

Scientific Forum on  
SUSTAINABLE DEVELOPMENT:  
A Role for Nuclear Power?

The Role of Nuclear Power for the OECD -  
Present Issues and Future Perspectives

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# The OECD

- 1947. George MARSHALL's speech at Harvard University.
- The Organisation for European Economic Co-operation (OEEC).
- The OEEC becomes the OECD, Organisation for Economic Co-operation and Development, with the entrance of the United States and Canada in 1960.





# The OECD

- Present Members: 29

The 15 European Union Members.

The European Commission.

Switzerland, Norway, Iceland and Turkey.

The United States and Canada.

Japan, Australia and New Zealand

Mexico, Czech Republic, Hungary, Poland and Korea



# The OECD

- The Mission

Promotion of policies to achieve the highest sustainable economic growth and employment, to contribute to sound economic expansion in Member as well as non-member countries and to contribute to the expansion of world trade on a multilateral, non-discriminatory basis.



# THE OECD PROJECT ON SUSTAINABLE DEVELOPMENT

- Three-year project
- Horizontal within the OECD
- OECD Ministerial in 2001
- NEA preparing the nuclear energy background



# THE OECD PROJECT ON SUSTAINABLE DEVELOPMENT

- Key policy questions for OECD governments
- Sustainable Development as a paradigm
- Addressing these questions imply formidable challenges to policy-making
- Reflect limits to the analysis
- Measurement tools
- Practical progress is being pursued on a case-by-case approach, starting from challenges such as climate change



