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**Regulatory Reform Review
Working Group Seminar
Beijing - 28 March 2008**

**Liberalised electricity market
experience in OECD countries**

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Outline

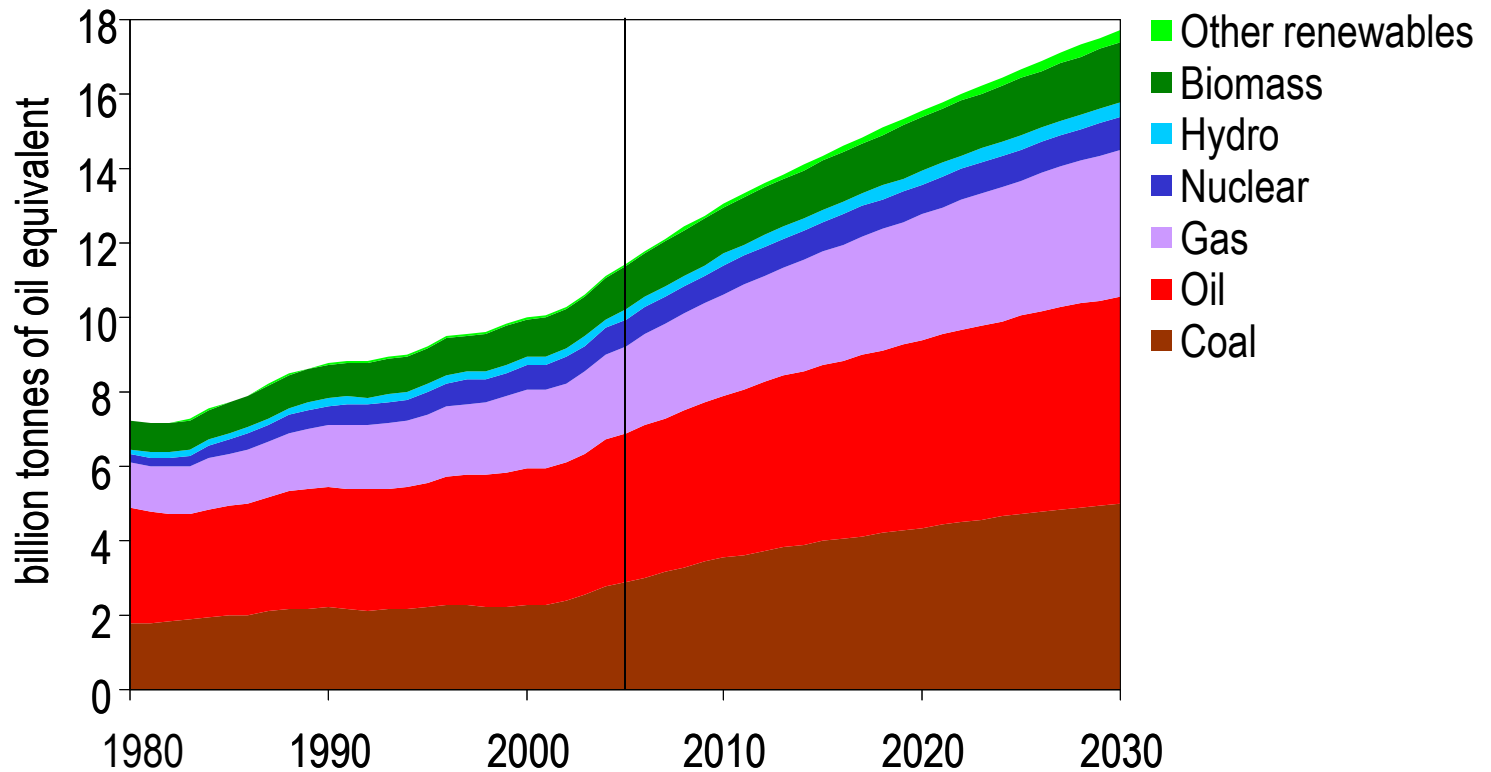
- **Introduction**
 - **Global energy challenges**
- **Evolving electricity market structure**
- **Security of supply and market delivery of investments**
- **Marginal pricing and competitive market regulation**
- **Empowering consumers for demand participation**
- **Conclusions**



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Challenge #1: Energy security

Increasing world primary energy demand and still strong reliance on fossil-fuels in 2030 (WEO 2007)



