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# Theory of national instruments of climate policy

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# **Structure of presentation**

- **National climate policy instruments**
  - Regulation
  - Taxes
  - Emissions trading
  - Voluntary agreements
  - Subsidies
  - R&D programmes
  - Information instruments

# Regulation

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- **Technology standards**

- mandate specific emission abatement technologies or production methods
- specific carbon dioxide capture and storage methods on a power plant

- **Performance standards**

- mandate specific environmental outcomes per unit of product.
- certain number of grams of CO<sub>2</sub> per kWh of electricity generated.

- **Product standards**

- requirement that refrigerators operate at least at a specified level of efficiency.

- **Technology-forcing standards**

- efficiency requirement slightly beyond technological feasibility
- go into effect only a number of years after announcement

# Regulation

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- **Technology standards are best used when there are few options open to the emitter for controlling emissions**

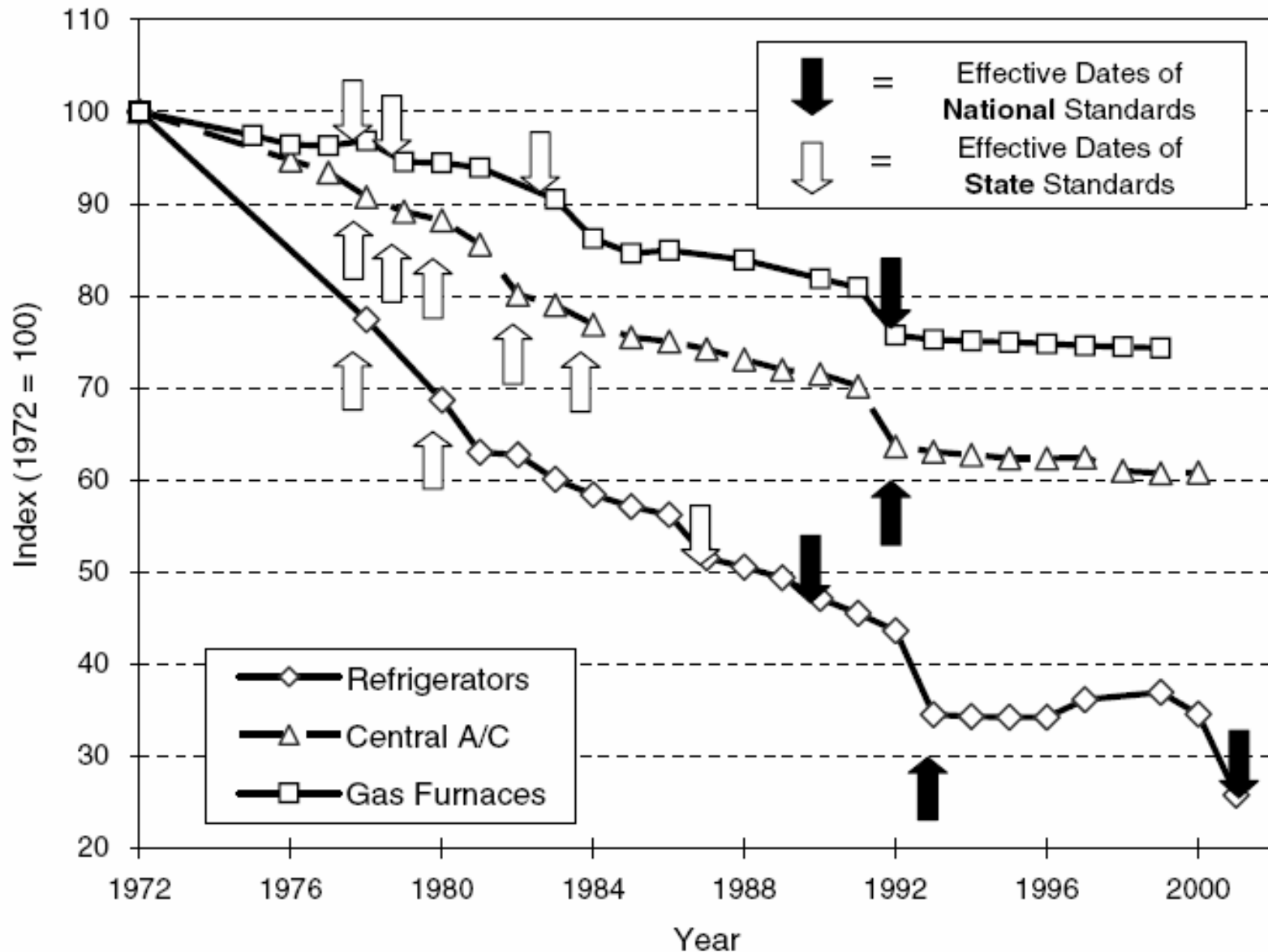
- Regulator can specify the technological steps
- Regulator must have good information on the abatement costs and options open to each firm

