

***“Assessing Euratom - 50 Years of European Nuclear Policy”
Public Hearing - European Parliament / ITRE***

Future Development and Economic Aspects of Nuclear Energy

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Overview

◆ Context

- Times are changing

◆ Economics

- Competitiveness is no more the most crucial issue

◆ Resources & technologies

- Available

Nuclear in the Energy World Scene

The times are changing

- ◆ **WEC – Sydney (9/04)**

“Keep all energy options open”

“No technology should be idolised or demonised”

- ◆ **IAEA Ministerial Conference - Paris(3/05)
*with OECD & NEA***

- ◆ **Greenpeace Co-Founder Calls N-Power
*“Environmentally Safe and Sound” (4/05)***
US Senate Energy and Natural Resources Committee

- ◆ **Finland, France, USA ,China, India, EC**

- ◆ **GIF, INPRO, GNEP, ...**

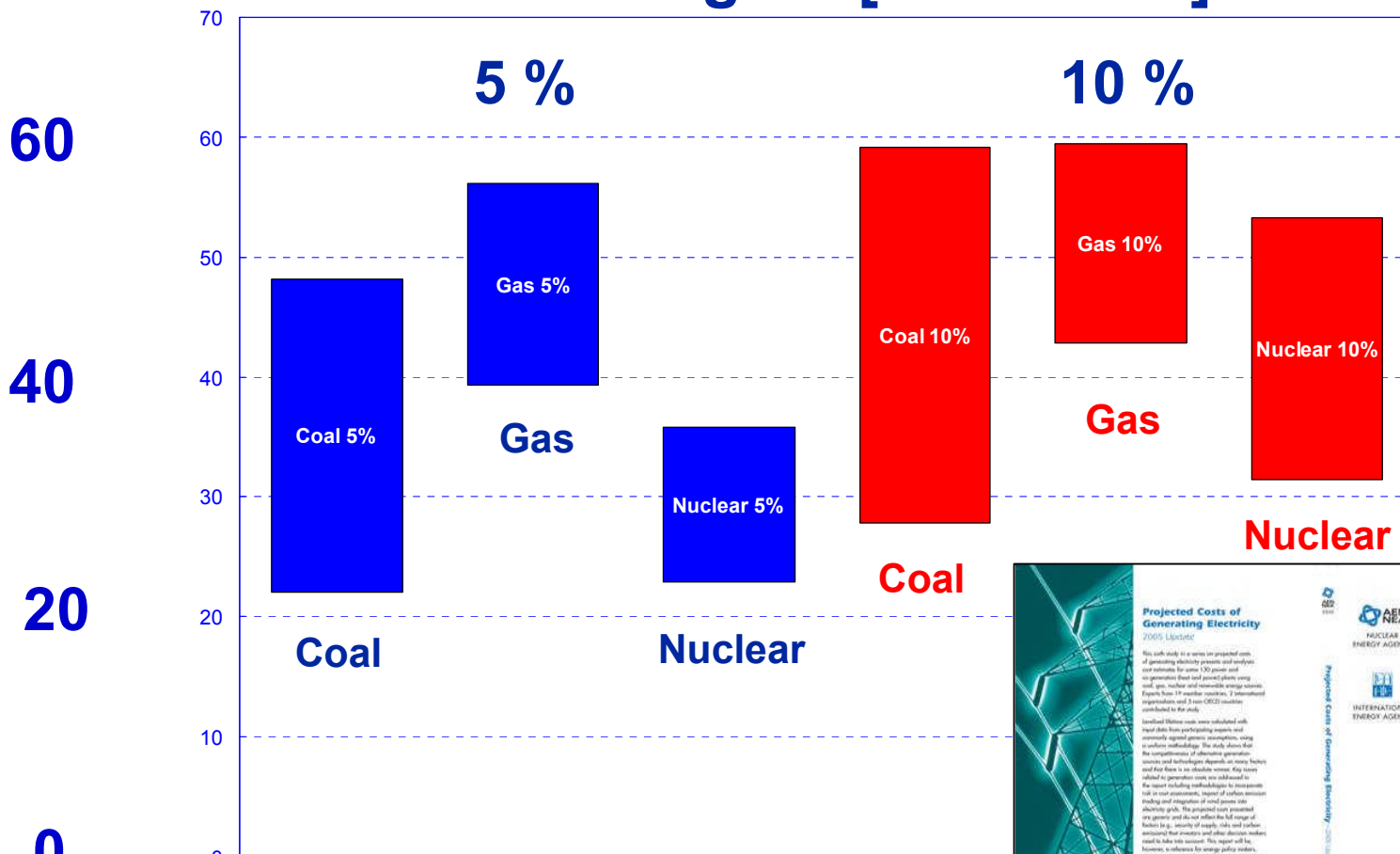
Why times are changing ?