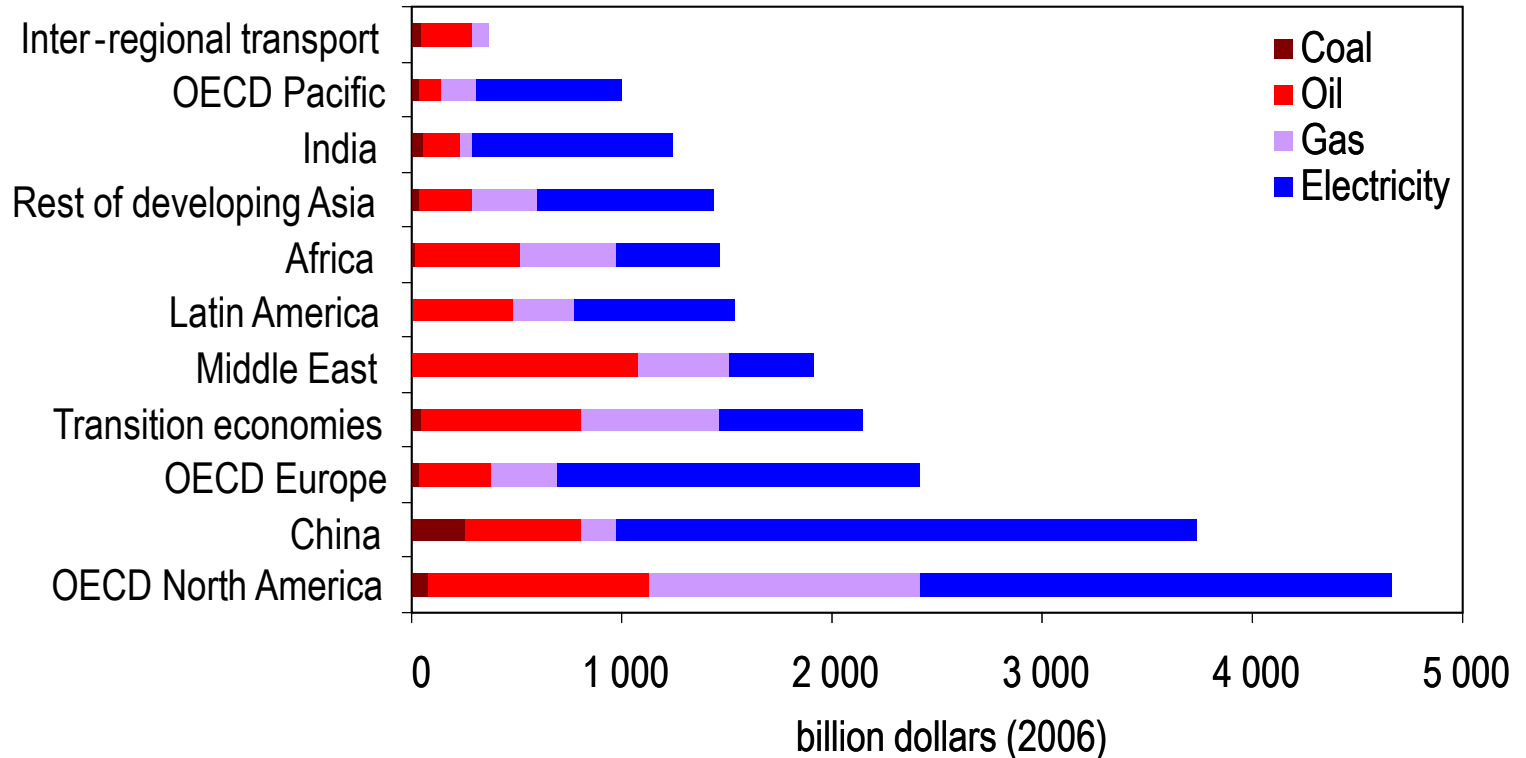
Global demand grows by more than half over the next quarter of a century, with coal use rising most in absolute terms



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Challenge #2: Energy investments

Huge investments will be required over the period to 2030



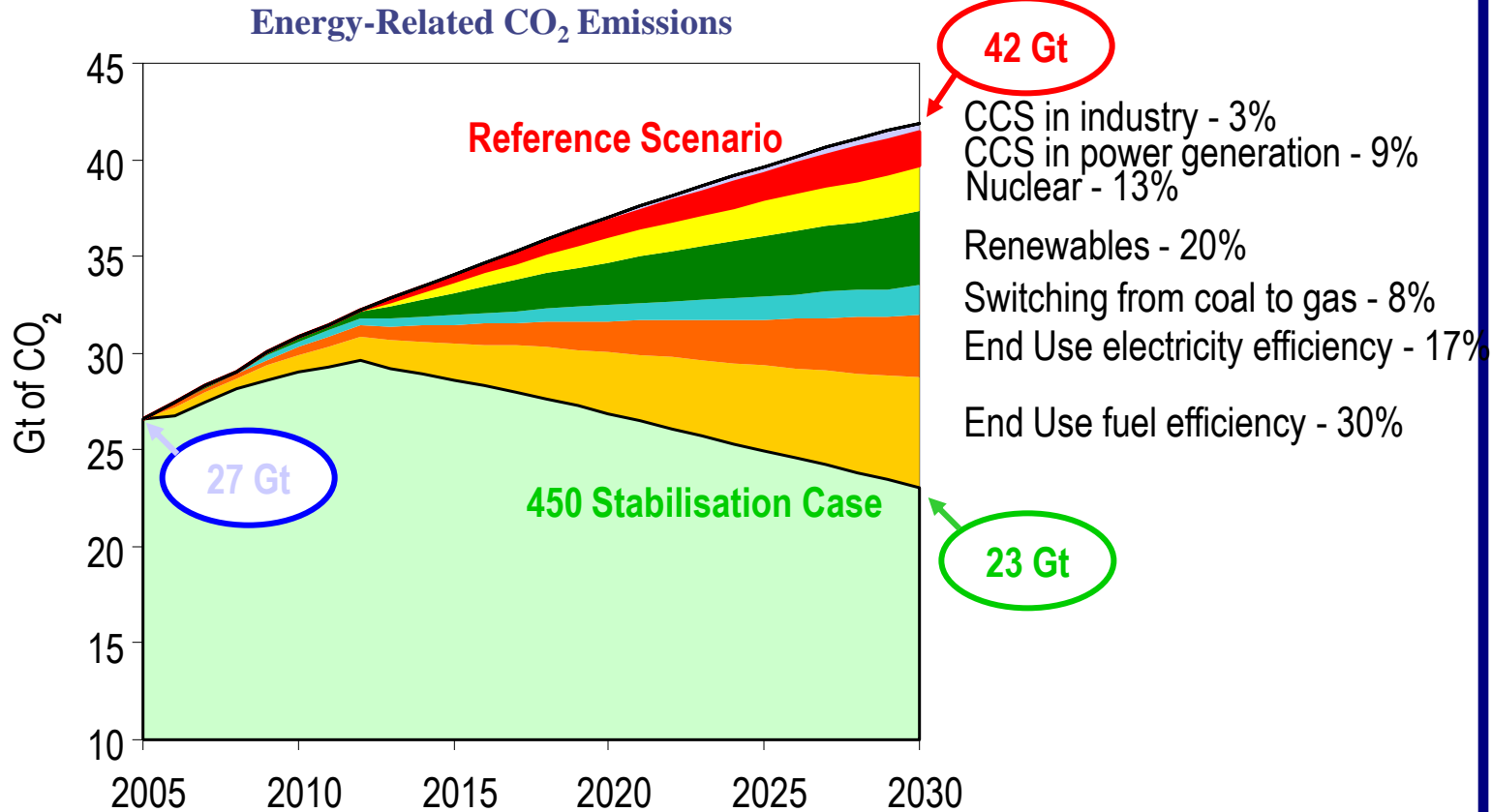
China and India account for 22 % of global energy investments