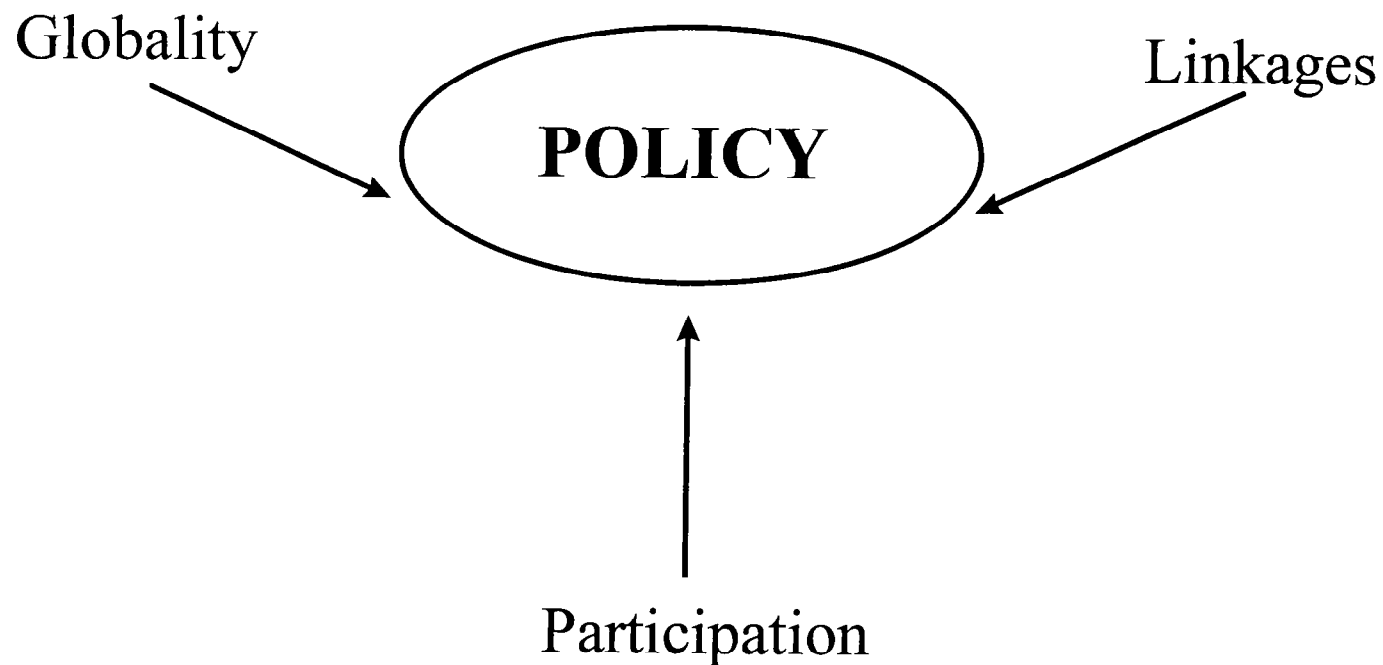
# THE OECD PROJECT ON SUSTAINABLE DEVELOPMENT

- The sustainable management of natural resources
- Focusing on the instruments available to policy-makers to “get prices right”
- Favour the creation and diffusion of clean technologies
- Help non-Member countries in establishing policy frameworks for sustainable development



# THE OECD PROJECT ON SUSTAINABLE DEVELOPMENT

Key elements for formulating policy



# THE OECD PROJECT ON SUSTAINABLE DEVELOPMENT

## GLOBALITY

- Requires global solutions (i.e. climate change)
- Even though action is required at domestic level
- Policies to be effective must often extend beyond national boundaries
- Success contingent on international co-ordination and negotiations



# THE OECD PROJECT ON SUSTAINABLE DEVELOPMENT LINKAGES

- Between economic, environmental and social dimensions
- Making policy choices
- Difficult trade-offs between objectives which affect different constituencies
- Building bridges between various policy communities



# THE OECD PROJECT ON SUSTAINABLE DEVELOPMENT

## PARTICIPATION

- Central to successfully meeting the challenge
- Both nationally and internationally
- Government alone cannot exercise sole responsibility

Other Stake-  
holders

Business  
Trade Unions  
NGOs



# The NEA

- The mission of the Agency.

To assist its Member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for the safe, environmentally friendly and economical use of nuclear energy for peaceful purposes, as well as to provide authoritative assessments and to forge common understanding on key issues, as support to government decisions on nuclear energy policy and as input to broader OECD policy analyses in areas such as energy and sustainable development.



# NUCLEAR ENERGY AND SUSTAINABLE DEVELOPMENT

## GLOBALISATION

- Nuclear provides 17% of world electricity at the end of the XX Century
- In the OECD area it provides around 25%
- Increase beyond the 367 GWe in operation today is feasible
- Not limited to highly developed countries
- Available resources combined with advanced technologies bode well over the coming centuries



# NUCLEAR ENERGY AND SUSTAINABLE DEVELOPMENT

## LINKAGES

- Not only produces electricity at reasonable cost in many countries
- It internalises in its cost its externalities
- Contributing with an 8% reduction in global CO<sub>2</sub> emissions
- Kyoto Protocol calls for a 5.2% reduction for 2008/2012 of the 1990 figures
- Radioactive waste although very hazardous by nature, can be isolated from the environment



# NUCLEAR ENERGY AND SUSTAINABLE DEVELOPMENT

## PARTICIPATION

- Perception by civil society appears as a determining factor
- Nuclear energy requires, in comparing it with other industrial activities, even stronger support
- Transparency and accountability are essential elements
- Building bridges with stakeholders
  - Business
  - Trade Unions
  - NGOs