- ◆ **Rising of fossil fuels prices**
- ◆ **Security of supply (and diversity)**
- ◆ **Climate change concerns**

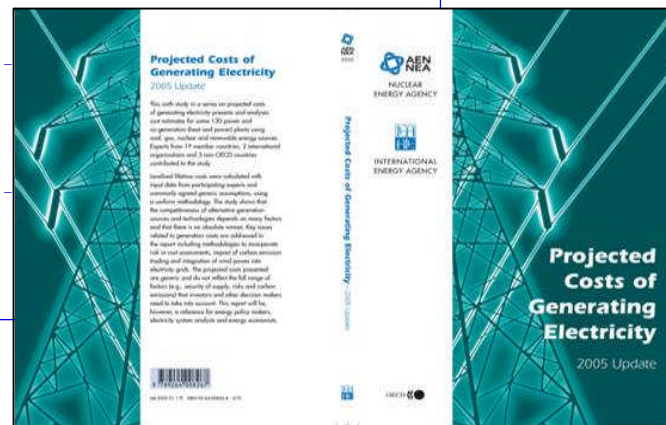
Nuclear energy main features

- ◆ **Mature technology**
- ◆ **Nearly carbon-free electricity generation source**
- ◆ **Stable cost and low marginal cost**
- ◆ **Geopolitical distribution of uranium resources**
- ◆ **“Domestic” source of energy**

IEA/NEA joint study (2005) Cost Ranges* [USD/MWh]

