



# **Volatile Electricity Prices, Government Intervention and Power Generation Investment**

**Peter Fraser**  
**International Energy Agency - IEA**  
**OECD Breakfast Series**  
**February 19, 2004**



# What's the IEA?

- Created in 1974 – now 26 members
- Energy policy “shared goals”
- Main tasks
  - ◆ Oil emergency stocks and oil markets
  - ◆ Energy statistics
  - ◆ Technology development
  - ◆ Policy Analysis
    - Country reviews of energy policies
    - World Energy Outlook
    - Energy and climate
    - Energy market reform



# Overview

- **Power generation investment outlook in IEA electricity markets**
- **Power generation investment and electricity prices**
- **Case studies**
- **Possible solutions**
- **Conclusions and recommendations**

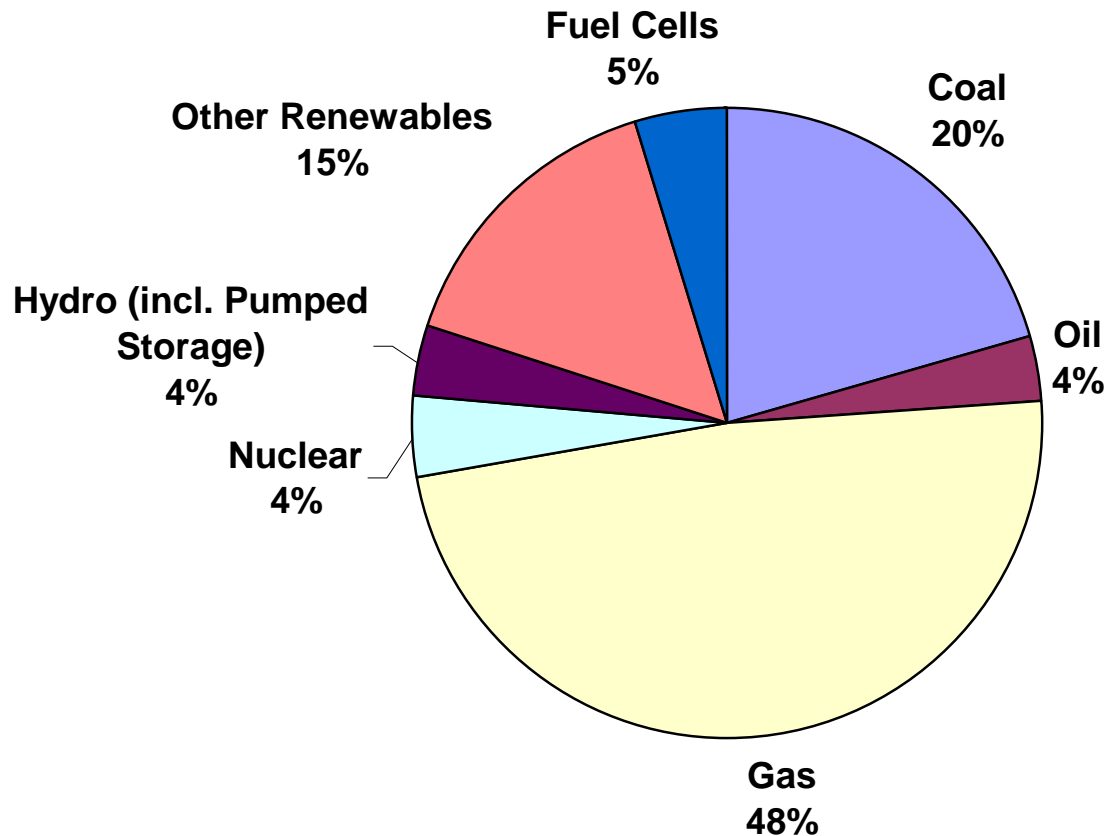


# Competitive Electricity Markets

- **Markets in 25 of 26 IEA countries.**
  - ◆ **Open to all in 9 countries, and parts of Australia, US, Canada**
  - ◆ **By 2007 consumers in all EU countries should have choice of supplier**
  - ◆ **Vision based on:**
    - **Competition and choice**
    - **Creation of a single market**



# Projected Capacity Additions 1999-2030



About \$2 trillion will be needed for generation investment, with gas making up half the total capacity.



