MINISTRY OF INDUSTRY AND TRADE

ENERGY BALANCE OF VIETNAM BY 2020

April-2009
• General information about Vietnam’s energy resources
• Current status of Vietnam’s energy supply vs. demand
• Forecasted energy supply-demand balance in Vietnam by 2020
• Major difficulties and bottlenecks
• **Hydropower**
  – Total estimated potential: 300 billion kWh/year:
    + The North: 60%
    + The Central: 26%
    + The South: 14%
  – The eco-technical potential: about 80 billion kWh
  – Total capacity of existing hydropower plants: 5245 MW (2008)
Vietnam Energy Resources

- Coal resources
  - Total explored reserves as of early 2005: about 4.5 billion ton, of which:
    + Quảng Ninh:
      - Exploited Anthracite reserve: 3.1 bil tons
      - Domestic mines: 200 mm tons
    + Under-explored reserves:
      - Khoái Châu – Đồng Hùng: 30 billion tons
• Oil and gas
  – Total oil and gas in place: 3-4 billion m\(^3\) oil equivalent, of which
    + Oil/condensate: 1,2 – 1,5 billion m\(^3\)
    + Gas: 1,8 – 2,5 thousands of billion m\(^3\)
  – 70 oil and gas discoveries found with total reserves of 900MM m\(^3\) oil equivalent (500 MM m\(^3\) for oil and 400 billion m\(^3\) for gas).
• Oil and gas (continues)
  – As at 2004 year end, 10/20 oil and natural gas fields have been put into production with total output of:
    • 169,9 billion tons crude oil
    • 18,67 BCM gas which have been used for power generation and residential purpose.
    • Undiscovered oil and gas (about 50% of the oil and gas in place) locate in coastal deep water (Phu Khanh basin), offshore and sensitive areas of the East Sea and overlapping areas.
VIETNAM ENERGY RESOURCES

• New and renewable sources of energy
  – Geo-thermal: More than 300 sources of hot mineral water existing (30°C – 105°C)
    - Focus Area: North Western and Central part
    - No available assessment of potential
  – Solar energy
    + Average sunshine hours: 2000 – 2500 hours/year
    + Total of average heat radiating energy: 150kCal/cm²/year
    + Estimated potential: around 43.9 billion TOE/year
• New and renewable sources of energy
  – **Wind energy**: Small potential, Distribution of wind energy density:
    - Island area: 800 – 1400 kWh/m²/year
    - Coastal and highland area: 500-1000 kWh/m²/year
    - Other area: below 500 kWh/m²/year
  – **Uranium**: World medium potential
    + Total estimated reserves: more than 200 thousand tons of U₃O₈.
– *Bio-mass energy*

+ Total potential reserves (wood, straw, sub-farming products): 43-46 MM TOE/year:
  - Wood energy: 60% (26-27 MM TOE)
  - Straw and sub-farming products energy: 40% (17-19 MM TOE)

+ Producing reserves: 10%
Primary energy supply: Total of primary energy produced increased by 13.7%/year during the period of 1990-2004 (from 7,1 to 43,6 MM TOE):

- Coal: 22,7%/year (4,5 MM tons - 25,05 MM tons) 50 MM tons -2008
- Crude oil: 15.5%/year (2,7 MM tons – 20,3 MM tons)
- Natural gas: 44,1%/year (unremarkable - 4,67 bil m³ )
- Electricity: 13,8%/year (8,7 billions kWh – 47,1 billions kWh) 75,9 billions kWh -2008
CURRENT STATUS OF VIETNAM’S ENERGY SUPPLY AND DEMAND

+ Hydropower: 6,9 bil. kWh – 18,1 bil. kWh (2001); 18 bil. kWh (2004), 25 billions kWh (2008),
+ Coal-plants: 4,3 bil. kWh (2001); 7,8 bil. kWh (2004), 11,5 billions kWh (2008),
+ Gas & Diesel: 8,1 bil. kWh (2001); 20,3 bil. kWh (2004), 33,3 billions kWh (2008),
+ Commercial electricity: 6,2 bil. kWh – 39,7 bil. kWh (1990 -2004: 14,2%/year; 01-04: 15,4%/year), 65,9 billions kWh -2008
CURRENT STATUS OF VIETNAM’S ENERGY SUPPLY AND DEMAND

STRUCTURE OF ENERGY CONSUMPTION IN 2004

- Industry: 34%
- Commerce and service: 9%
- Transportation: 10%
- Agriculture: 47%