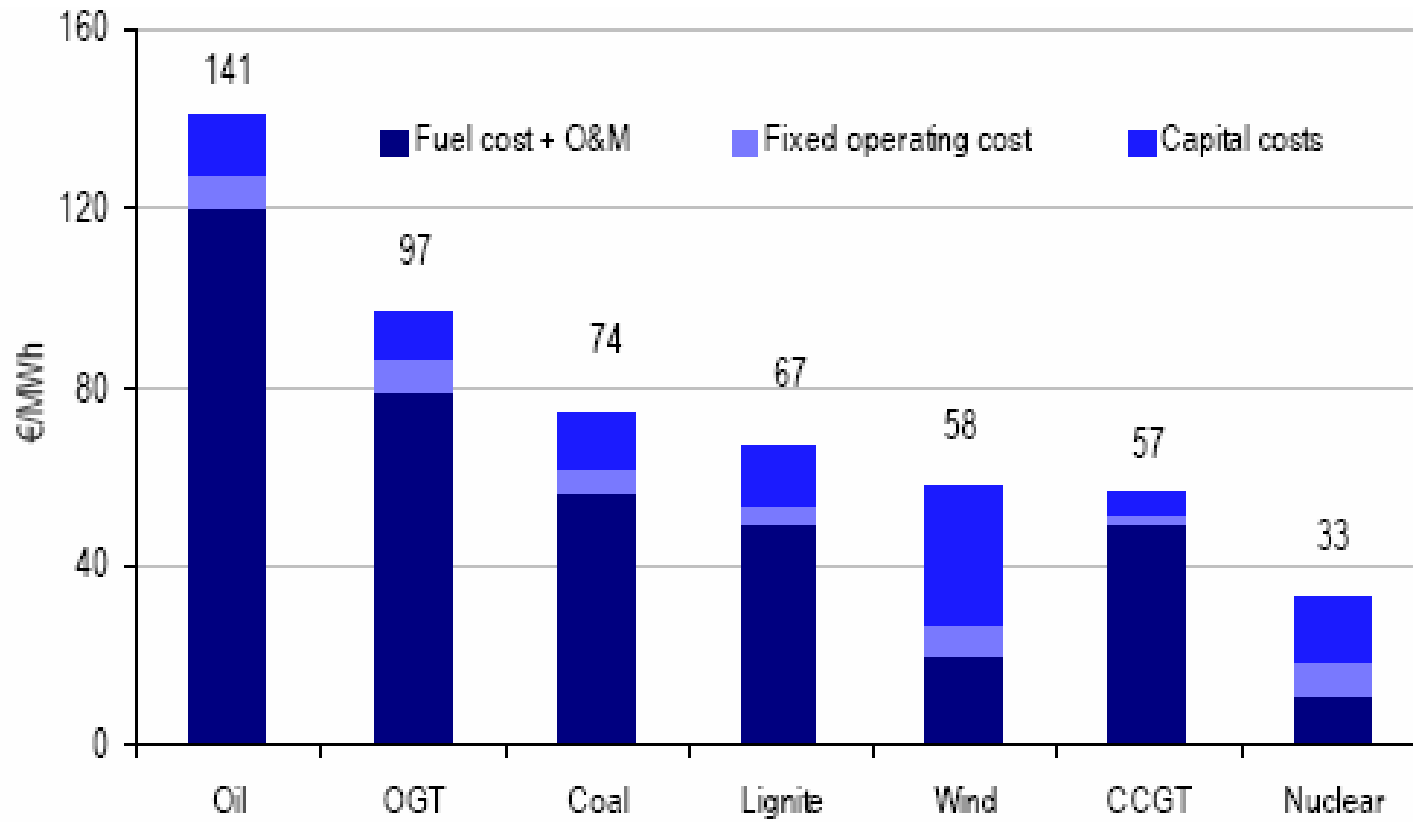


* Excluding the 5% highest and 5% lowest values



Full Cost on New Capacity (€/MWh)

Source UBS



Capital market views

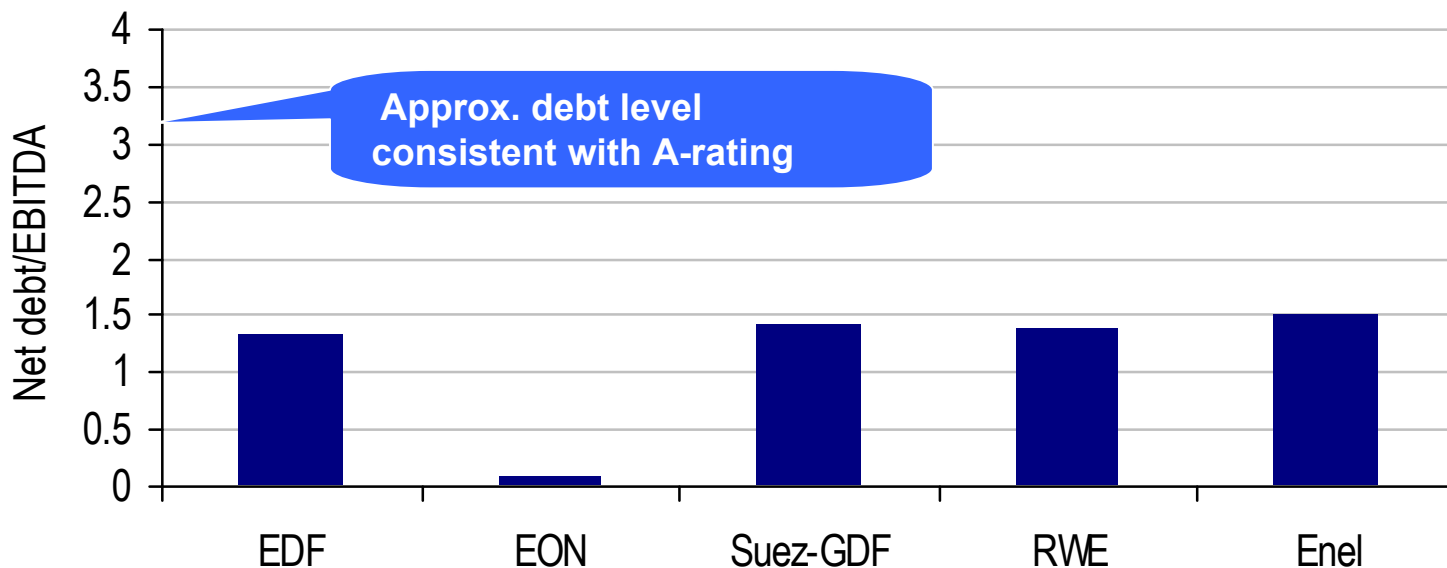
- ◆ A remarkable change in capital markets views on nuclear over the last two years
 - “Too much capital intensive” disappeared
- ◆ Capital markets expect new build in Europe (not in all countries)
- ◆ Resources to invest in new NPP are available
- ◆ Competitiveness is no more an issue