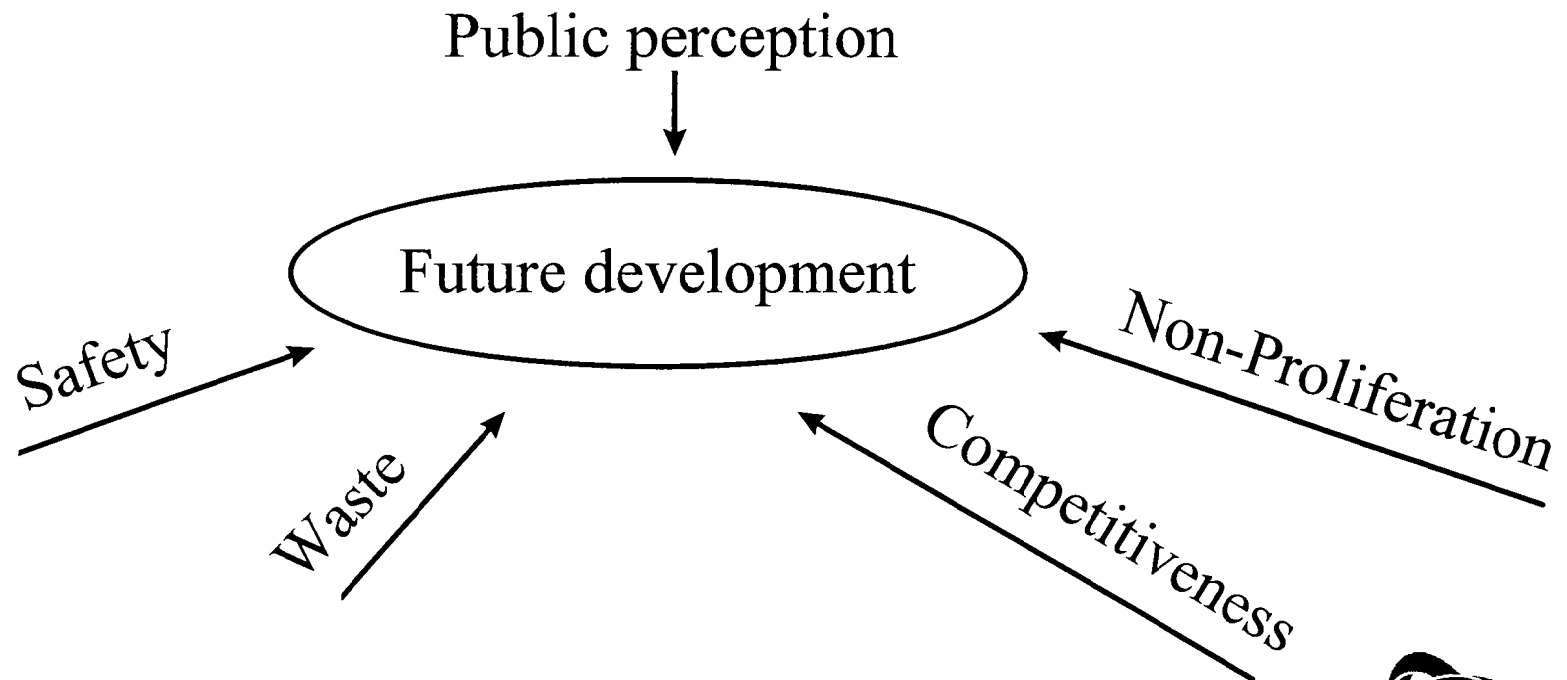


# ROLE OF NUCLEAR ENERGY IN OECD COUNTRIES

- In producing electricity
- Historical roles
  - Diversification
  - Security of supply
  - Technological and industrial development
- Protection of the environment
  - Appearing as a key factor
  - Climate change

# The NEA

The remaining issues



# The NEA

The remaining issues

## SAFETY

- Maintaining the safety record of OECD countries.
- Safety Culture.
- Ageing
- Regulatory Effectiveness.
- Operator responsibility.
- Maintaining the infrastructure
- Impact of deregulation of the electricity market.



# The NEA

## The remaining issues WASTE

- The low- and medium-level waste.
- The high-level waste. Spent fuel.
  - Interim storage.
  - Geological disposal.
  - Reprocessing.
- The Waste Isolation Pilot Plant (WIPP), New Mexico (USA)
- The Yucca Mountain Project. Nevada (USA).
- Confidence Building



# The NEA

## The remaining issues COMPETITIVENESS

- Generating costs.
  - Capital intensive
  - Low variable cost
- Factors affecting the cost.
  - Construction schedule.
  - Standardisation
  - Number of units.
  - Licensing
  - Externalities
- Deregulation of electricity market
  - Impact on competitiveness.
  - stranded costs.