Legend:
- Industry
- Commerce and service
- Transportation
- Agriculture
CURRENT STATUS OF VIETNAM’S ENERGY SUPPLY AND DEMAND

STRUCTURE OF ENERGY PRODUCTION IN 2004

- **Crude Oil**: 15.9%
- **Natural gas**: 31.9%
- **Coal**: 15.5%
- **Hydro power**: 36.6%
### ENERGY IMPORT AND EXPORT DURING PERIOD 1990 -2004

<table>
<thead>
<tr>
<th>Import and Export</th>
<th>1990</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil export</td>
<td>2.6 MM tons</td>
<td>20 MM tons</td>
</tr>
<tr>
<td>Coal export</td>
<td>0.8 MM tons</td>
<td>10.5 MM tons (2003)</td>
</tr>
<tr>
<td>Energy export turnover</td>
<td></td>
<td>Around 6 billions USD (increase by 50%/year in 2003)</td>
</tr>
<tr>
<td>Petroleum product import</td>
<td>1.9 MM tons</td>
<td>11 MM tons</td>
</tr>
<tr>
<td>Petroleum product import turnover</td>
<td></td>
<td>3.57 billions USD (11% total turnover)</td>
</tr>
<tr>
<td>Net export</td>
<td>0.3 MM TOE</td>
<td>16.2 MM TOE</td>
</tr>
</tbody>
</table>
ENERGY IMPORT AND EXPORT DURING PERIOD 1990 -2004

Energy Export and Import during 1990-2004
ENERGY IMPORT AND EXPORT DURING PERIOD 1990 -2004

- Total final energy consumption during 1991-2004 increased by 10.8%  
  - Year 1990: 4,14 MM TOE  
  - Year 2000: 12,2 MM TOE  
  - Year 2004: 17,7 MM TOE
STRUCTURE OF ENERGY CONSUMPTION DURING 1990-2004

<table>
<thead>
<tr>
<th>Product</th>
<th>1990 (%)</th>
<th>2004 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>31.4</td>
<td>30.7</td>
</tr>
<tr>
<td>Oil and gas</td>
<td>55.9</td>
<td>50.7</td>
</tr>
<tr>
<td>Electricity</td>
<td>12.6</td>
<td>18.5</td>
</tr>
</tbody>
</table>
STRUCTURE OF ENERGY CONSUMPTION DURING 1990-2004

- Coal: 30.70%
- Oil and Gas: 50.70%
- Electricity: 18.50%
The average consumption per capita of Vietnam is estimated at 20% of the world’s average level.

<table>
<thead>
<tr>
<th>Item</th>
<th>1990</th>
<th>1995</th>
<th>2000</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply of primary energy, kgOE/capita/year</td>
<td>100</td>
<td>152</td>
<td>249</td>
<td>318</td>
</tr>
<tr>
<td>Primary energy consumption, kgOE/capita/year</td>
<td>64</td>
<td>110</td>
<td>157</td>
<td>218</td>
</tr>
<tr>
<td>Commercial power, kgOE/capita/year</td>
<td>94</td>
<td>155</td>
<td>286</td>
<td>488</td>
</tr>
</tbody>
</table>
# Forecasted Oil and Gas Product Demand

<table>
<thead>
<tr>
<th>Product</th>
<th>2010 (MMtons)</th>
<th>2020 (MMtons)</th>
<th>2001-2010 (%/year)</th>
<th>2010-2020 (%/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>15-16</td>
<td>26-28,6</td>
<td>7,5 - 8</td>
<td>6,4 – 6,8</td>
</tr>
<tr>
<td>Petrochemical</td>
<td>8</td>
<td>17</td>
<td>10%</td>
<td>5%</td>
</tr>
<tr>
<td>Gas</td>
<td>10 billion m³</td>
<td>15-16 billion m³</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FORECASTED ELECTRICITY DEMAND BY 2020

Electricity - Base case
Electricity – Upper case
Demand – Base case
Demand – Upper case
ENERGY BALANCE BY 2020
COAL SUPPLY-DEMAND BALANCE

