



# ENERGY

## Observations on Energy

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Overview

Comments appreciated.

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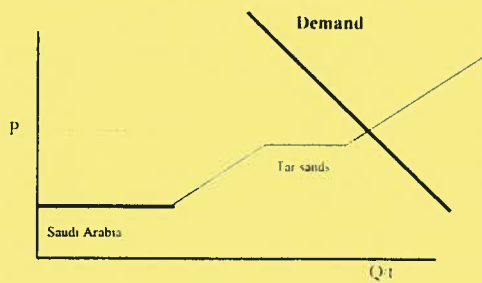
## Major Energy Sources

- Prices
- Relative growth
- Volatility
- Policy Issues

## Oil

- WOP will remain politically driven
- Accordion supply curve
- OPEC will try to keep around \$25 US, with pressure downward
- Demand in US and Canada will weaken
- Less seasonal volatility as heating load becomes smaller share
- US oil security with more than 50% imported remains an issue (also for Japan and much of Europe)

## Accordion Supply Curve



## Energy Import Shares

| Country | Energy Imports/Total Supply |
|---------|-----------------------------|
| U.S.A.  | 26.5%                       |
| Japan   | 81.0%                       |
| Germany | 60.0%                       |
| France  | 51.1%                       |
| OECD    | 48.3%                       |

## Natural Gas

- Increasing supplies will keep price pressures down. Less than elastic with respect to oil price changes
- More volatility as heating-cooling load increases share of total; less volatile if more infrastructure put in place; more volatile if electricity generation load grows
- Alaska supplies – will they be hooked up with \$2 per mcf cost? How about at \$4 per mcf?

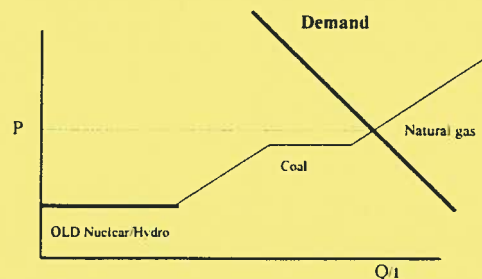
## Electricity

- Ubiquitous, flexible; growing penetration
- Price volatility up, as deregulation leads to market clearing pricing
- Privatization being generated by unwillingness of governments to change pricing, and desire of business to acquire capital-intensive businesses

## Electricity pricing

- Average price may be reduced eventually, but volatility up
- Marginal generating capacity will have rising marginal costs
- Oil "accordion" supply curve could work here if low-cost base supplier chose to "play a tune"

## Accordion Electricity Supply Curve



## Should network systems be left to the market?

- Who captures network economies?
- Who maintains the infrastructure of the network?
- Important for electricity, natural gas, water, transportation, communications, research
- Strong incentives for "free riders" and "rebalancing" of benefits and costs

## Conjectures

- Volatility will be continuing for all energy prices – not necessarily correlated
- Role of government will not disappear
- International trade in energy – oil and NG will continue and grow
- Only metallurgical coal will show growth in international trade

## Major policy clashes coming

- Replacement of post-war gas transportation infrastructure in US – who pays?
- Reliability of electricity – who ensures?
- GHG and fuel choices
- Will nuclear facilities in US and Canada be replaced?

## One Fatal Flaw

- Middle East turmoil results in long-term damage to oil supplies
- Breakthrough in transportation fuels (e.g., ethanol, hydrogen, multi-fuel fuel cells)
- More rapid falloff in domestic producibility in US and Canada
- Major push on CO2 reduction