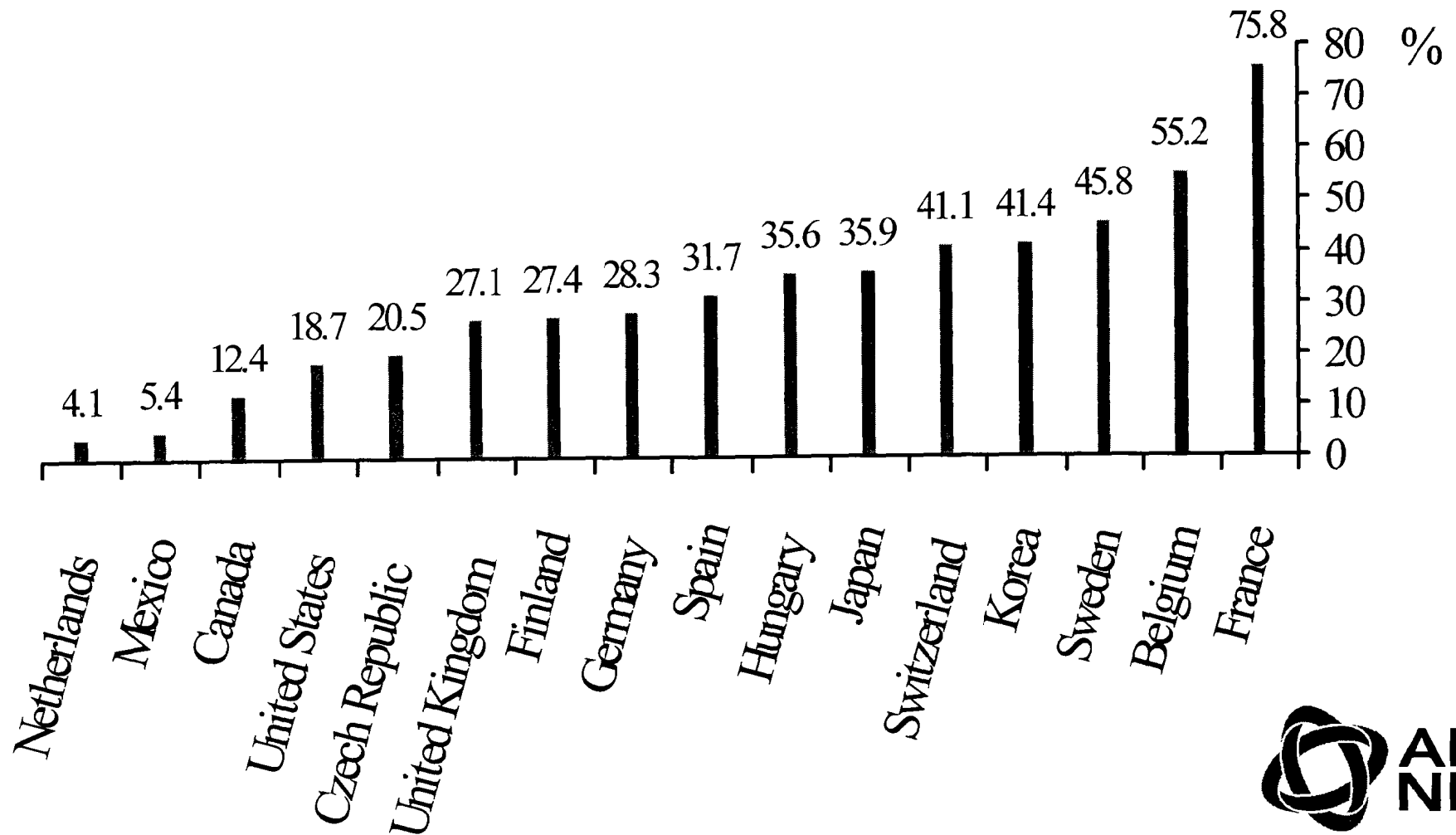
# The NEA

## The remaining issues NON-PROLIFERATION

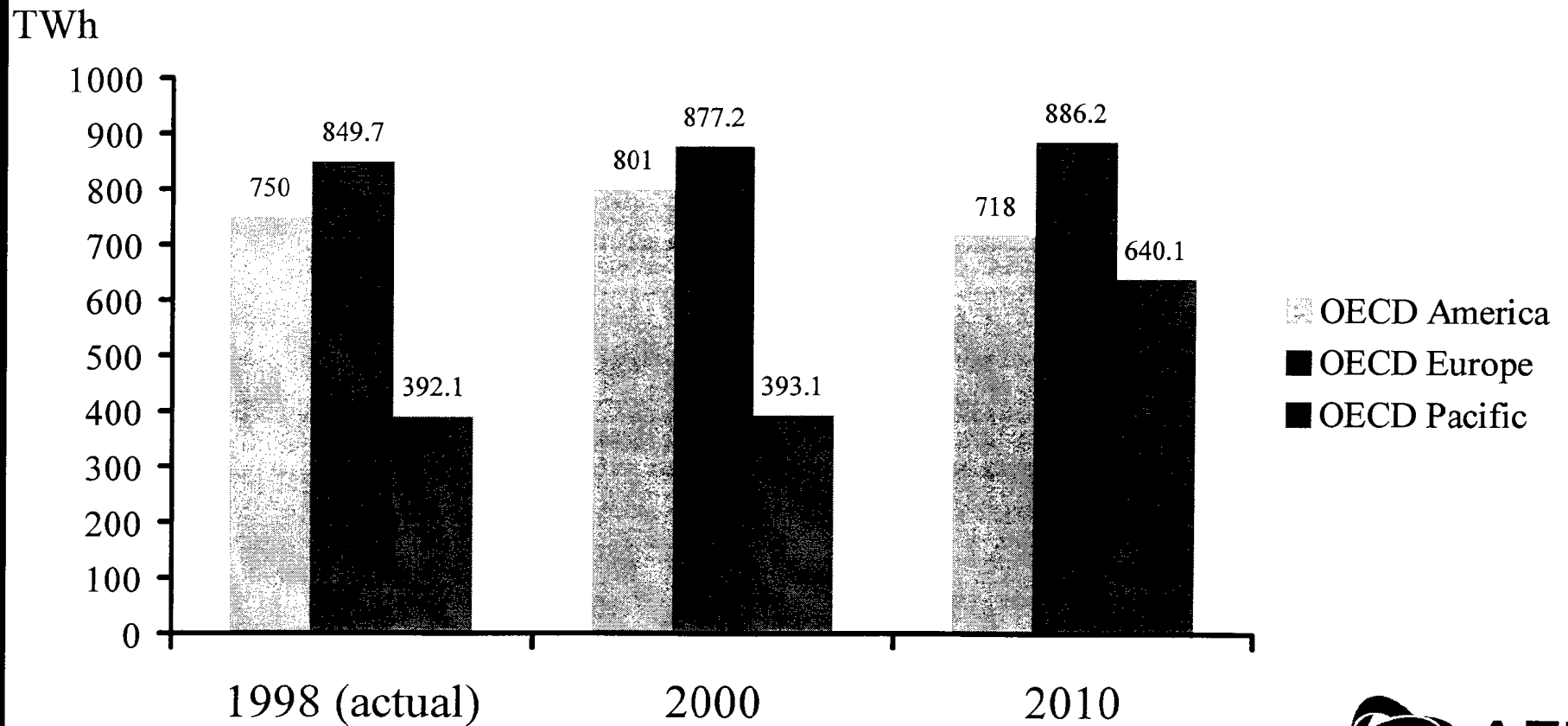
- NEA not directly involved.
- Peaceful uses not contributing to proliferation.
- Use of Plutonium from nuclear disarmament.



