Liberalised electricity market experience in OECD countries

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Outline

- Introduction
  - Global energy challenges
- Evolving electricity market structure
- Security of supply and market delivery of investments
- Marginal pricing and competitive market regulation
- Empowering consumers for demand participation
- Conclusions
Challenge #1: Energy security
Increasing world primary energy demand and still strong reliance on fossil-fuels in 2030 (WEO 2007)

Global demand grows by more than half over the next quarter of a century, with coal use rising most in absolute terms
Challenge #2: Energy investments
Huge investments will be required over the period to 2030

China and India account for 22% of global energy investments
Challenge # 3: Climate change

CO₂ emissions are on an unsustainable path

Stabilising greenhouse-gas concentration at 450 ppm would require emissions to be reduced to 23 Gt in 2030.
Evolving market structure: Before reform

- Centralised investment decisions
- Investment driven by economies of scale
- All risks and costs passed-through
- Regulated return on investments

Vertically Integrated Utility
- Generation
- Transmission
- Distribution

Few incentives for efficiency, innovation or least-cost risk management

Customers
Evolving market structure: After reform

- Competitive generation
- Generation investments driven by risk/return equation
- T&D remain regulated
- Unbundling limits pass-through
- Strong incentives for least-cost risk management
Transmission in liberalised markets

**Before**

- Connect large scale generation sources to load centers
- Means to achieve economies of scale
- Often a complement to generation
- Planning is centralised and well coordinated
- Reliability investments

**After**

- Connect diversified generation sources to load centers
- Means to achieve energy diversification and competitive markets – open and non-discriminatory access
- Can be a substitute to generation
- Planning is more complex
- Reliability and economic investments
“Unbundling” security of supply

Reliability of electricity supply

Energy security
Coal, natural gas, uranium...

Adequacy
Generation capacity, transmission and distribution networks

System security
Operation, control, contingency management...
Have markets failed to deliver investments in generation capacity?

Index 100=1997

- Australia
- Texas
- Alberta
- Germany
- United Kingdom
- Nordic

Under construction

Why markets have triggered dash-to-gas investments over the period 1990-2004?
Risk and return assessment tends to favour investments in gas-fired power plants

<table>
<thead>
<tr>
<th>Technology</th>
<th>Unit Size</th>
<th>Lead Time</th>
<th>Capital Cost/ kW</th>
<th>Operating Cost</th>
<th>Fuel Cost</th>
<th>CO₂ Emissions</th>
<th>Regulatory Risk</th>
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<td>Short</td>
<td>Low</td>
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<td>Nil</td>
<td>Nil</td>
<td>Medium</td>
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</tbody>
</table>
Market reform and grid reliability

- Market reform is not to blame for the 2003 blackout in North America
- Liberalised markets have contributed to:
  - increased cross-border and regional trade
  - longer distance use of transmission infrastructure
  - greater, more volatile and less predictable grid usage
- Creating new real-time challenges for system operators
Marginal pricing ensures optimal dispatch in competitive generation markets

- Decentralised decision making in competitive markets is a strong instrument to ensure optimal dispatch
- Lack of price elasticity on the demand side may be the critical market failure for a robust price settlement at all times
Example of price responsiveness in the Nordic markets

Nordic drought

1 EURO = 8 NOK

Source: adapted from ECON Energy, 2003
Flexibility is critical for market clearing in tight situations

- Cost reflective pricing creates incentives for flexible resources to meet peak-load particularly in situations of scarcity
- Price caps and other market intervention mute incentives
Increasing cross-border trade improves supply flexibility
Demand participation makes markets work better

Consumption is not homogenous
Empowering consumers: the third pillar

- Retail competition protects and brings the benefits to the consumer through competitive prices, customer choice and innovation
- Demand response to price adds real resources to the system
- Transparent prices improve framework for energy efficiency
- Balancing supply & demand \(\Rightarrow\) investment
- Mitigate possible abuse of market power
  \(\Rightarrow\) Large potential benefits still remain to be realised
Real competition is a prerequisite

- Unbundling
  - Truly independent system operation
- Market rules giving fair and easy access to all market players
- Regulation of natural monopolies
- Regulation of competition

- Liberalisation is a process that requires political commitment and strong government involvement
- Competitive market framework provides signals to market participants
Conclusions

- Liberalisation of electricity markets has delivered significant benefits based on the experience of OECD countries.
- Effective competition requires independent system operation and transparency.
- Cost reflective prices - the corner stone for efficient market response.
- Competitive markets need an improved framework to empower consumers for demand participation.
- Institutional arrangements are required for market monitoring and coordinated planning.
- No “one-size-fits-all” market model.
Thank you!

Some references:

- OECD/IEA, 2007: Tackling investment challenges in power generation in IEA countries
- OECD/IEA, 2006: China’s power sector reforms – Where to next?
- OECD/IEA, 2005: Lessons from liberalised electricity markets

Planned publications (2008)

- Electricity transmission investments in liberalised markets: trends, issues and best practices
- Customer choice in electricity markets: Retail switching and demand response in competitive markets