- **Losses in cost effectiveness arise when**

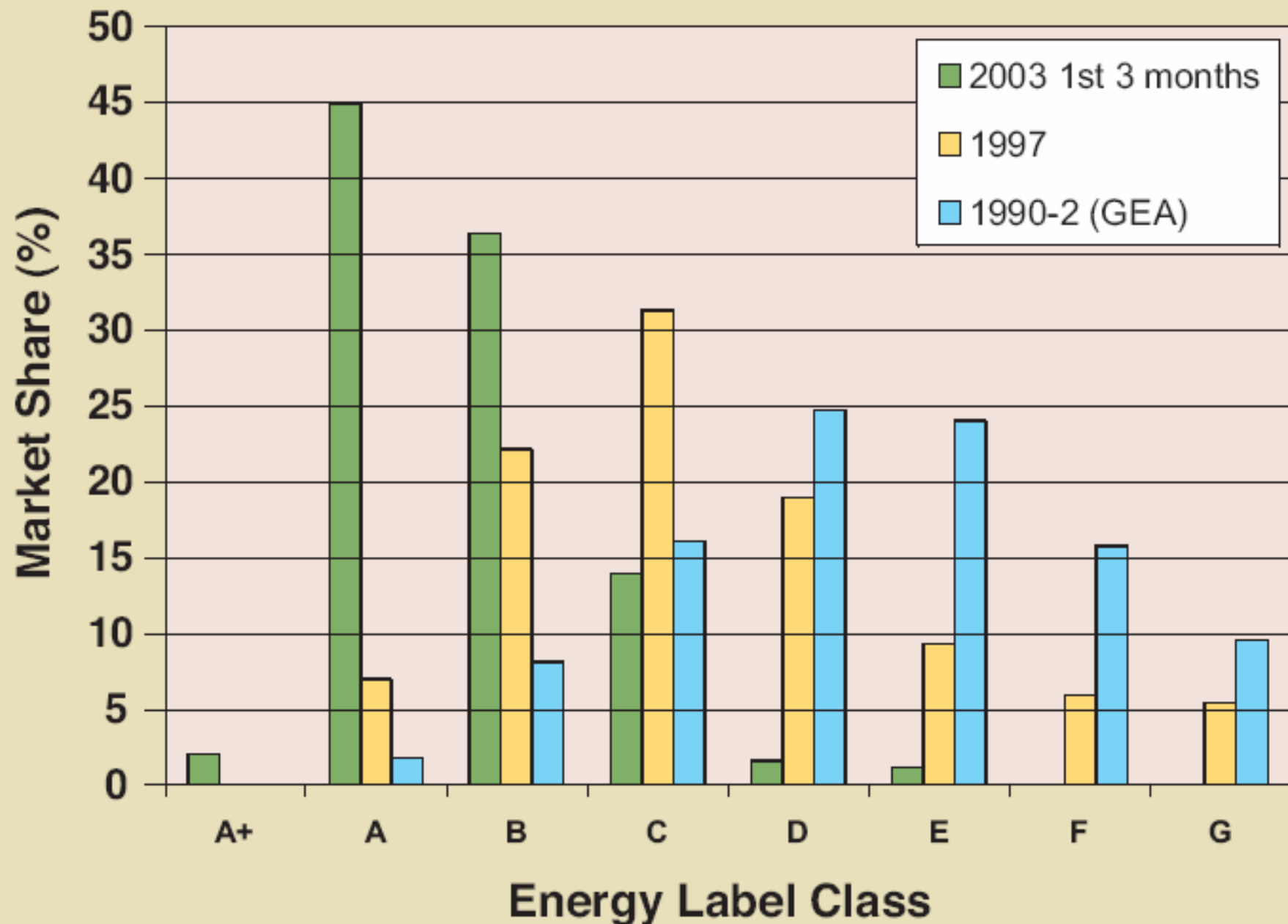
- Regulators are less well informed
- Technology standards are applied uniformly to a variety of firms

- **Do not give emitters incentives to look for better ways to reduce emissions**

# Technology standards in the US



# Refrigerator standards+labels in the EU



# **Regulation**

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- **Standards make sense when**
  - firms are not responsive to price signals
  - informational barriers prevent firms or individuals from responding solely to price signals

# **Taxes**

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- **Emitters will undertake the least expensive reductions throughout the economy**
  - **Cost-efficiency!**
- **Do not ensure a specific level of emissions**
  - **Need for adjustment**
- **CO<sub>2</sub> emissions in Denmark decreased 5% between 1996 and 1997 when the tax rate was raised**
- **Are politically difficult to implement**



# CO<sub>2</sub> taxes in Scandinavia

- **Sweden 1991, 0.7% of GDP (1.5 billion €), 42 €/t CO<sub>2</sub>**
  - Industry gets reduction by 70%,
- **Norway 1991, 0.6% of GDP (0.8 billion €)**
  - Offshore pays 50%
- **Denmark 1992, 0.4 % of GDP, (0.7 billion €), 13 €/t CO<sub>2</sub>**
  - Industry can reduce tax if it does energy audits
- **Finland 1990, 0.4% of GDP, (0.5 billion €), 17 €/t CO<sub>2</sub>**

# CO<sub>2</sub> taxes in Scandinavia II

	Sweden	Norway	Finland	Denmark
	€/tonne CO <sub>2</sub>			
<b>Total</b>	<b>23</b>	<b>16</b>	<b>8</b>	<b>10</b>
Households	43	17	46	23
All industries	17	15	6	7
Agriculture and fishing	36	13	16	15
Mining and quarrying	14	40	12	1
Manufacturing	9	5	6	14
Electricity, gas and water supply	13	7	1	0
Construction	44	21	17	13
Wholesale and retail trade	43	11	14	42
Transport, storage and communication	15	9	6	9
Financial intermediation	43	218	•	107
Public administration and services	39	25	•	59



# **The CCL in the UK**

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- **Gas taxed more heavily than coal**
  - Political interest to keep coal power plants
- **Electricity generators have no incentive for fuel switch as tax is levied downstream rather than upstream**
- **Exemption of households**
  - Issue of “fuel poverty”
- **80% reduction of tax if climate change agreement signed**
  - Targets of agreements largely business-as-usual

# **Emissions trading**

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- **Fixes quantity of emissions**
- **Is cost-efficient**
- **Can be implemented “upstream” or “downstream”**
  - Downstream requires monitoring on plant level
- **Problem of allowance allocation**
  - Free allocation (“grandfathering”)
  - Auctioning