# Security of Supply in Electricity Markets

- **New investment has favoured gas for economic reasons, but coal (and even nuclear) can be built**
- **Excess capacity is down**
- **But most markets are just beginning to approach their first investment cycle**

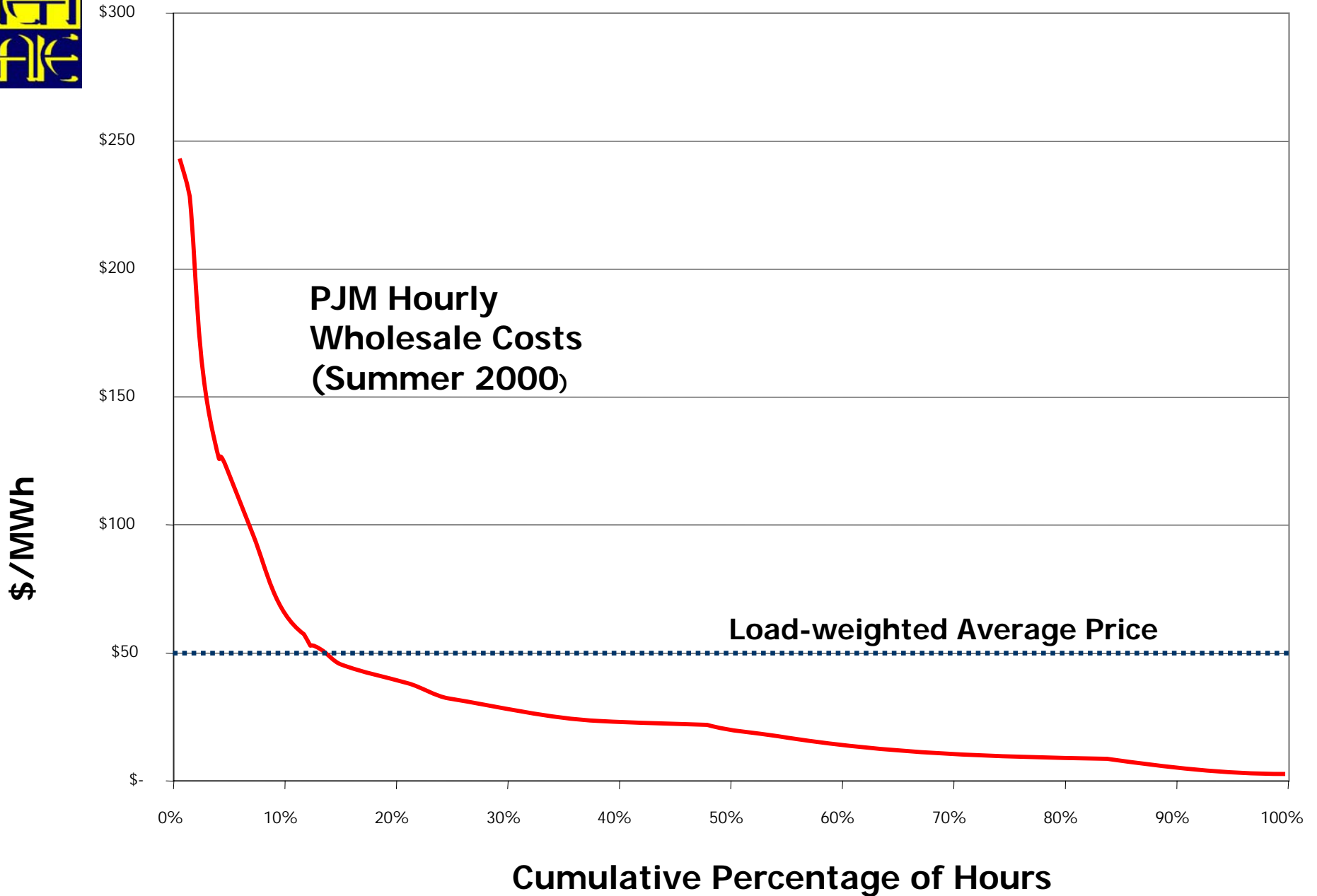


# Investment and electricity prices

- Demand for electricity varies by the minute, hour, day, season.
- Prices depend on demand/supply balance at any moment.
- Market prices act as reference prices for investors.
- Investment strategies for different type of plant:
  - ◆ Baseload (continuous operation, average price)
  - ◆ Midload (operate when prices favourable)
  - ◆ Peakload (like midload but over small number of hours)



# Prices in the Penn.- New Jersey – Maryland Market



Peaking capacity needs occasional high prices to be profitable.