- Coal for electricity generation
- Coal for other sectors
- Coal supply

MM tons


IEEJ: May 2009
FORECAST OF CRUDE OIL PRODUCTION

*Vietnam remains to be the crude oil export country up to 2010*

<table>
<thead>
<tr>
<th>Duration</th>
<th>Production (MM tons)</th>
<th>Domestic production (MM tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006 - 2010</td>
<td>18.2 - 20</td>
<td>18 - 19</td>
</tr>
<tr>
<td>2011 - 2015</td>
<td>17.2 - 21</td>
<td>16 - 18</td>
</tr>
<tr>
<td>2016 - 2020</td>
<td>16.5 - 20.5</td>
<td>13 - 15</td>
</tr>
</tbody>
</table>
FORECAST OF CRUDE OIL IMPORT DEMAND

- **Vietnam become crude oil import country from 2015**

<table>
<thead>
<tr>
<th>Crude oil import</th>
<th>2015 (MM tons)</th>
<th>2020 (MM tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base case</td>
<td>1,2</td>
<td>10</td>
</tr>
<tr>
<td>Low case</td>
<td>5</td>
<td>14</td>
</tr>
</tbody>
</table>
**CRUDE OIL SUPPLY AND DEMAND BALANCE**

- *Vietnam remains crude oil import country by 2020*

<table>
<thead>
<tr>
<th>Crude Oil product import</th>
<th>2010</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10 MM tons</td>
<td>10-13 MM tons</td>
</tr>
</tbody>
</table>

*Assumption:*
- *Dungquat refinery comes into operation by 2009*
- *Refinery #2, #3 comes into operation by 2015 and 2020*
# Natural Gas Supply-Demand Balance

<table>
<thead>
<tr>
<th>Production by 2020 (billion m³)</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2005 (billion m³)</td>
</tr>
<tr>
<td>15-16</td>
<td>5.3</td>
</tr>
<tr>
<td></td>
<td>- For electricity: 4.1</td>
</tr>
<tr>
<td></td>
<td>- Others: 1.2</td>
</tr>
</tbody>
</table>
• For base case (gas supply of 12 billion m³)

<table>
<thead>
<tr>
<th>Total energy consumption</th>
<th>Hydropower</th>
<th>Coal</th>
<th>Natural Gas</th>
<th>FO fired electricity</th>
<th>New and renewable energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010: 20 MM TOE</td>
<td>36.2%</td>
<td>23.6%</td>
<td>31.6%</td>
<td>5.6%</td>
<td>3%</td>
</tr>
<tr>
<td>2020: 35.6 MM TOE</td>
<td>31.5%</td>
<td>19.2%</td>
<td></td>
<td></td>
<td>Nuclear power: 6.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Renewable energy: 4%</td>
</tr>
</tbody>
</table>
PRIMARY ENERGY BALANCE FOR POWER GENERATION

Year 2010
- Hydroelectricity: 36.2%
- Coal: 31.6%
- Gas: 5.6%
- FO-fired: 3.0%
- New & Renewable E.: 23.6%

Year 2020
- Hydroelectricity: 31.5%
- Coal: 19.2%
- Gas: 30.5%
- FO-fired: 4.0%
- New & Renewable E.: 6.3%
- Nuclear: 8.4%
- Imported: 19.2%
## GENERAL ENERGY SUPPLY-DEMAND BALANCE

<table>
<thead>
<tr>
<th>Energy</th>
<th>2010 (%)</th>
<th>2020 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New and renewable</td>
<td>2,1</td>
<td>3,3</td>
</tr>
<tr>
<td>Nuclear power</td>
<td></td>
<td>2,9</td>
</tr>
<tr>
<td>Hydro power</td>
<td>&lt;20</td>
<td>15-17</td>
</tr>
<tr>
<td>Crude Oil products</td>
<td>35</td>
<td>32</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>18-20</td>
<td>14-15</td>
</tr>
<tr>
<td>Coal</td>
<td>33,6</td>
<td>29-30</td>
</tr>
</tbody>
</table>
GENERAL ENERGY SUPPLY-DEMAND BALANCE

- Hydro power
- Gas
- Crude Oil
- Coal
- Total energy demand

MM TOE

Major difficulties and bottlenecks

1. Balance between conversion energy development and new-renewable energy development issues.

2. Balance between energy development and environment protection issues.

3. Balance between energy export for social-economic development and energy conservation issues.
CONCLUSION

4. Energy price increasing and low-income people issues.

5. Energy development to fulfill increasing demand while shortage of fossil energy.

6. Balance between energy development and Transportable system

7. Energy development to fulfill increasing demand while shortage of capital investment.
Thank you!