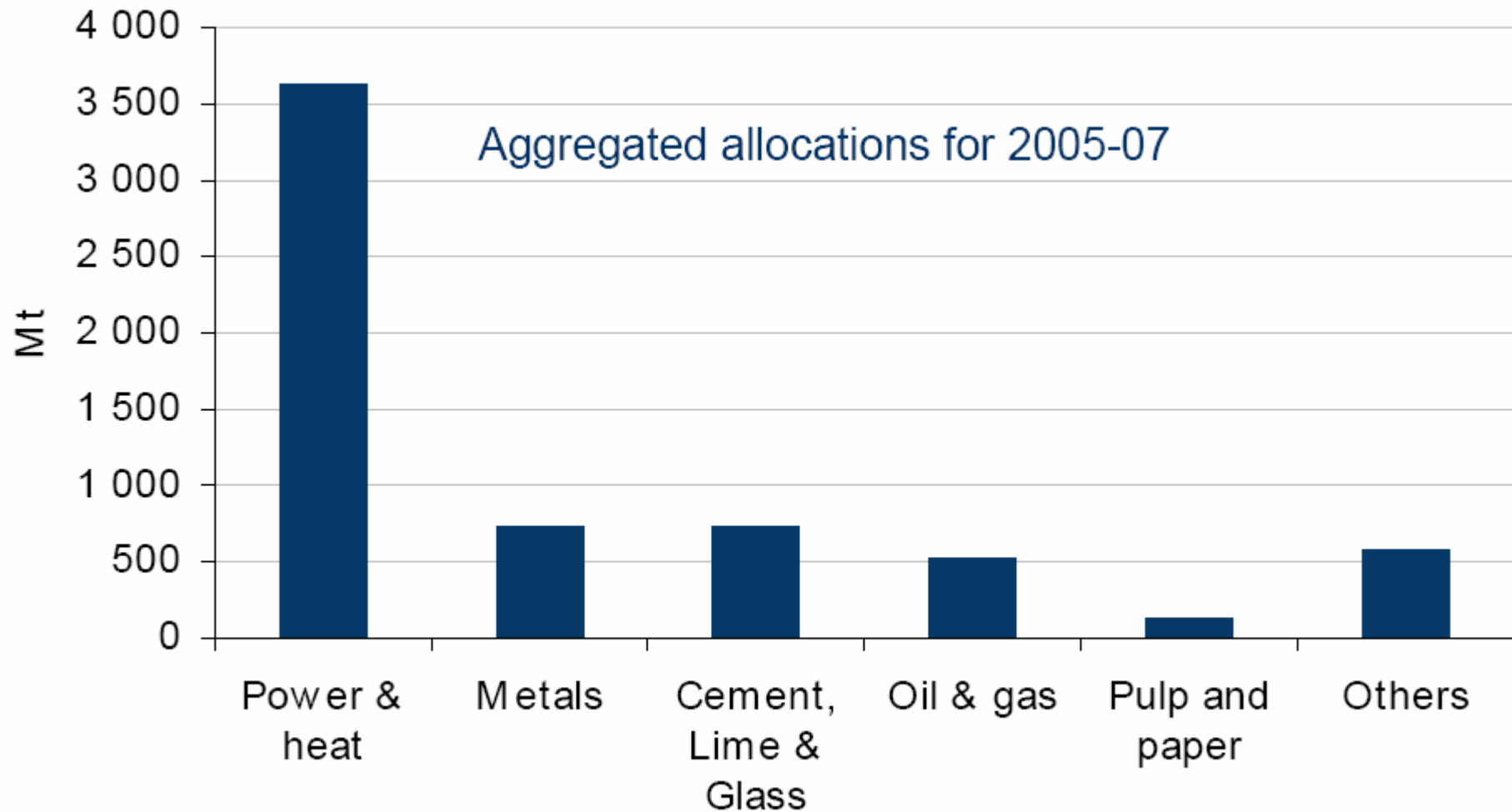
# Emissions trading in the EU

- Decided in 2003
- Started in Jan. 2005
- Member states allocate allowances, but Commission can make changes