# **Volatile Prices and Political Risk**

- **But the high prices may also increase prices to consumers**
- **High prices = high political concern and increases risk of intervention**
- **Such intervention can undermine investment**



# Case studies

- Report looks at “price crises” in five jurisdictions
- Discusses government response and impact on investment
- Lessons for government



# Price crises in liberalised markets

Jurisdiction	Cause of Price Crisis	Duration
Canada (Alberta)	High fuel prices, high electricity prices in neighbouring markets	1/2001 - 3/2001
New Zealand	Tight energy supply due to low rainfall	4/2001 -7/2001 and 4/2003 - 6/2003
Australia (South Australia)	Tight capacity due to rapid growth	1/2002 -3/2002
Nordpool	Tight energy supply due to low rainfall/cold winter	12/2002 - 03/2003
Canada (Ontario)	Demand growth, delay in capacity investment.	7/2002 - 7/2003

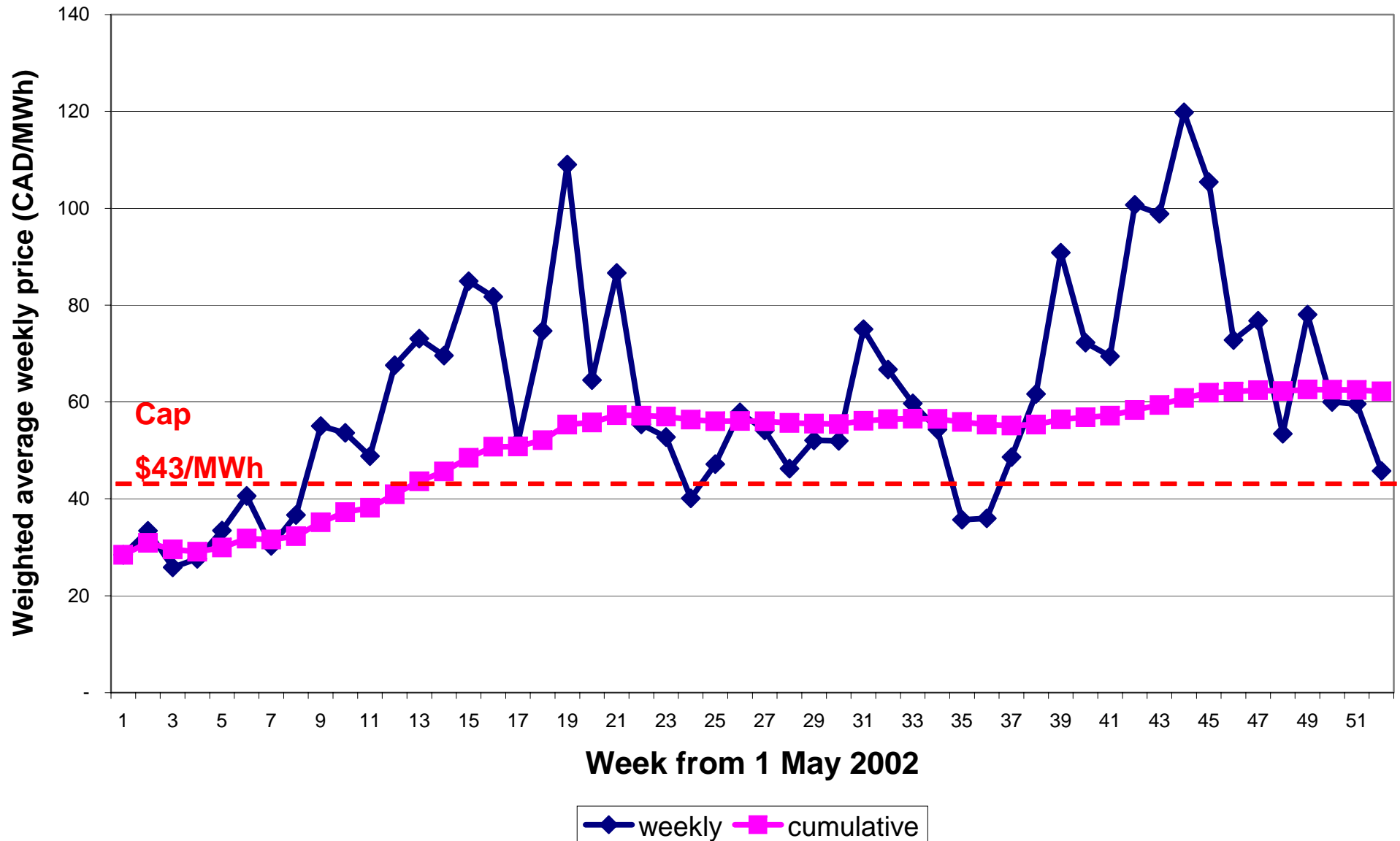


# Ontario market

- **Government opened market to all consumers in May 2002**
- **Tight market + hot summer = wholesale price rises 30%**
- **Nov 2002: Govt capped retail prices below cost until 2006 for about 50% of the market**
- **Consumers effectively “borrowing” to pay for their current consumption**



