4th APEC Energy Demand and Supply Outlook: Investments

Serguei Popov

APERC workshop at EGW 38
Bali, Indonesia, November 16th, 2009
1. Genesis
   APERC’s approach to the energy investments outlook

2. Scope and structure
   descriptions by supply chain, by energy, by region

3. Pro’s and con’s
   APERC’s strong points and [not yet] missed opportunities
Reminder – Demand drives supply
[so, the energy investments uncertainty is...]

Alan Greenspan, former chairman of the Federal Reserve

“I had been going for 40 years with considerable evidence that it was working very well. The whole intellectual edifice, however, collapsed in the summer of last year.“

Financial Times, October 24, 2008

Henry M. Paulson, Jr. then US Treasury Secretary

We have not in our lifetime dealt with a financial crisis of this severity and unpredictability

[Testimony before the USA House Committee on Financial Services]
Previous projections

- 2002 – Investment chapter with energy estimations for APEC member economies in 2020, and discussion on issues and challenges


- 2006 Energy D&S Outlook for the APEC region contain investments for coal, oil, gas, and electricity supply for each member economy and regions within APEC
Methodology

- Calculate total investments for 2006-2030 time frame, utilising macro approach
- Conversion to US$2006 at exchange rate base from local currencies
- Compatible costs with individual economy’s amendments where possible
- Range approach (low and high assumptions) to address uncertainties along supply chain

For each circle chart: inner circle stands for low, and outer – for high cost assumption; the investments range is located in centre. Units are billions of US$2006
Range of energy investments identified

- Energy investments will require from 0.9% to 1.2% of GDP at PPP basis, or 1.2% - 1.6% at exchange rate basis.
1 Range of energy investments identified

- Energy production and supply cost for all APEC members are within 25 – 63 US$2006 per toe

APEC averages are within 28 - 37 US$2006 per toe
Assessment of energy investments in the APEC region for 2006-2030 time frame
Investments by region

- China, USA and Russia accounts for 70% of total energy investments in the APEC region
Investments along supply chain

- Share of transformation and transportation is 46% and 28% of total energy investments
APEC member economy’s energy investments along supply chain

Extraction/Production
Transformation
Transportation/Transmission
Distribution
Investments by energy

- Power and heat supply infrastructure will require 58% of total energy investments.
APEC member economy’s energy investments by energy

- Crude oil and petroleum
- Natural gas
- Coal
- Power & Heat Generation, Transmission and Distribution

Australia
Brunei Darussalam
Canada
Chile
China
Hong Kong, China
Indonesia
Japan
Korea
Malaysia
Mexico
New Zealand
Papua New Guinea
Peru
Philippines
Russian Federation
Singapore
Chinese Taipei
Thailand
United States
Vietnam
Investments structure for Power Generation, Transmission and Distribution

- Within Power industry generation will require 58% of energy investments
Investments for energy supply as share of APEC member economy’s GDP

- Papua New Guinea: 2.0%
- Brunei Darussalam: 8.6%
- Vietnam: 1.5%
- Canada: 1.5%
- New Zealand: 1.0%
- Australia: 1.0%
- China: 1.0%
- Singapore: 1.0%
- Philippines: 1.0%
- Indonesia: 1.0%
- Malaysia: 1.0%
- Chile: 1.0%
- Thailand: 1.0%
- Mexico: 1.0%
- Peru: 1.0%
- Korea: 1.0%
- Japan: 1.0%
- United States: 1.0%
- APEC average: 0.69-0.94%

GDP per capita in 2030, USD2006 PPP
Investments for energy supply as share of APEC member economy’s GDP

- GDP calculated at exchange rate basis

<table>
<thead>
<tr>
<th>Country</th>
<th>Investment as % of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>1.1%</td>
</tr>
<tr>
<td>Brunei Darussalam</td>
<td>8.7%</td>
</tr>
<tr>
<td>Canada</td>
<td>1.3%</td>
</tr>
<tr>
<td>Chile</td>
<td>1.3%</td>
</tr>
<tr>
<td>China</td>
<td>2.4%</td>
</tr>
<tr>
<td>Hong Kong, China</td>
<td>0.2%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1.7%</td>
</tr>
<tr>
<td>Japan</td>
<td>0.6%</td>
</tr>
<tr>
<td>Korea</td>
<td>0.9%</td>
</tr>
<tr>
<td>Malaysia</td>
<td>2.1%</td>
</tr>
<tr>
<td>Mexico</td>
<td>1.0%</td>
</tr>
<tr>
<td>New Zealand</td>
<td>1.3%</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>4.8%</td>
</tr>
<tr>
<td>Peru</td>
<td>1.4%</td>
</tr>
<tr>
<td>Philippines</td>
<td>2.0%</td>
</tr>
<tr>
<td>Russia</td>
<td>5.2%</td>
</tr>
<tr>
<td>Singapore</td>
<td>1.0%</td>
</tr>
<tr>
<td>Chinese Taipei</td>
<td>1.2%</td>
</tr>
<tr>
<td>Thailand</td>
<td>1.6%</td>
</tr>
<tr>
<td>United States</td>
<td>0.7%</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>4.2%</td>
</tr>
</tbody>
</table>

