MANAGING ENERGY DEMAND GROWTH IN EMERGING MARKET COUNTRIES

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AGENDA

- Focus on China, India, South Africa
- Comparative energy intensities
- Demand growth and self-sufficiency
- Energy supply constraints versus distributional constraints
- Energy deficits as constraints to growth and FDI
- Government and industry strategies for managing energy demand growth
Opportunities For Energy Investment In the Non-OECD?

- Much of required investment will be in the non-OECD - China alone will require $2.3 trillion, or 14% of global total over next 30 years (IEA WEO 2002)
- Less from government sources
- High risk, but potentially high return
- Positive demand growth outlook
- Government favor
- More conducive to some types of investment than the OECD - e.g. refineries and alternative energies
Comparative Energy Intensities

Emerging market countries make significant progress, but still trail developed world
Energy Demand Growth and Self-Sufficiency

**ENERGY SELF-SUFFICIENCY**
Domestic Energy Production: Domestic Energy Demand

- China
- India
- South Africa

**ENERGY DEMAND GROWTH**

- China: 150%
- India: 236%
- South Africa: 67%

Source: JPMorgan Comodities Research, EIA
Oil Demand Growth and Self-Sufficiency

**OIL DEMAND**
- South Africa
- India
- China

**OIL SELF-SUFFICIENCY**
- Domestic Oil Production: Domestic Oil Demand

- China
- India
- South Africa
Energy Supply Constraints Versus Distributional Constraints

Outright Supply Constraints:
Supply rations natural demand

Distribution Constraints:
Dispersed population + poor distributional infrastructure limit consumption in certain regions or by certain segments of the population
Why Should Governments Care?

- Access to reliable and affordable energy is a key development indicator, and key to keeping the population happy, particularly as disposable income and expectations rise post-democratization.

- Energy security is increasingly viewed as a strategic imperative, particularly with respect to external dependency.

- Reliable and affordable energy supply is key to maintaining economic growth.

- A failure to supply reliable and affordable energy can seriously discourage foreign investment.
Government Strategies for Managing Demand Growth and Securing Energy Supply

- Conservation mandates and demand side management
- New domestic generation, production, & distribution capacity
- E&P abroad, diversification of foreign sources
- Strategic stockpiling
- Alternative energies
Conservation Mandates/Demand Side Management

More Growth Friendly

- More stringent fuel standards for personal vehicles, improved road quality
- Efficiency standards for appliances
- Reduction in energy subsidies + Tax incentives for alternative energy development, energy efficiency and conservation measures

Less Growth Friendly

- Limiting industrial production to certain days of the week
- Forced shutdown of inefficient refining, generation facilities
- Blackouts/brownouts
New Domestic Generation, Production, and Distribution Capacity

- New refinery capacity
- New power generation capacity
- Pipeline & tanker fleet investment
- Off-grid technology
E&P Abroad, Diversification of Foreign Sources

**% Chinese Crude Imports from Major Regions**

<table>
<thead>
<tr>
<th>Region</th>
<th>2002</th>
<th>2003</th>
<th>2004*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mideast</td>
<td>49.9%</td>
<td>50.9%</td>
<td>46.7%</td>
</tr>
<tr>
<td>Asia</td>
<td>17.3%</td>
<td>16.5%</td>
<td>15.5%</td>
</tr>
<tr>
<td>N. Africa/Med</td>
<td>9.3%</td>
<td>6.5%</td>
<td>8.0%</td>
</tr>
<tr>
<td>Atlantic Basin</td>
<td>20.7%</td>
<td>23.7%</td>
<td>28.3%</td>
</tr>
<tr>
<td>Americas</td>
<td>0.0%</td>
<td>0.8%</td>
<td>0.4%</td>
</tr>
<tr>
<td>W. Europe</td>
<td>4.9%</td>
<td>1.3%</td>
<td>3.2%</td>
</tr>
<tr>
<td>W. Africa</td>
<td>13.1%</td>
<td>16.5%</td>
<td>19.4%</td>
</tr>
<tr>
<td>FSU</td>
<td>5.6%</td>
<td>7.2%</td>
<td>6.7%</td>
</tr>
<tr>
<td>OPEC</td>
<td>39.6%</td>
<td>37.6%</td>
<td>33.8%</td>
</tr>
</tbody>
</table>

*Source: JPMorgan Commodity Research, China OGP*
Strategic Stockpiling

- China and India are both planning government stockpiles
- Government tanks are not yet complete, but there are strong indications that inventories are on the rise.

Implied Chinese Stockpiling

[Graph showing implied stock levels and days of import & demand cover over time, with data sources referenced.]
Alternative Energies

- In large countries with dispersed populations, expanding the grid is not necessarily the most efficient option for rural electrification.

- Renewable energy - e.g. solar, hydro, and wind - have found a foothold in China, South Africa, and India as a result.

- Many of these technologies are most effective for small-scale off-grid applications.