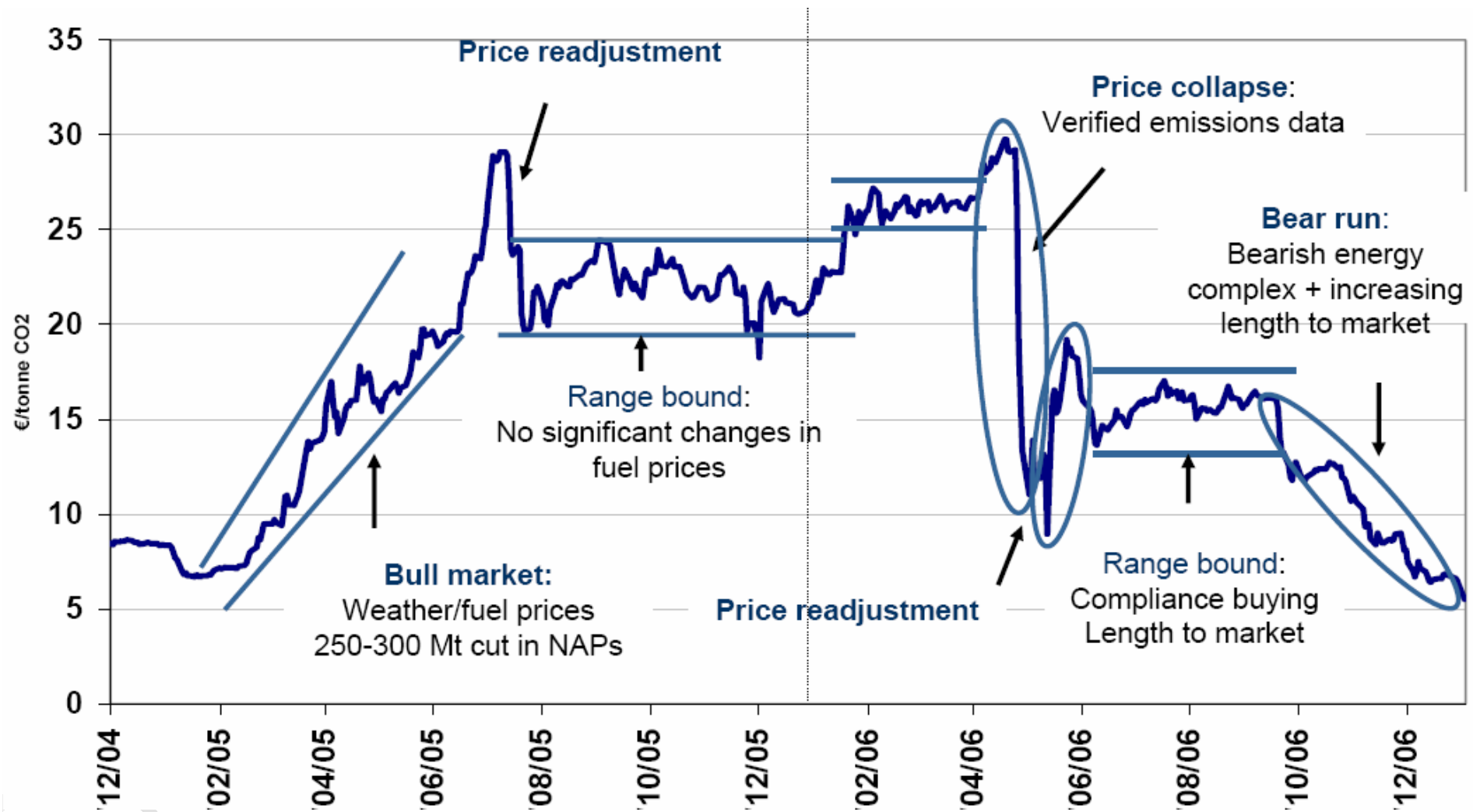


# Emissions trading in the EU

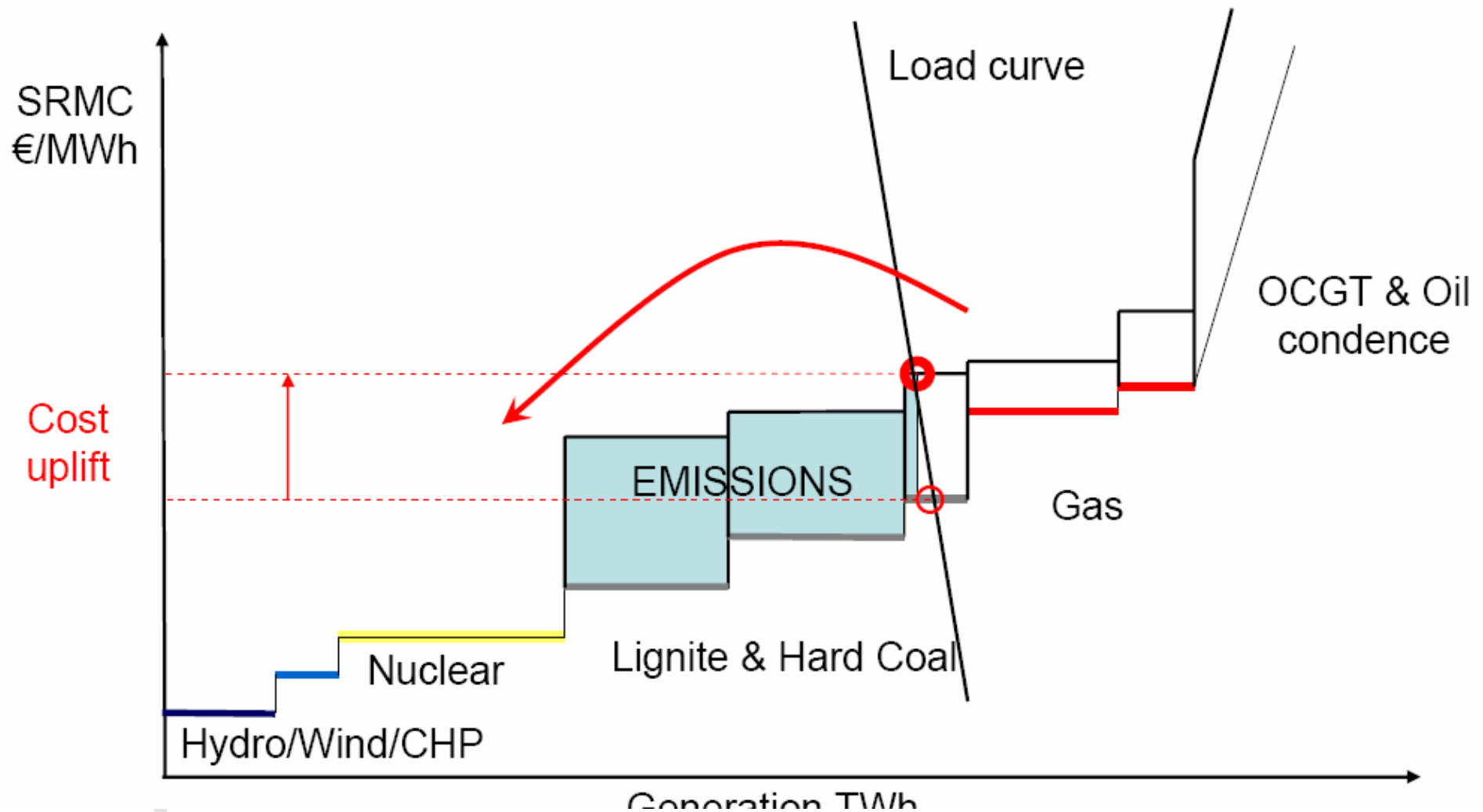
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# Prices in the EU trading scheme

