
</tr>
<tr>
<td>2020</td>
<td>44%</td>
<td>100%</td>
<td>56%</td>
<td>50%</td>
<td>55%</td>
<td>57%</td>
</tr>
<tr>
<td>2025</td>
<td>50%</td>
<td>100%</td>
<td>63%</td>
<td>53%</td>
<td>59%</td>
<td>65%</td>
</tr>
<tr>
<td>2030</td>
<td>52%</td>
<td>100%</td>
<td>69%</td>
<td>56%</td>
<td>62%</td>
<td>70%</td>
</tr>
</tbody>
</table>

(Source) Asia Pacific Energy Research Centre (2006), “APEC Energy Demand and Supply Outlook”
Coal Demand and Production by 2030 (2002 and 2030)

Renewed Interest in Coal due to Price Competitiveness
Tight Balance between Demand and Production in 2030

(Source) Asia Pacific Energy Research Centre (2006), “APEC Energy Demand and Supply Outlook”
## LNG Demand Outlook (Unit: Million LNG Tonnes)

*Increasing LNG Imports for Existing Importers*

*Emergence of New LNG Importers*

<table>
<thead>
<tr>
<th>Year</th>
<th>NEA</th>
<th>SEA</th>
<th>NA</th>
<th>LA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>China</td>
<td>Japan</td>
<td>Korea</td>
<td>CT</td>
</tr>
<tr>
<td>2004</td>
<td>59.3</td>
<td>22.3</td>
<td>6.8</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>6.6</td>
<td>60.7</td>
<td>35</td>
<td>11</td>
</tr>
<tr>
<td>2020</td>
<td>26.2</td>
<td>74.1</td>
<td>48.4</td>
<td>14.8</td>
</tr>
<tr>
<td>2030</td>
<td>52</td>
<td>81.2</td>
<td>58.7</td>
<td>19.7</td>
</tr>
</tbody>
</table>

(Source) Asia Pacific Energy Research Centre (2006), “APEC Energy Demand and Supply Outlook”
Outlook of Nuclear Energy Production

Expansion of Nuclear for the Enhancement of Energy Security

(Source) Asia Pacific Energy Research Centre (2006), "APEC Energy Demand and Supply Outlook"
APEC electricity generation would require annual additions of 74GW.
Increasing share of coal in power generation mix

(Source) Asia Pacific Energy Research Centre (2006), “APEC Energy Demand and Supply Outlook”
Total Energy Investment Requirements 2003 – 2030

Between 5.95 trillion USD to 7.55 trillion USD

- Electricity generation & transmission, 60.4%
- Oil & Gas production & processing, 17.7%
- Oil & Gas international trade, 7.5%
- Oil & Gas domestic pipelines, 9.2%
- Coal production & transportation, 5.1%

(Source) Asia Pacific Energy Research Centre (2006), “APEC Energy Demand and Supply Outlook”
Energy Investment Requirements as Share of GDP (2002-2030)

Difficulty for Financing Energy Projects in Some Economies of APEC.

(Source) Asia Pacific Energy Research Centre (2006), “APEC Energy Demand and Supply Outlook”
Outlook of CO2 Emissions (2002-2030)

The Power Sector and Transport Sector to Lead CO2 Emissions.

(Source) Asia Pacific Energy Research Centre (2006), “APEC Energy Demand and Supply Outlook”
Challenges for the Energy Sector of APEC

- **Energy Security**
  - Increasing Import Dependency
    - Oil and Natural Gas
  - Growing Need for Energy Infrastructure
    - Tankers, Pipeline, Refineries, Power Plants, and etc.
  - Looming Shortage of Human Resources for Energy Sector
    - Engineers, Operators and Scientists
  - Increasing Flow of Energy Transportation
    - Maritime Congestion, Sea-lane Security, Long Distance Pipeline Security

- **Investment**
  - Substantial Investment Requirements
    - Upstream, Midstream and Downstream

- **Environment**
  - Damaging Impact from Expansive Energy Use on Environment
    - Local and Global
Options for the Future

- **Enhancing Energy Efficiency Improvement**
  - Supply Side
    - CCGT, Clean Coal Technology, Fuel Cells
  - Demand Side
    - Electricity Appliances: Air Conditioner, Refrigerator, Washing Machine
    - Automobile: Fuel Efficient Automobile, Hybrid Vehicle

- **Developing Alternative Energy Sources**
  - New and Renewable Sources, Bio Fuels, Non-conventional Oil, LNG, and Advanced Nuclear

- **Promoting Cross-border Resource Allocation**
  - Power Interconnection
  - Oil Pipeline
  - Natural Gas Pipeline
  - Joint Stockpiling: Oil and Natural Gas