# Ontario prices and LRMC – well above cap level



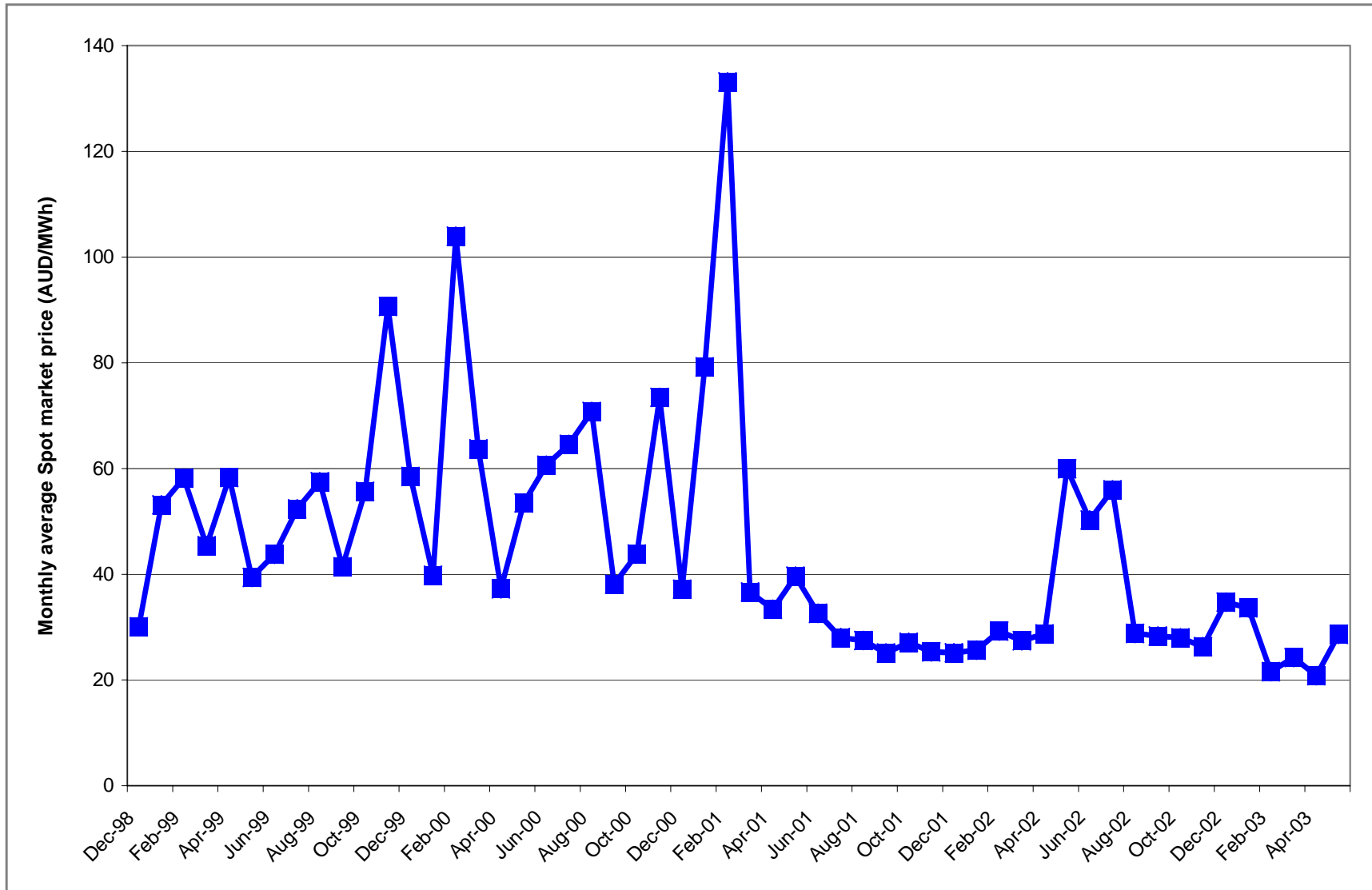


# Consequences

- **Government is caught in a trap**
  - ◆ Government “temporarily” intervenes to subsidise retail prices well below entry price for new generation
  - ↓
  - ◆ higher demand and discouraged investment (political risk)
  - ↓
  - ◆ even higher wholesale prices
  - ↓
  - ◆ higher government subsidies and blackout risks
  - ↓
  - ◆ Direct investment by government in new capacity
  - ◆ Government trapped itself into paying for higher prices and new supply!
- **New govt has corrected prices but will likely go for long-term power purchase agreements.**