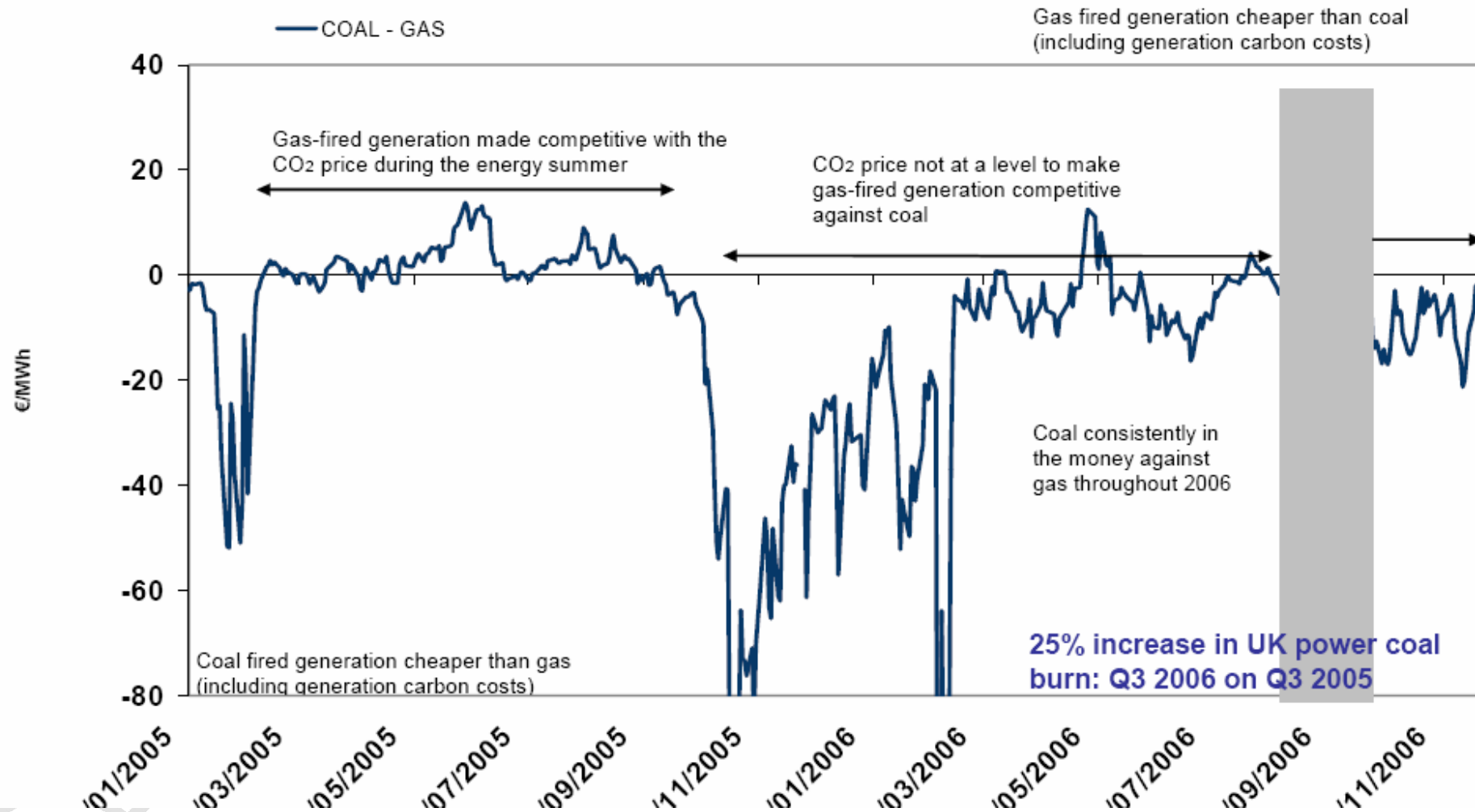


# Power price effects of EU trading





# Fuel switch effects of EU trading



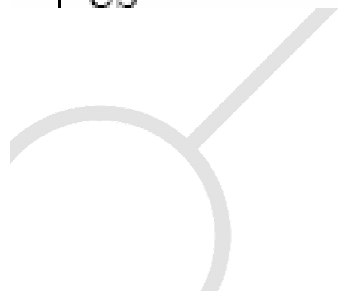
# **Voluntary agreements**

- **Agreements between a government authority and private parties to achieve emissions objectives beyond compliance with regulated obligations**
- **Politically fashionable**
  - Germany: failure
  - Netherlands: mitigated success
  - EU car manufacturers: failure
- **Ineffective unless sanctions / threat with introduction of mandatory instruments**

# Voluntary agreements

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Country	VA Scheme	Program Years
<i>Completely Voluntary</i>		
Australia	Greenhouse Challenge	1996-present
Canada	Industry Program for Energy Conservation	1975-2003
Finland	Action Programme for Industrial Energy Conservation	1992-1997
Finland	Agreements on the Promotion of Energy Conservation in Industry	1997-present
France	Voluntary Agreements on CO2 Reductions	1996-2002
Ireland	The Self Audit Scheme	1994-1997
Korea (S.)	VA System For Energy Conservation & Reduction of GHG Emissions	1998-present
Sweden	EKO-Energi Programme	1994-2002
Taipei (Taiwan)	Energy Auditing Program	2002-2020
US	ClimateVISION	2003-present