Challenge # 3: Climate change

CO₂ emissions are on an unsustainable path

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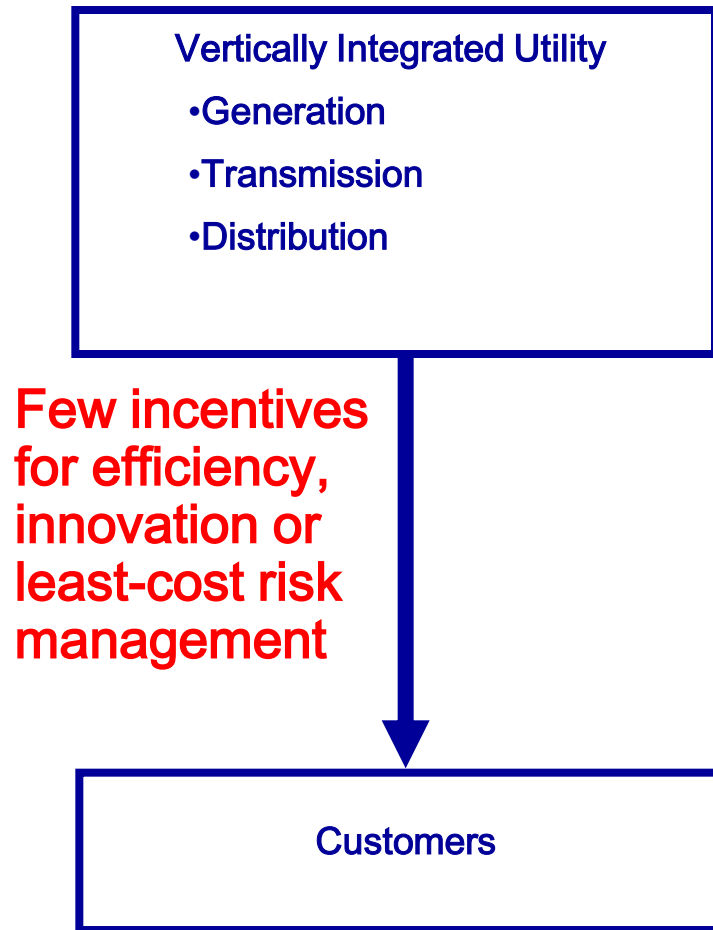


Stabilising greenhouse-gas concentration at 450 ppm would require emissions to be reduced to 23 Gt in 2030



Evolving market structure: Before reform

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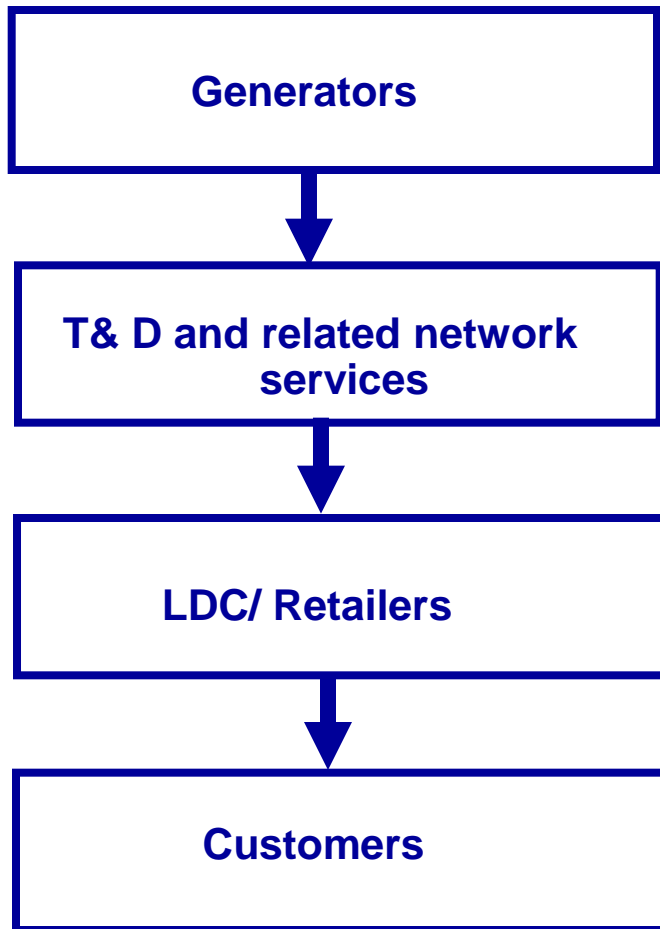


- Centralised investment decisions
- Investment driven by economies of scale
- All risks and costs passed-through
- Regulated return on investments



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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



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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

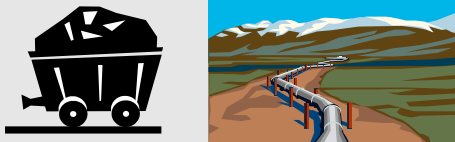
- Connect diversified generation sources to load centers
- Means to achieve energy diversification and competitive markets – open and non discriminatory access
- Can be a substitute to generation
- Planning is more complex
- Reliability and economic investments

“Unbundling” security of supply

Reliability of electricity supply

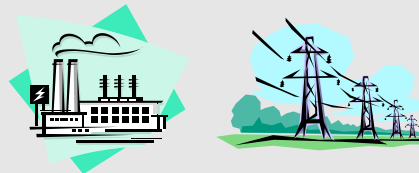


Energy security



Coal, natural gas, uranium...