# Nuclear Power Share of Total Electricity Production in the OECD Area (1998)

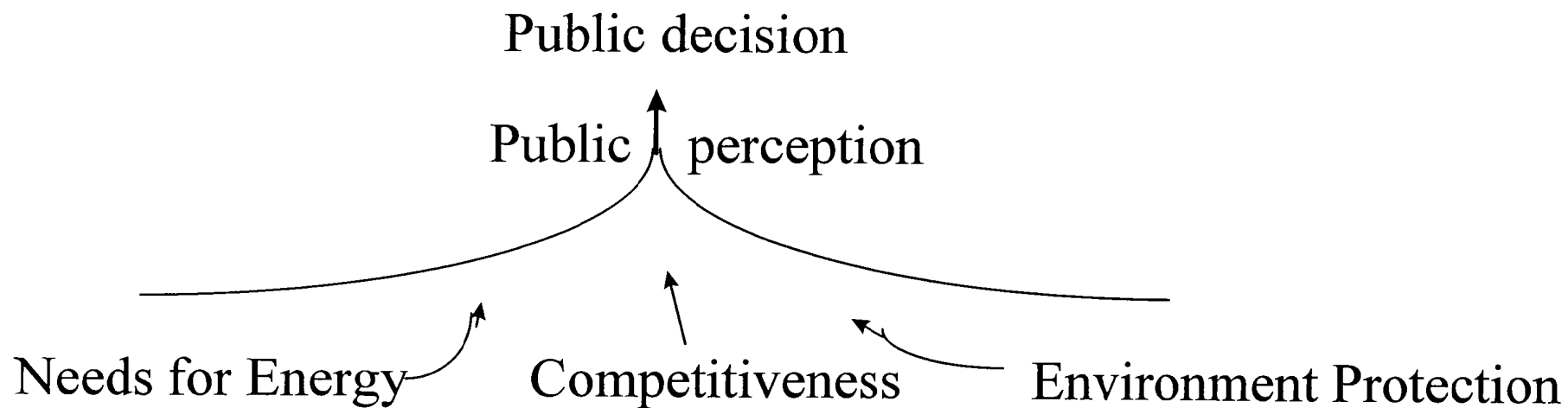


# Nuclear Power Production in the OECD Area (1998-2010)



# The NEA

FUTURE OF NUCLEAR ENERGY



# NUCLEAR POWER AND CLIMATE CHANGE

## The Kyoto Protocol

- The United Nations Framework Convention on Climate (UNFCCC).
- The Kyoto Agreement, December 1997.
  - Greenhouse gases (GHG) emissions to be reduced.
  - Includes CO<sub>2</sub> and five other gases.
  - Target in 2008-2012, 5.2% reduction over 1990 emissions (Annex I countries)
    - European Union 8%
    - USA 7%
    - Japan 6%
  
- Nuclear is contributing actually with an 8% savings.