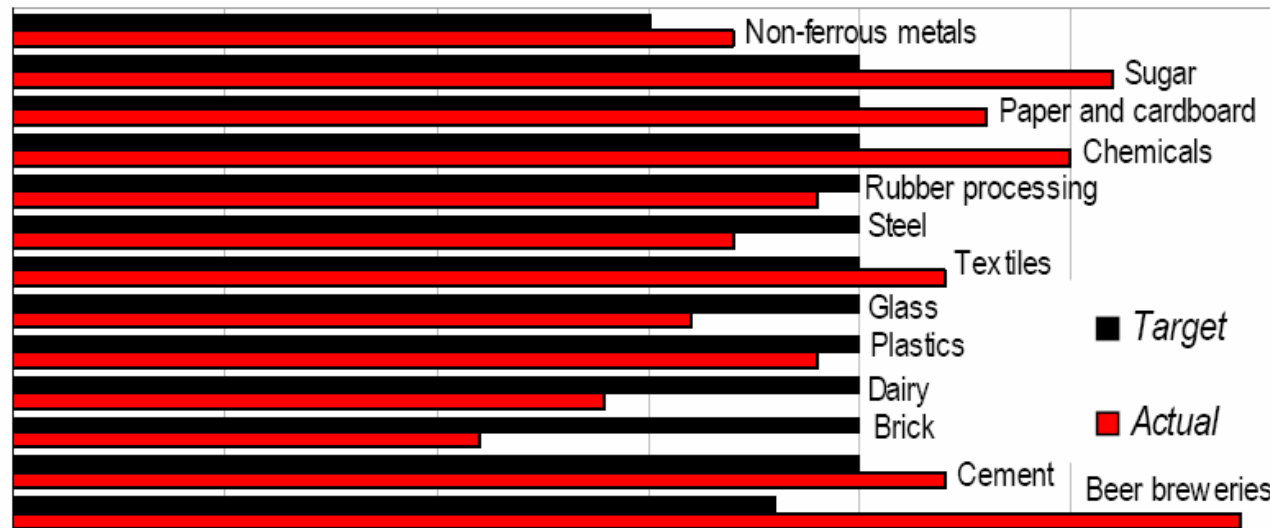
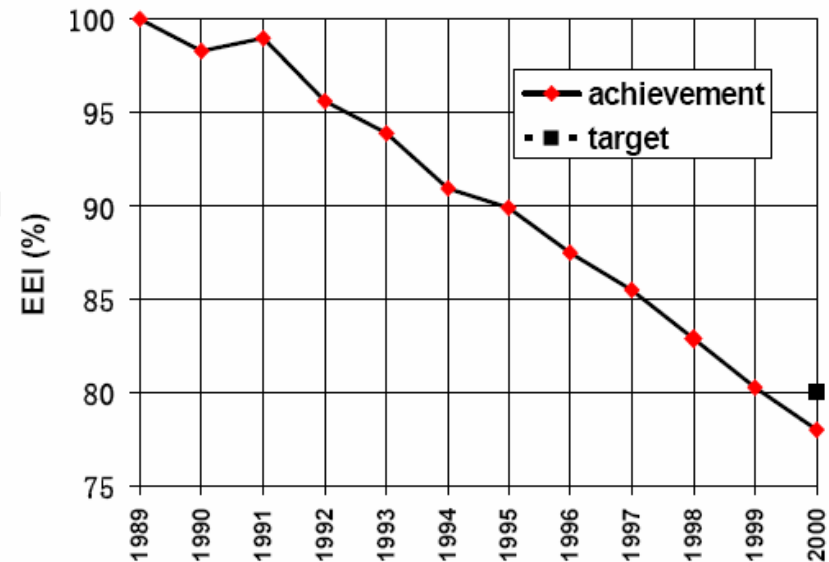


# Voluntary agreements

<i>Threatened Regulations or Taxes</i>		
France	AERES Negotiated Agreements	2002-present
Germany	Declaration of German Industry on Global Warming Prevention	1995-2000
Germany	Agreement on Climate Protection	2000-2012
Japan	Keidanren Voluntary Action Plan on the Environment	1997-present
Netherlands	Long Term Agreements on Industrial Energy Efficiency	1989-2000
Netherlands	Benchmarking Covenants	2001-2012
New Zealand	VAs to Limit Carbon Dioxide Emissions	1995-2000
<i>Energy/GHG Taxes or Regulations</i>		
Canada	Large Final Emitters Program	2003-2012
Denmark	Agreements on Industrial Energy Efficiency	1993-present
Ireland	Negotiated Energy Agreements Pilot Project	2002-2003
New Zealand	Negotiated Greenhouse Agreements	2003-2012
Switzerland	CO2 Law Voluntary Measures	2000-2012
UK	Climate Change Agreements	2001-2013