Adequacy



*Generation capacity,
transmission and
distribution networks*

System security

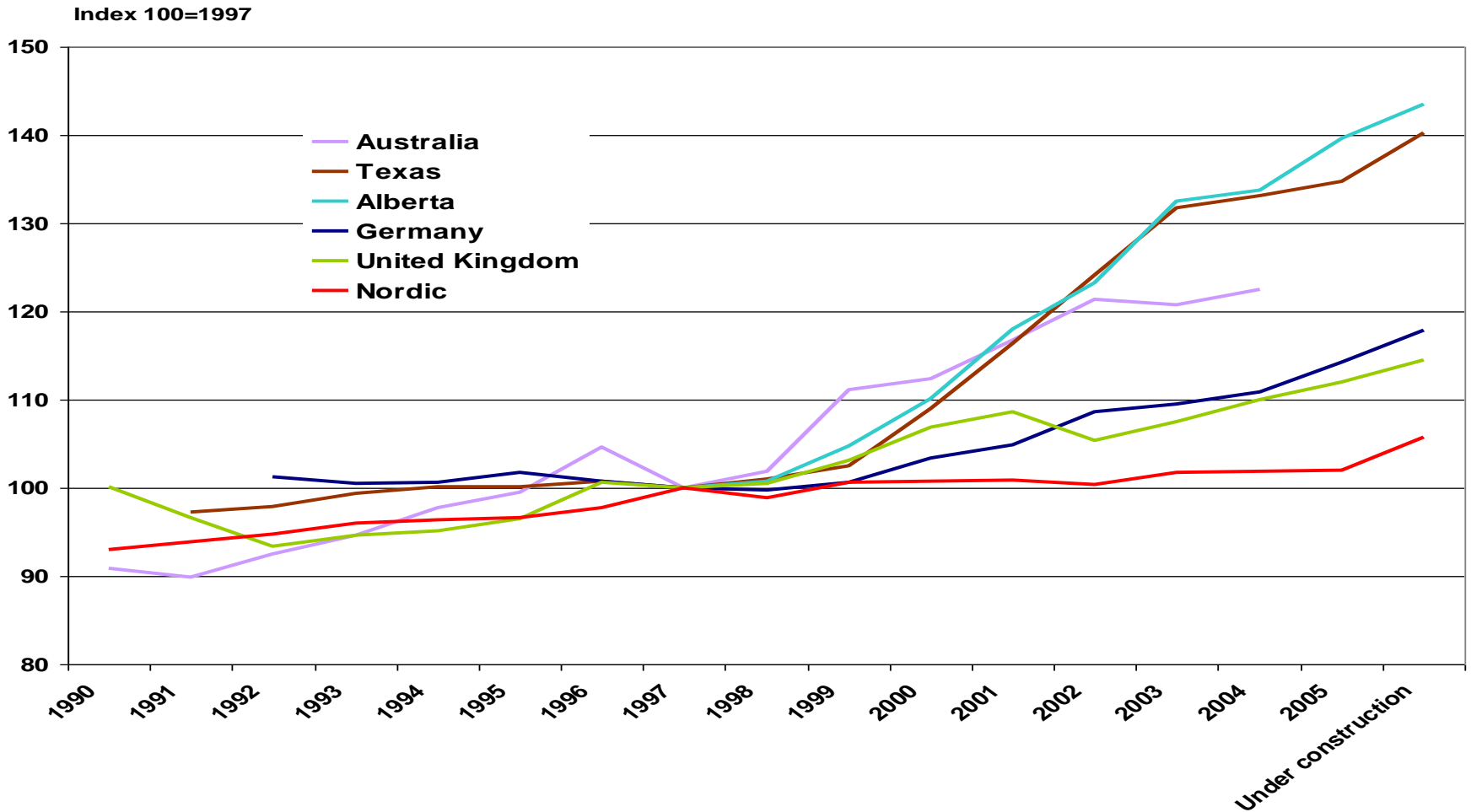


*Operation, control,
contingency management...*



Have markets failed to deliver investments in generation capacity?