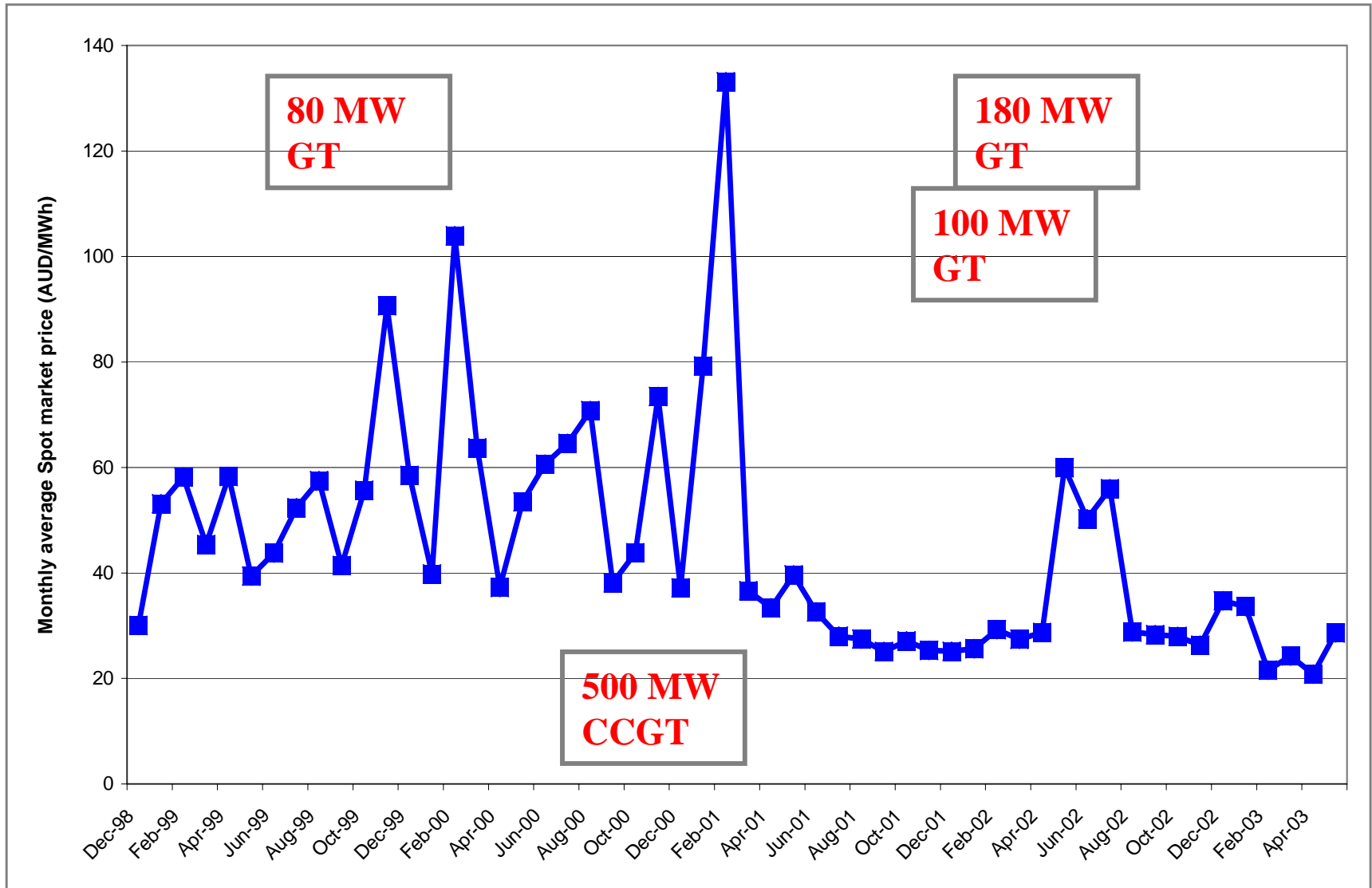


# South Australia – high prices when market opened





# led to 30% capacity increase





## ... that has been profitable

Earnings in AUD per kW (price – fuel cost)	1999	2000	2001	2002	Total	Capital Cost
Peak (Gas Turbine)	199	217	116	69	<b>601</b>	500
Mid (Combined Cycle)	293	319	186	130	<b>928</b>	1031
Base (Brown Coal)	433	456	325	266	<b>1480</b>	1500
Capacity Factor of Peaker	43%	43%	17%	15%		
Annual Average Price (AUD/MWh)	54.5	56.9	42.2	35.3		