# Voluntary Agreements: Netherlands Experience

22.3% savings over 10-year period  
2x business-as-usual



29 sectors signed  
Agreements

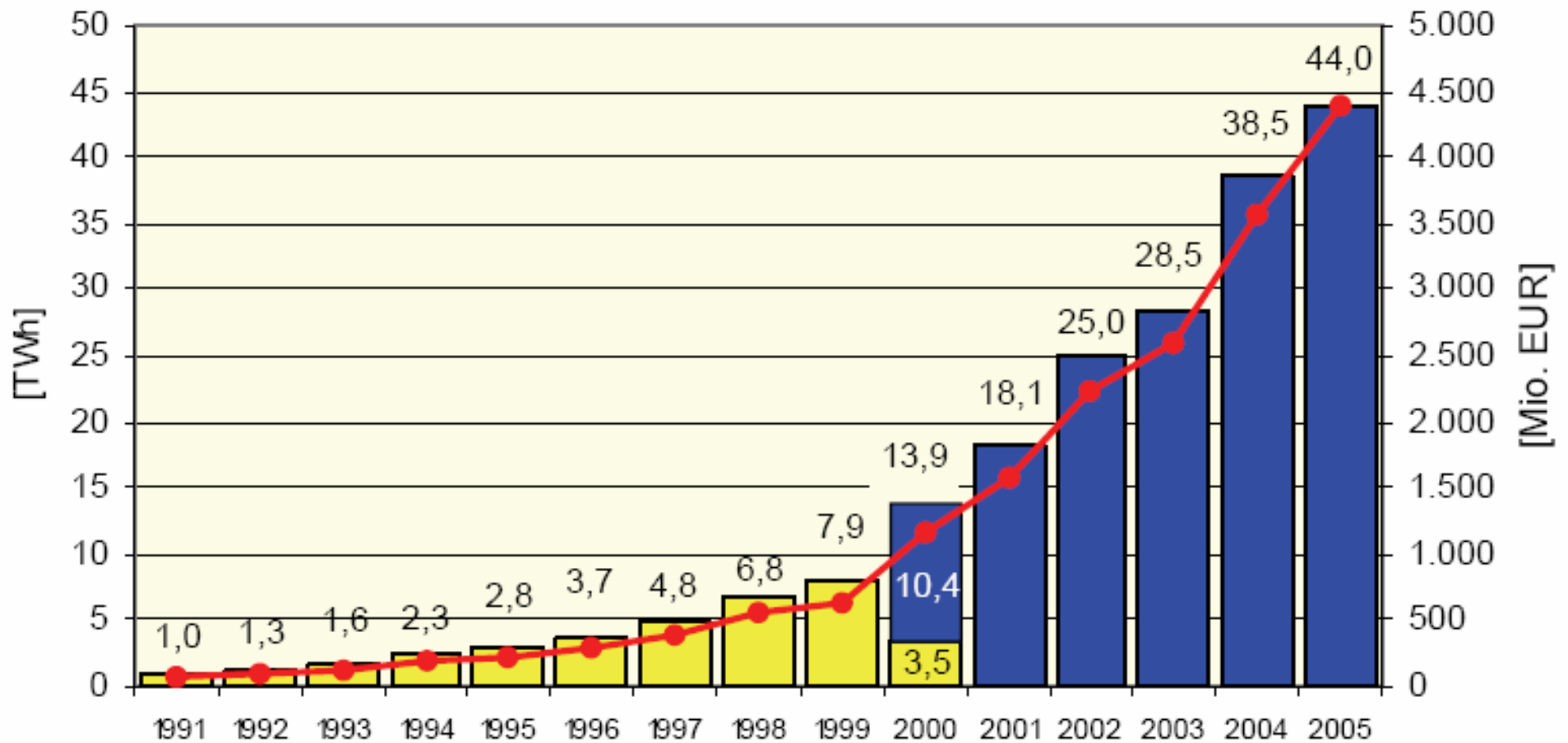
Many met or  
exceeded the  
target

# Subsidies

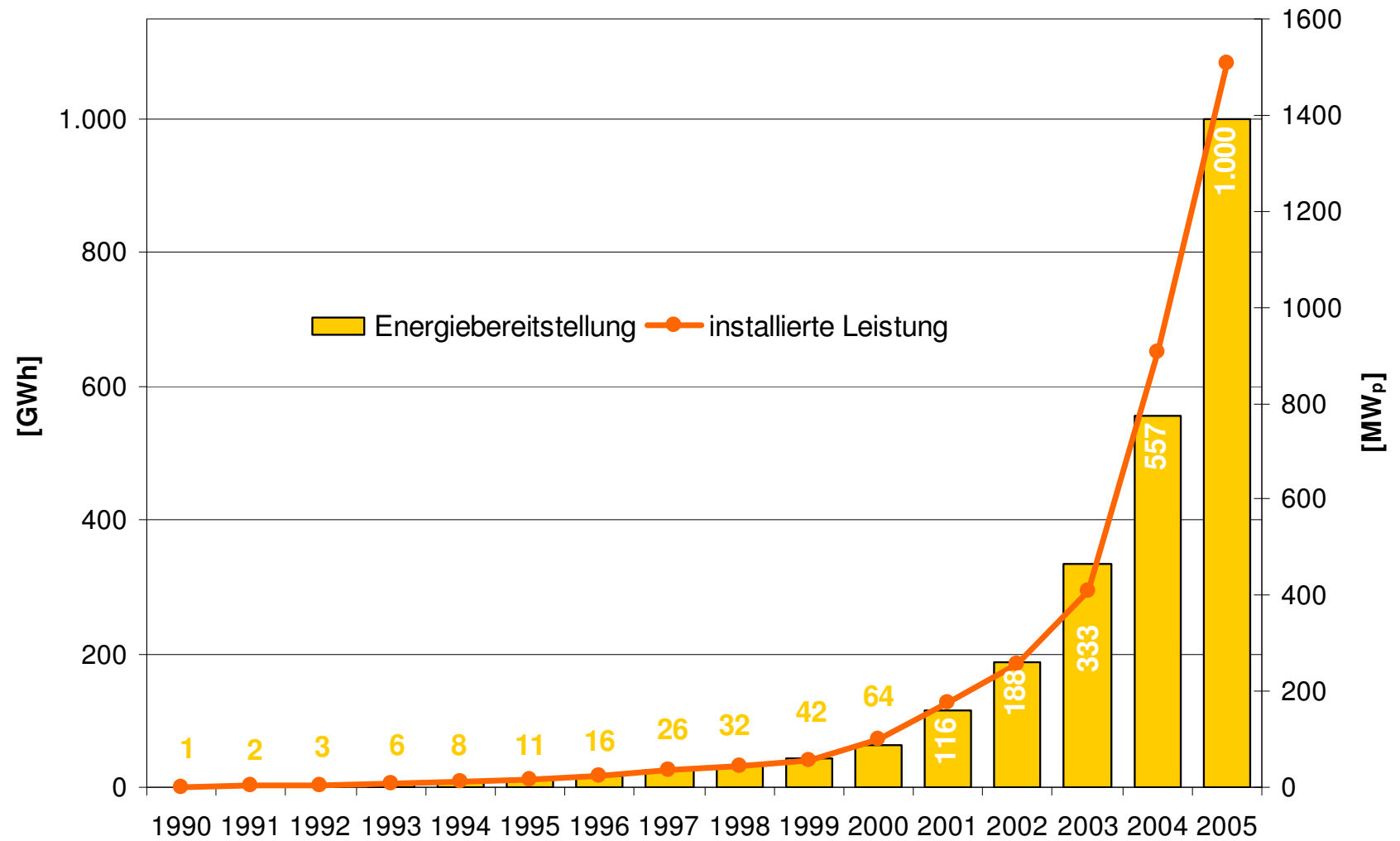
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- **Support for R&D**
  - All OECD countries
- **Investment tax credits**
  - US
- **Feed-in tariffs for renewable electricity**
  - Germany, India
- **Politically easy to implement**
  - Burden falls on many people and is small
  - Gain is concentrated in small groups
- **Limited incentive to innovate**
- **Difficult to abolish**