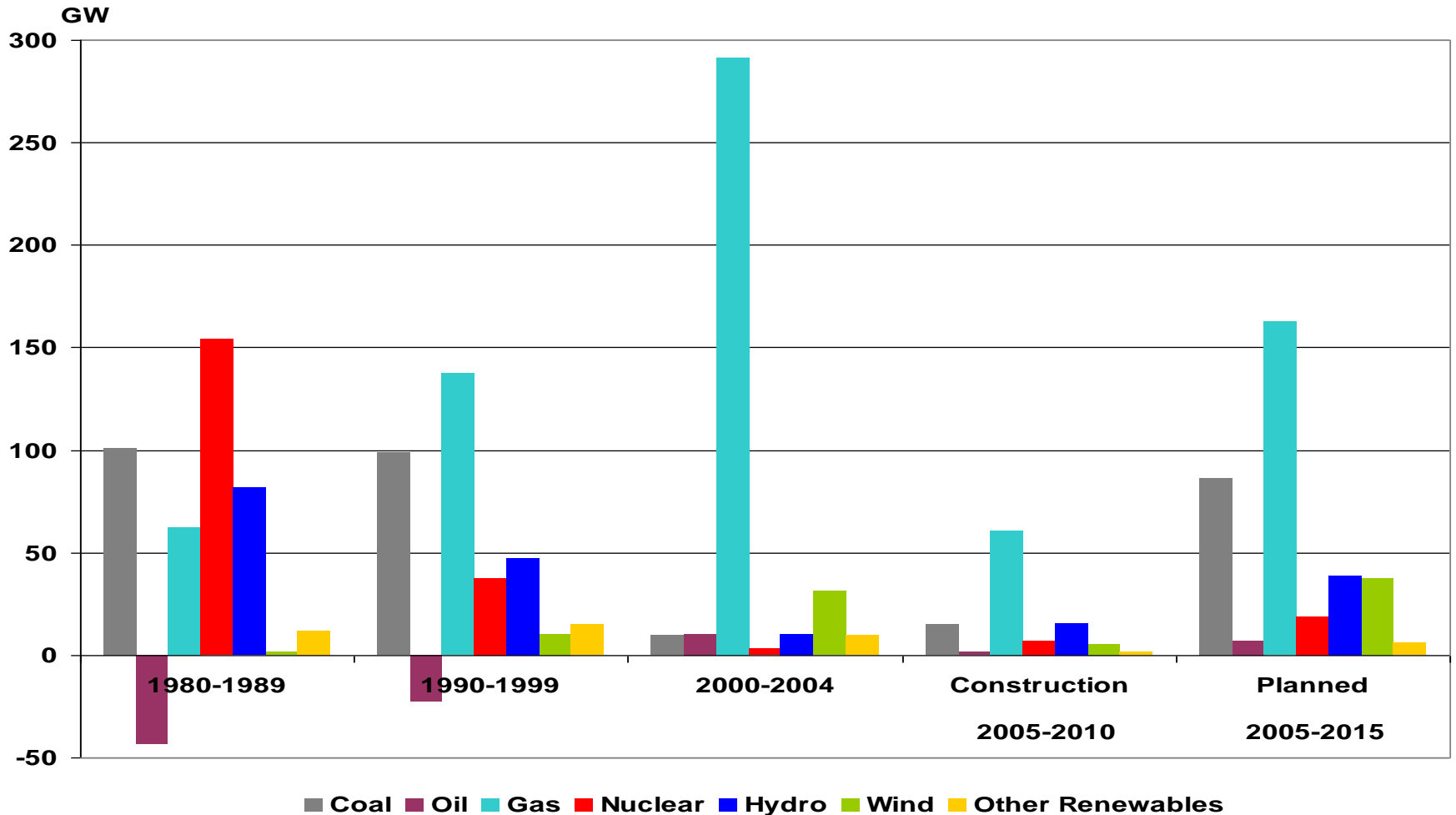
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Why markets have triggered dash-to-gas investments over the period 1990-2004 ?

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Risk and return assessment tends to favour investments in gas-fired power plants

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Technology	Unit Size	Lead Time	Capital Cost/ kW	Operating Cost	Fuel Cost	CO ₂ Emissions	Regulatory Risk
CCGT	Medium	Short	Low	Low	High	Medium	Low
Coal	Large	Long	High	Medium	Medium	High	High
Nuclear	Very large	Long	High	Medium	Low	Nil	High
Hydro	Very large	Long	Very high	Very low	Nil	Nil	High
Wind	Small	Short	High	Very low	Nil	Nil	Medium



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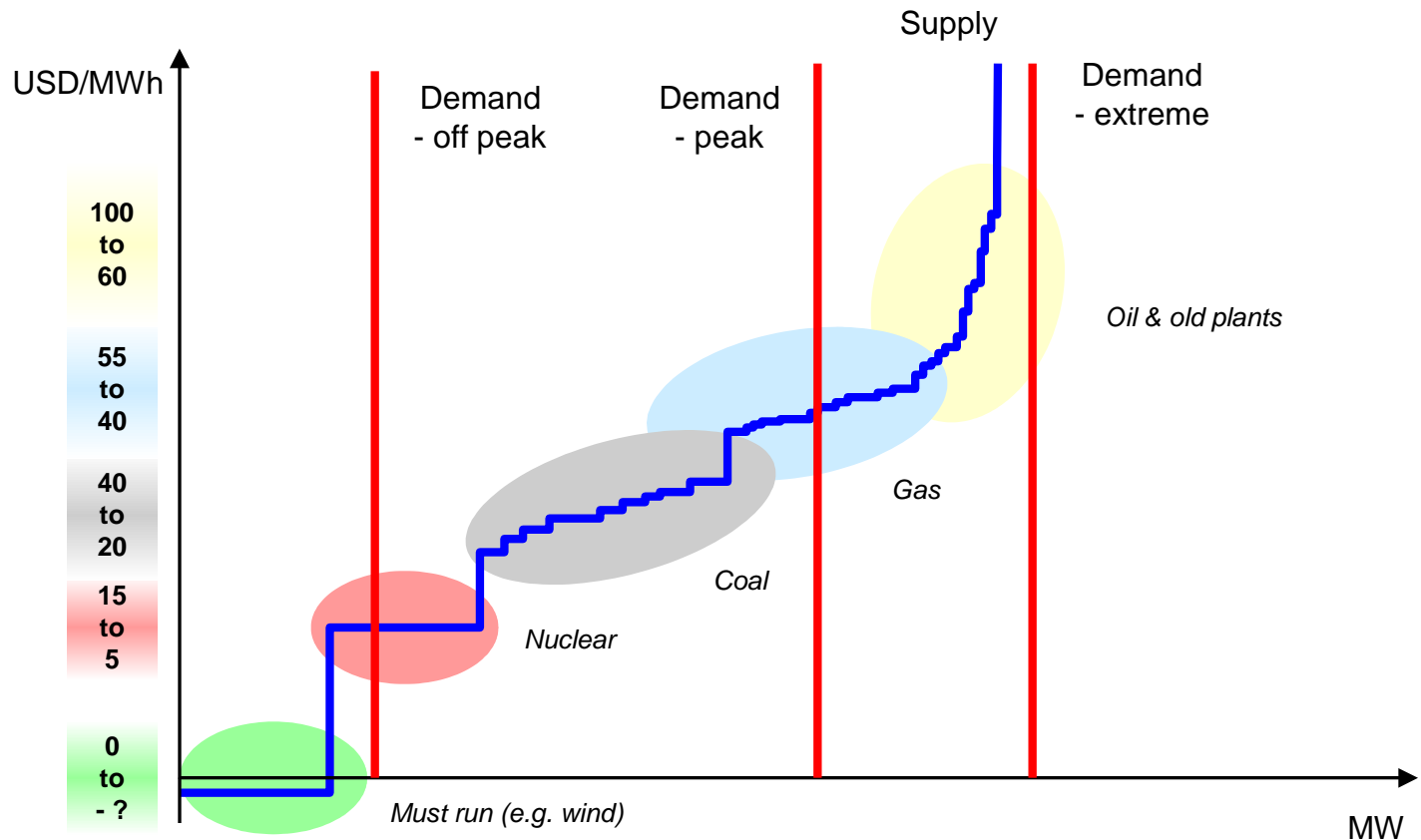
Market reform and grid reliability