# CO<sub>2</sub> Emissions (g CO<sub>2</sub> equiv./kWh) from Electricity Generation Chains

*Ranges correspond to differences in technology for the same primary source.*



# NUCLEAR POWER AND CLIMATE CHANGE

## The NEA Analysis

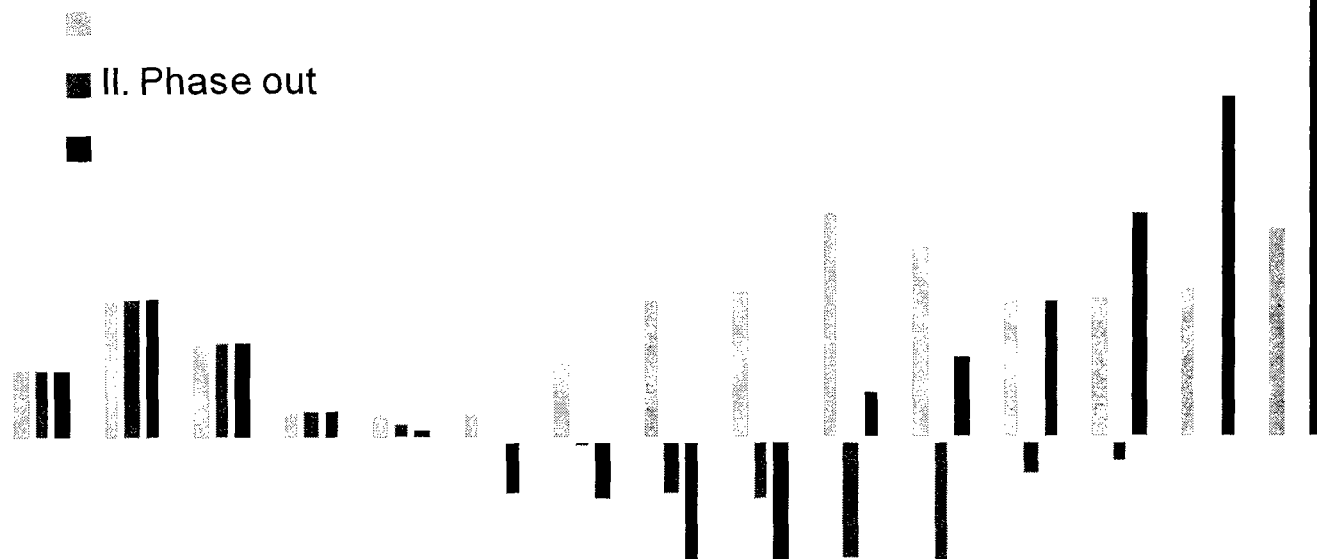
### - Three Variants

- I. continual nuclear growth 1.120 GWe in 2050
- II. phase-out, completed by 2045
- III. stagnation followed by revival. Early retirements (2015) and revival 1.120 GWe (2020-2050)



Three variants of world nuclear  
power capacity (GWe) up to 2050

# Gross nuclear capacity additions or shutdowns (GWe/y)

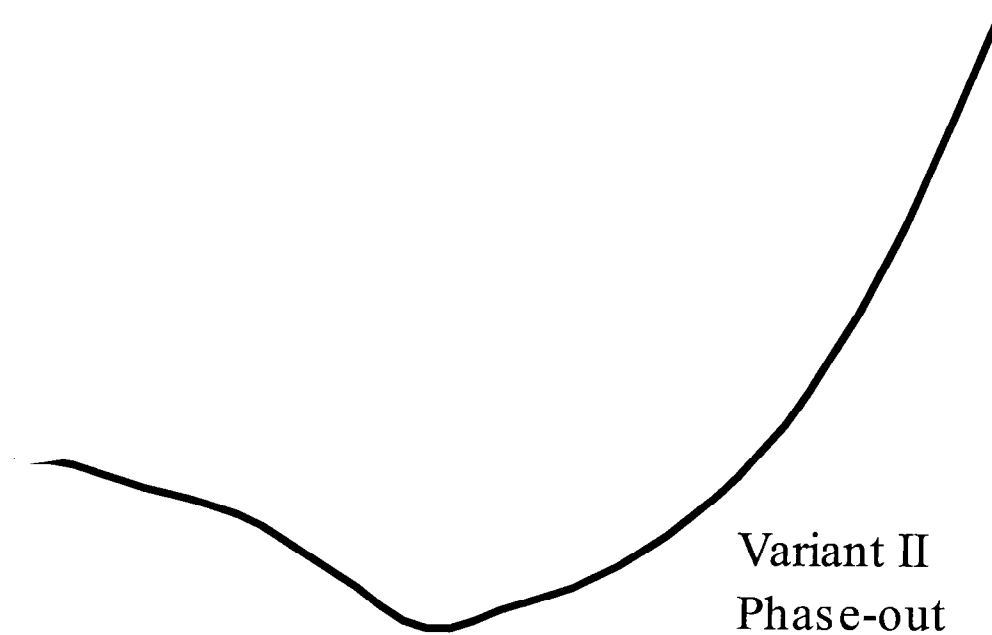


# Cumulated greenhouse gas (GHG) emissions avoided (GtCO<sub>2</sub>-equiv.)

II. Phase out



# World nuclear electricity generation (TWh)



# NUCLEAR POWER AND CLIMATE CHANGE

## The NEA Analysis

- The three variants are feasible:
  - Construction rate feasible for nuclear industry.
  - Cumulative investment requirements can be met.
  - Siting of plants and fuel cycle facilities possible.
  - Natural resources available.
  - Significant contribution to reducing emissions of greenhouse gases is possible.
    - Variant I.                    6.3 Gt of CO<sub>2</sub> in 2050. 200 Gt accumulated to 2050. 33% of GHG from Energy as a max.
    - Variant II.                    55 Gt accumulated to 2050.
    - Variant III.                    100 Gt accumulated to 2050



**THE NEA**

**NUCLEAR ENERGY**

**MAINTAINING THE OPTION**