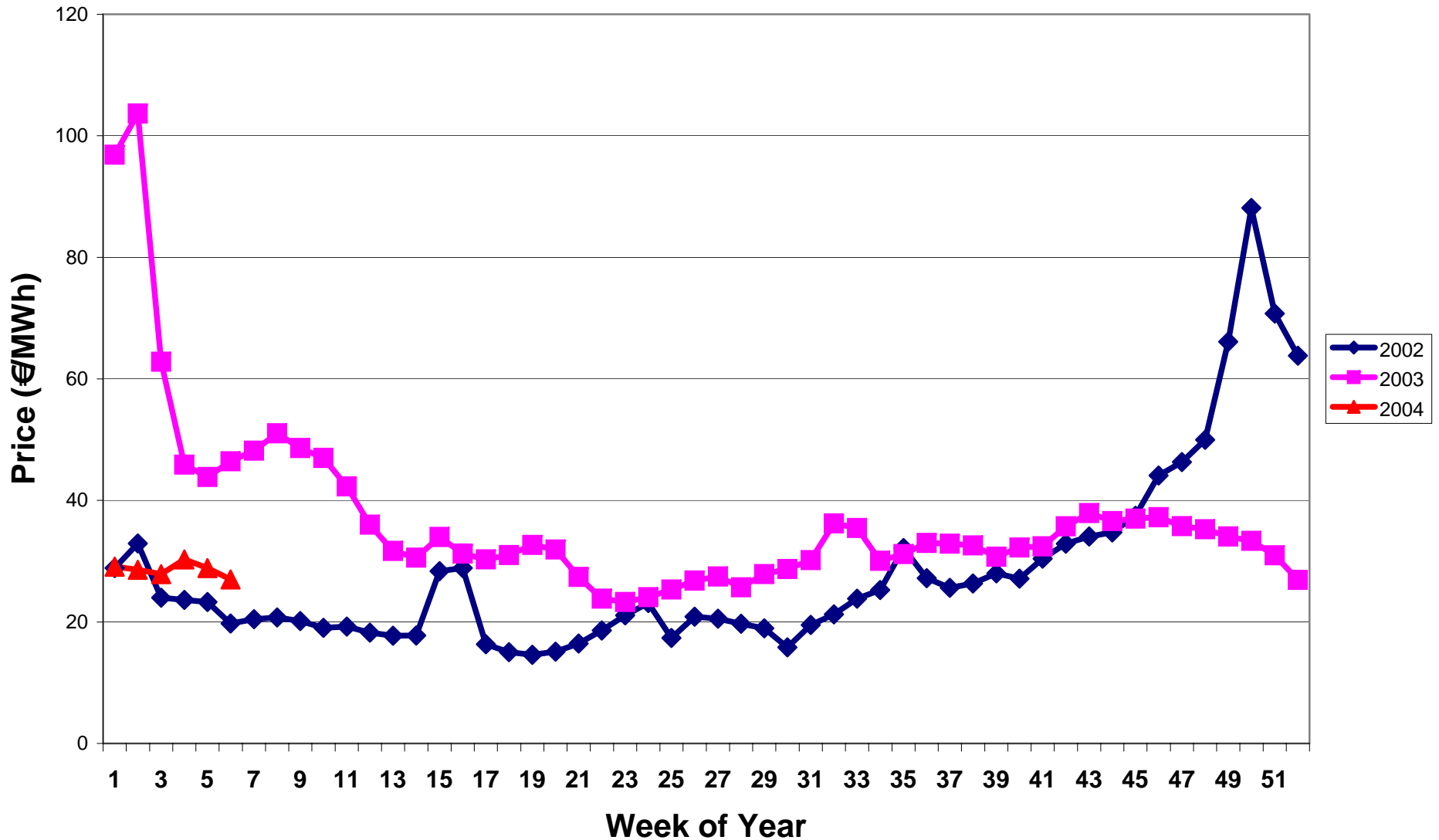


# Norway

- **An open market since 1991 supplied by hydropower (99.7%)**
- **Interconnected to Nordic market (Denmark, Sweden, Finland)**
- **Low prices in most years.**
- **Difficult to build new capacity**
  - ◆ **Now importing energy even in average year**
- **Lowest rainfall in autumn 2002 in 70 years led to drop in energy available**



# Norway: High market prices in 2003





## ... led to high retail prices for households, but not industry!

Customer group	Price Q1 2002 (ore/kWh)	Price Q1 2003 (ore/kWh)	Change (%)	% customers on fixed-price contracts
<b>Households</b>	<b>23.7</b>	<b>62.4</b>	<b>131</b>	<b>7.8%</b>
<b>Services</b>	<b>18.7</b>	<b>39.4</b>	<b>110</b>	<b>22.3%</b>
<b>Industry (excluding energy-intensive)</b>	<b>18.1</b>	<b>31.4</b>	<b>73</b>	<b>55.1%</b>
<b>Energy intensive industry</b>	<b>16.8</b>	<b>11.3</b>	<b>-32</b>	<b>99.5%*</b>



# Norway – results of the crisis

- **High prices in early 2003 led to:**
  - ◆ Demand cuts by large users
  - ◆ High bills for smaller consumers (+€700/a)
- **Government has resisted political pressure to “reregulate”**
  - ◆ Record of success
  - ◆ Temporary nature of the crisis
- **Focus on solutions**
  - ◆ Supply approvals
  - ◆ Demand response



# Possible solutions

- **Manage the situation**
  - ◆ Provide transitional arrangements for small consumers
  - ◆ Monitor for manipulation
- **Act as “last resort” builder**
  - ◆ Offer tenders (Ireland)
- **Capacity/resource adequacy mechanisms**
- **Demand response**



## SA: A low price cap might have discouraged peakers

	1999	2000	2001	2002	Total
Peaker earnings (AUD/kW with existing cap )	199	217	116	69	601
Peaker earnings (AUD/kW with lower cap)	159	171	79	54	463
Difference (AUD/kW)	40	46	37	15	138
No. of hours affected	28.5	29.5	24	12	94
Impact on annual average price	- 8%	-10%	-9%	- 5%	

If prices in the market are capped too low, a separate mechanism is needed to encourage peak capacity.



## Capacity mechanisms and volatility

- **Several jurisdictions have recently rejected the idea (Nordic ministers, UK, Ireland, Australia). Concerns about cost, effectiveness.**
- **Seen in some jurisdictions (e.g., US FERC) as a means to rely less on volatile prices**
- **If political risk of intervention is high, may be adopted as second-best solution.**