Energy supply cost as share of GDP

GDP per capita in 2030, USD2006 ExR
Investments for primary energy production as share of APEC member economy’s GDP

- Brunei Darussalam: ~8.1%
- Australia
- Papua New Guinea
- Russia
- Malaysia
- Indonesia
- Mexico
- Vietnam
- Canada
- United States
- China
- Thailand
- New Zealand
- Korean
- Japan
- China (Taipei)
- Hong Kong, China
- Singapore
- Peru
- Chile
- Philippines

GDP per capita in 2030, USD2006 PPP

- 10,000
- 20,000
- 30,000
- 40,000
- 50,000
- 60,000
- 70,000
Investments for energy production as share of APEC member economy’s GDP

- **GDP calculated at exchange rate basis**

<table>
<thead>
<tr>
<th>Country</th>
<th>的投资额（占GDP比例）</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>1.13%</td>
</tr>
<tr>
<td>Brunei Darussalam</td>
<td>8.19%</td>
</tr>
<tr>
<td>Canada</td>
<td>0.39%</td>
</tr>
<tr>
<td>Chile</td>
<td>0.01%</td>
</tr>
<tr>
<td>China</td>
<td>0.46%</td>
</tr>
<tr>
<td>Hong Kong, China</td>
<td>-</td>
</tr>
<tr>
<td>Indonesia</td>
<td>0.95%</td>
</tr>
<tr>
<td>Japan</td>
<td>..</td>
</tr>
<tr>
<td>Korea</td>
<td>0.00%</td>
</tr>
<tr>
<td>Malaysia</td>
<td>1.34%</td>
</tr>
<tr>
<td>Mexico</td>
<td>0.60%</td>
</tr>
<tr>
<td>New Zealand</td>
<td>0.16%</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>2.09%</td>
</tr>
<tr>
<td>Peru</td>
<td>0.12%</td>
</tr>
<tr>
<td>Philippines</td>
<td>0.05%</td>
</tr>
<tr>
<td>Russia</td>
<td>1.42%</td>
</tr>
<tr>
<td>Singapore</td>
<td>-</td>
</tr>
<tr>
<td>Chinese Taipei</td>
<td>..</td>
</tr>
<tr>
<td>Thailand</td>
<td>0.34%</td>
</tr>
<tr>
<td>United States</td>
<td>0.17%</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>0.94%</td>
</tr>
</tbody>
</table>

注：GDP以汇率为基础计算。
Intraregional and external energy trade
Intraregional oil flow in APEC

- Russian export is ~ 90% outside APEC

- Russian:
  -304
  -337

- China:
  487
  140

- NEA:
  392
  398

- Americas:
  444
  488

- SEA:
  272
  54

- Oceania:
  32
  24

1323 Mtoe net import in 2030
767 Mtoe net import in 2005
Intraregional gas flow in APEC

- Russian export is 100% outside APEC

- Russia:
  - Export: -232 Mtoe
  - Import: -143 Mtoe

- China:
  - Export: 154 Mtoe
  - Import: -2 Mtoe

- NEA:
  - Export: 173 Mtoe
  - Import: 118 Mtoe

- Americas:
  - Export: 78 Mtoe
  - Import: 26 Mtoe

- SEA:
  - Export: 23 Mtoe
  - Import: -56 Mtoe

- Oceania:
  - Export: -115 Mtoe
  - Import: -11 Mtoe

- Total net import in 2030: 81 Mtoe
- Total net import in 2005: -69 Mtoe
Intraregional coal flow in APEC

- Significant export outside of APEC
- Chinese net export is under question

Russia
-79
-44

China
-68
-71

NEA
235
207

Americas
6
-13

SEA
-163
-74

Oceania
-258
-147

-327 Mtoe net import in 2030
-141 Mtoe net import in 2005
Gas trade infrastructure account for 78% of international energy transportation investments in the APEC region.
Energy production investments outside of APEC by supply chain

- US$2006 trln. 0.5 – 0.7 will be required to invest outside of APEC region in order to secure energy supply

- Regions outside of APEC are

  Middle East, Africa, Latin America, Central Asia
Energy production investments outside of APEC by energy

- Natural gas will take 75% of these investments, as LNG trade will grow considerably
Pro’s and con’s
• APERC provides energy investment projections for each member economy, which is not a case for similar annual energy outlooks, for example presented by IEA and EIA.
3 [Not yet] missed opportunities?

- Lack of alternative scenarios for comparison, considering various structural assumptions for economic growth and energy supply

- Lack of analysis of possible energy investment shortages/excesses within APEC economies and its relationship with energy security and environmental footprints
Thank you for your attention

http://www.ieej.or.jp/aperc/