- **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**



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Marginal pricing ensures optimal dispatch in competitive generation markets

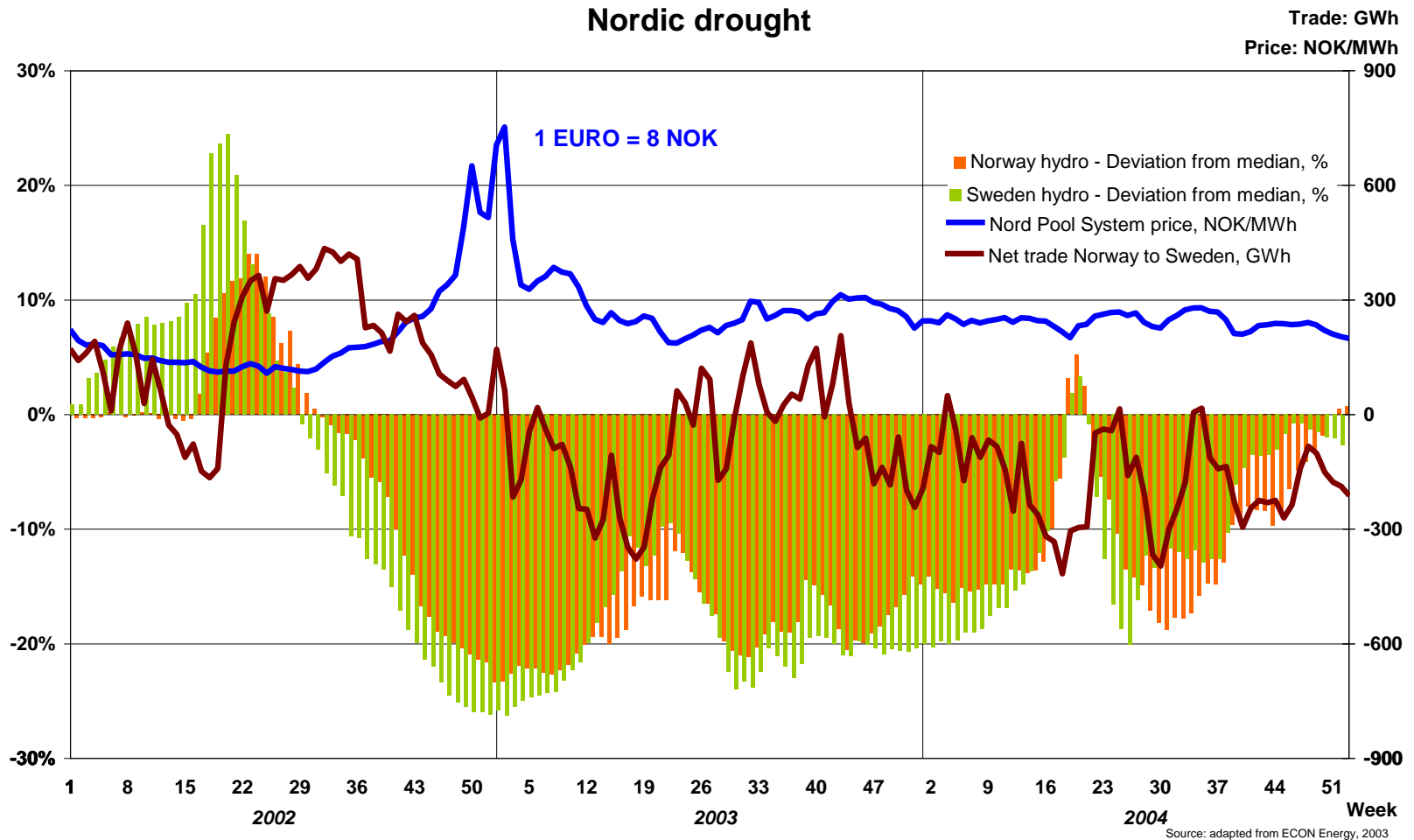


- Decentralised decision making in competitive markets is a strong instrument to ensure optimal dispatch
- Lack of price elasticity on the demand side may be the critical market failure for a robust price settlement at all times