# Feed in tariff in Germany



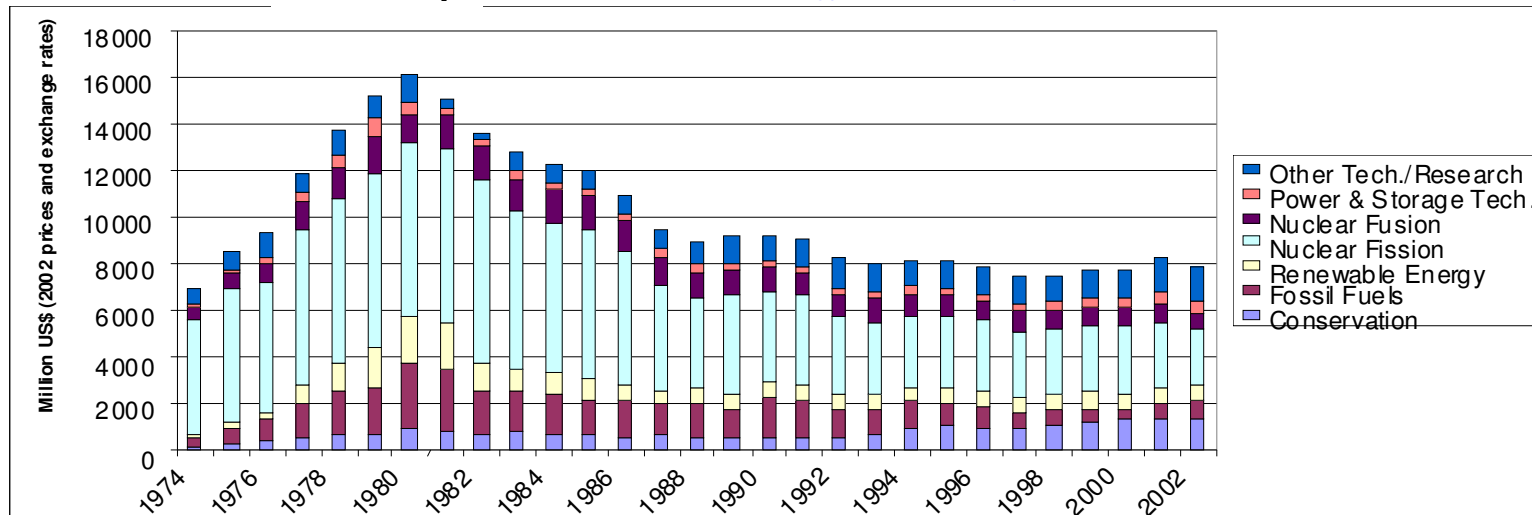
# PV in Germany



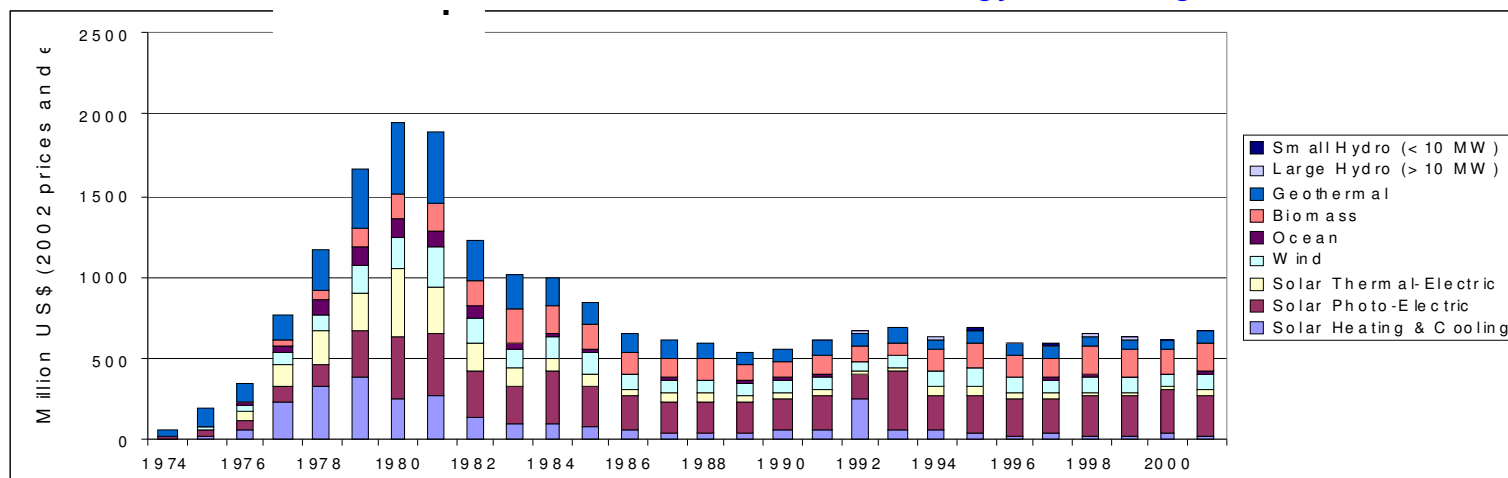


# R&D programmes

## IEA Government Energy RD&D Budgets



## IEA Government Renewable Energy RD&D Budgets



# **Information instruments**

- **Public disclosure requirements**
- **Labelling programs for consumer products**
  - EU energy efficiency labels: large success
  - Need regular update to remain effective
- **Awareness/education campaigns**
- **Benefits high if complicated information can be bundled into a single key message**

# Labelling of refrigerators in Korea