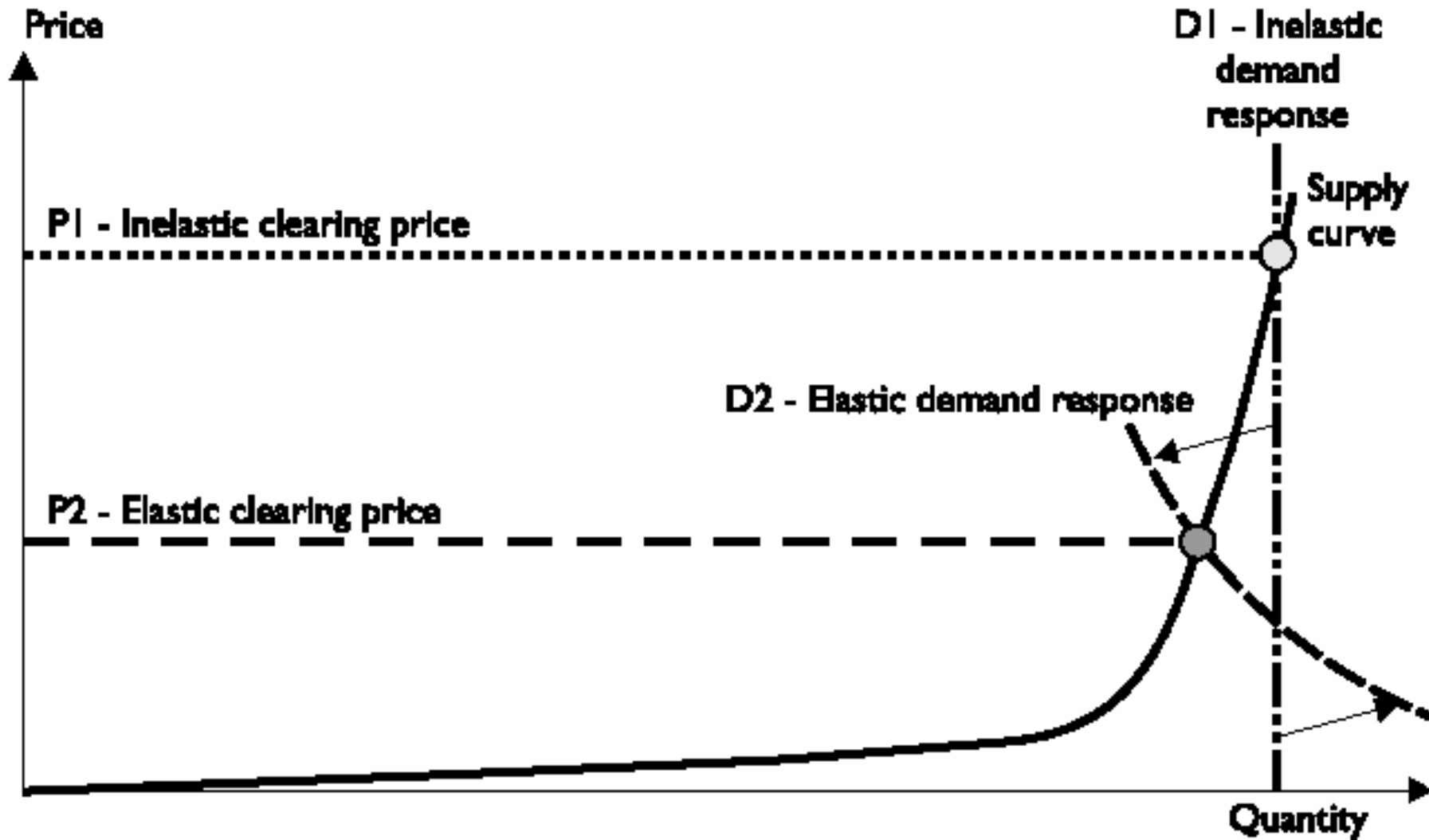


# Demand response is key

- **Electricity prices are high and volatile because high spot prices do not deter consumption**
  - ◆ **While everyone wants some electricity at all times, certain uses are not critical and can be deferred.**
    - **Electric water heaters, cycling air conditioning**
  - ◆ **Consumers with on-site power generation can turn it on during peak periods.**
    - **“Emergency” on-site generation for buildings in CA amounts to 6% of peak load, but was not used during the crisis**
  - ◆ **A strong demand response would:**
    - **Limit price rises**
    - **Limit market power under tight conditions**
    - **Lower costs a lot in the short term, more moderately in the medium term**



# Increasing Demand Response Makes Markets Work Better





# How to get more demand response

- ◆ **Consumers lack the means and incentives to do so**
- ◆ **The means include:**
  - A modern infrastructure (hourly meters) that measures consumption and could control some uses (e.g., water heaters)
  - In Italy, 30 million such meters are in the process of being installed.
- ◆ **The main incentive is price**
  - Exposing the customer to hourly prices (ideal)
  - Paying customers to cut consumption when prices are above a certain level (second-best)



# Conclusions

- **Volatile electricity prices encourage investment in the different types of plants needed.**
- **Governments need to allow markets to work but must:**
  - ◆ **Define their role a priori**
  - ◆ **Manage transitions particularly for small consumers**
  - ◆ **Monitor markets to avoid manipulation**
  - ◆ **Encourage demand response**



**Thank You for your attention**

**More information:**

**[www.iea.org](http://www.iea.org)**

**Contacts:**

**Peter Fraser**

**([peter.fraser@iea.org](mailto:peter.fraser@iea.org))**