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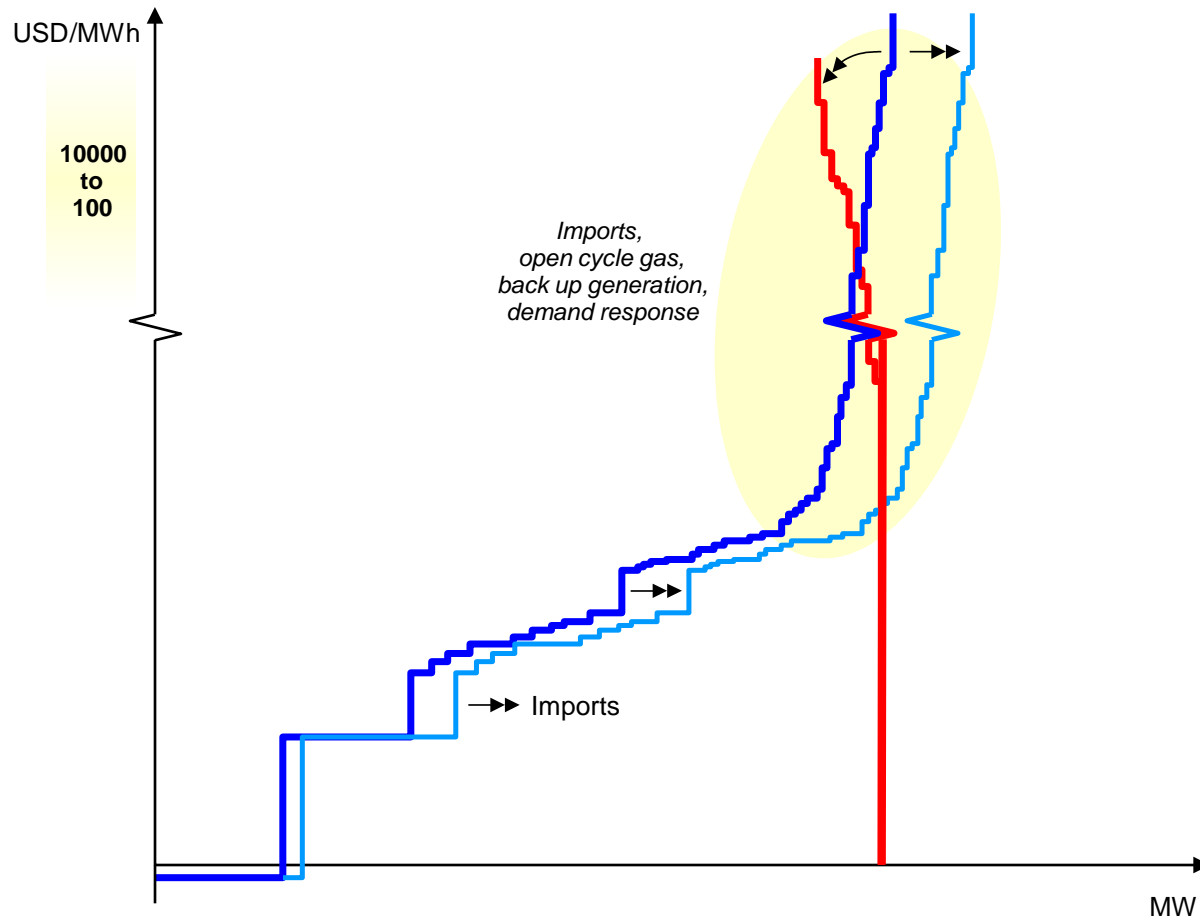
Example of price responsiveness in the Nordic markets





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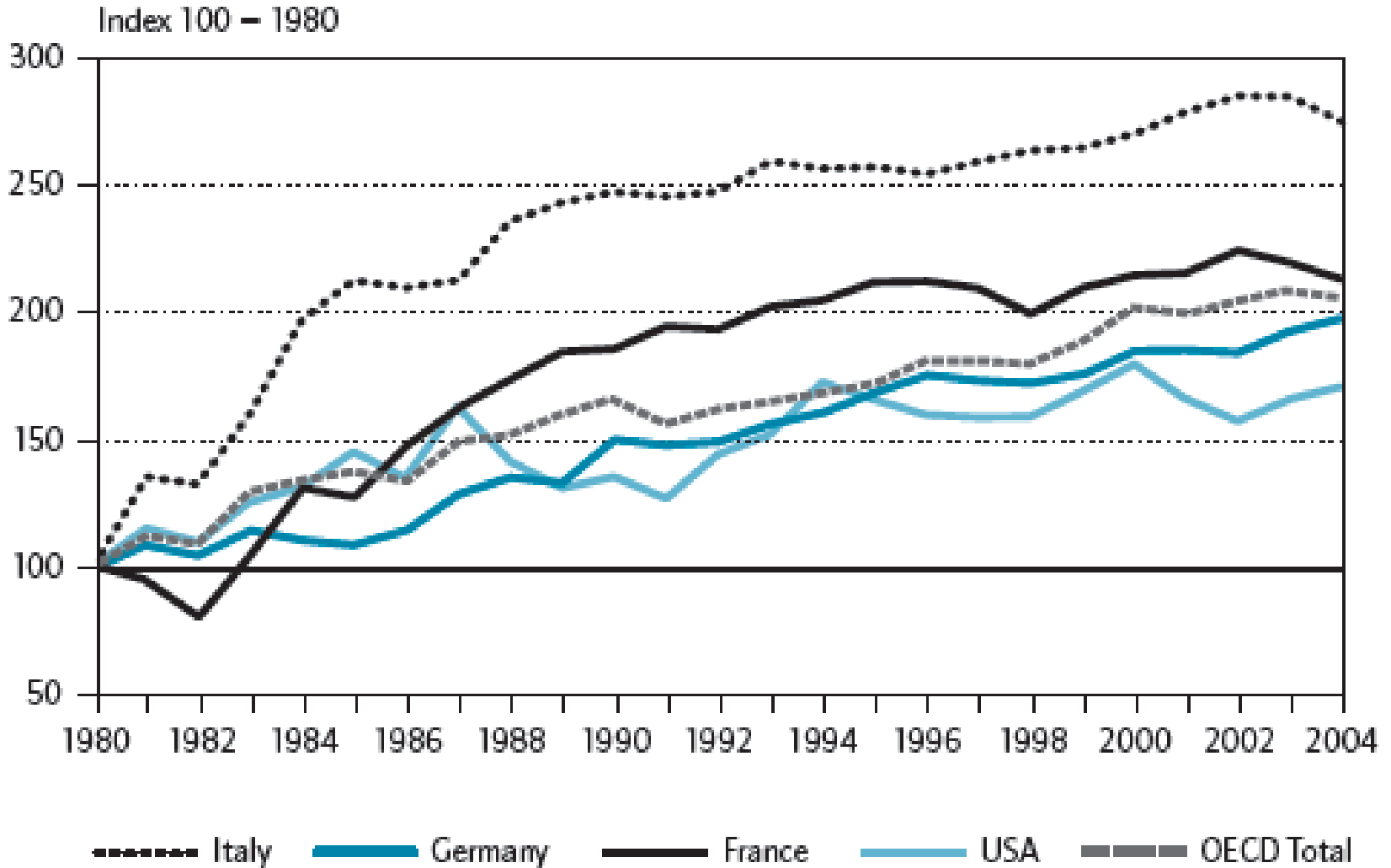
Flexibility is critical for market clearing in tight situations



- 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



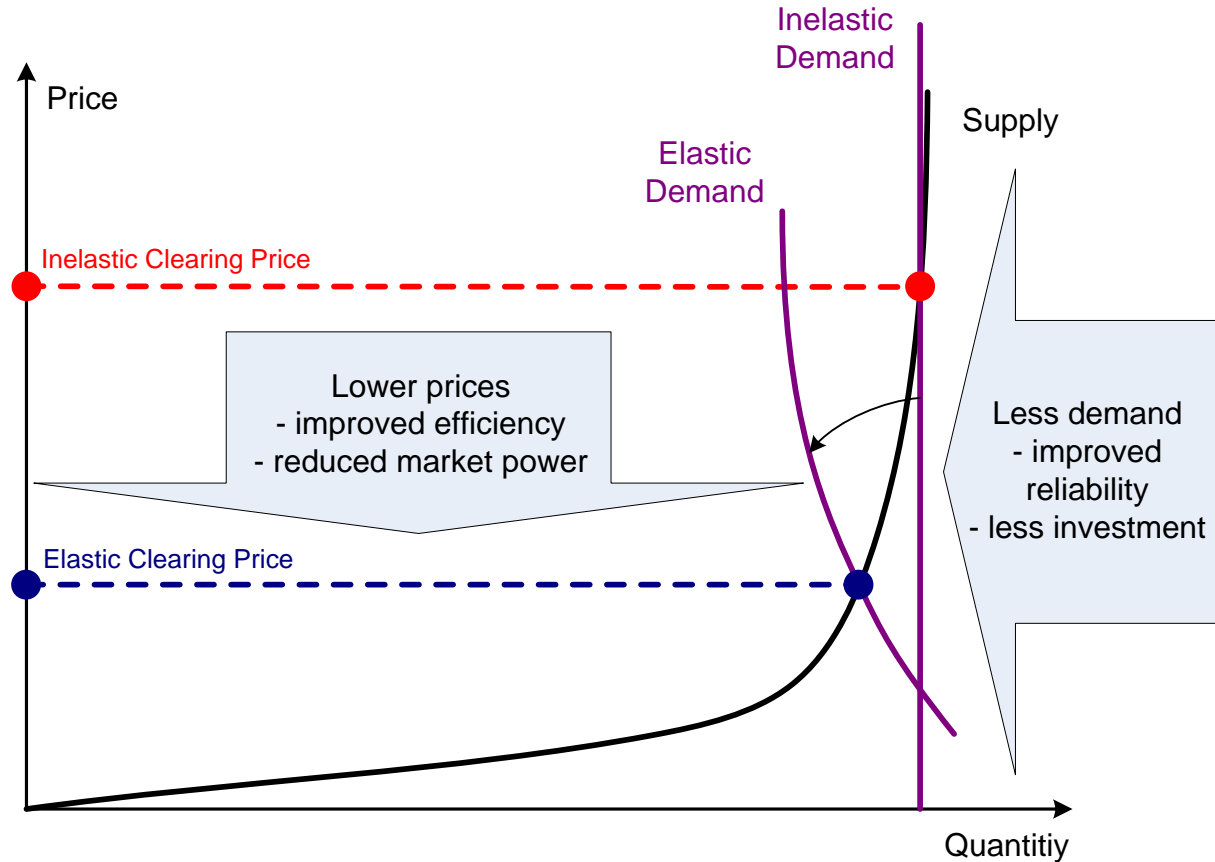
Increasing cross-border trade improves supply flexibility





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Demand participation makes markets work better

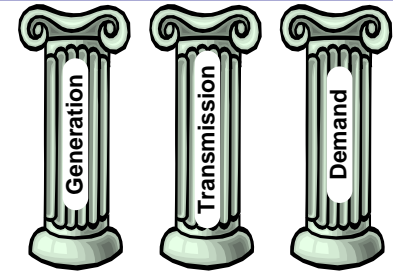


Consumption is not homogenous



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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



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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**



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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**



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Thank you!

Some references:

- **OECD/IEA, 2007: World Energy Outlook 2007 - China and India insights**
- **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**