Paradoxe ?

- ◆ Existing nuclear power plants are “cash cows” for most utilities worldwide
- ◆ Decisions to build new plants “future cash cows” are difficult to make

Investment Capacities of Major European Utilities

Source UBS



Additional debt potential 80 G€

~ 40 GW of new nuclear capacity

not considering additional EBITDA from new investments

The nuclear case seems good, so where is the problem ?

- ◆ **Business risks**
- ◆ **Lack of confidence in the stability of the rules**
 - **political stability**
 - **nuclear regulatory stability**
 - **taxation stability (incl. ETS)**
- ◆ **To reduce risks, partnership utilities / large industrials ('the Finnish solution')**
- ◆ **Role of governments**
 - **societal benefits should be recognized**
 - **role to play in reducing the risk, not causing them**

Uranium Resources

Red Book

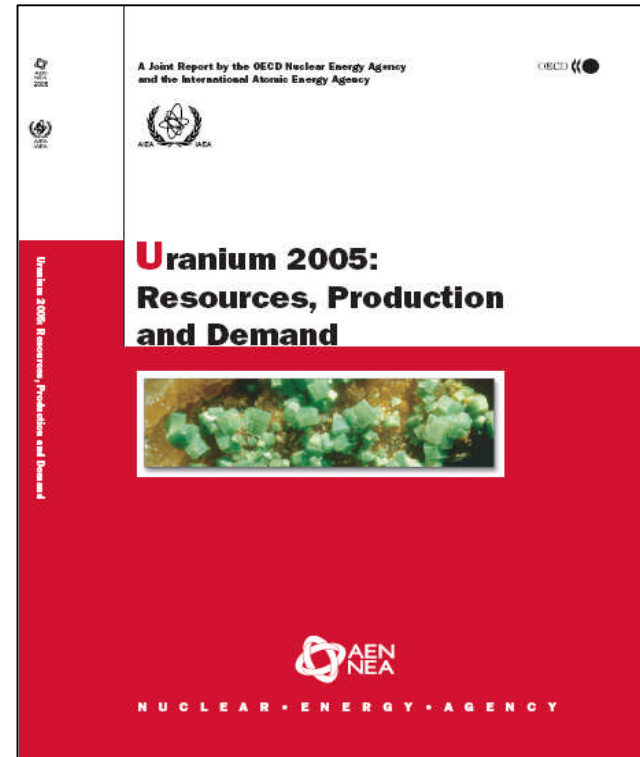
“Uranium 2005: Resources, Production and Demand”

- IAEA / NEA
- 21st edition
- 43 countries

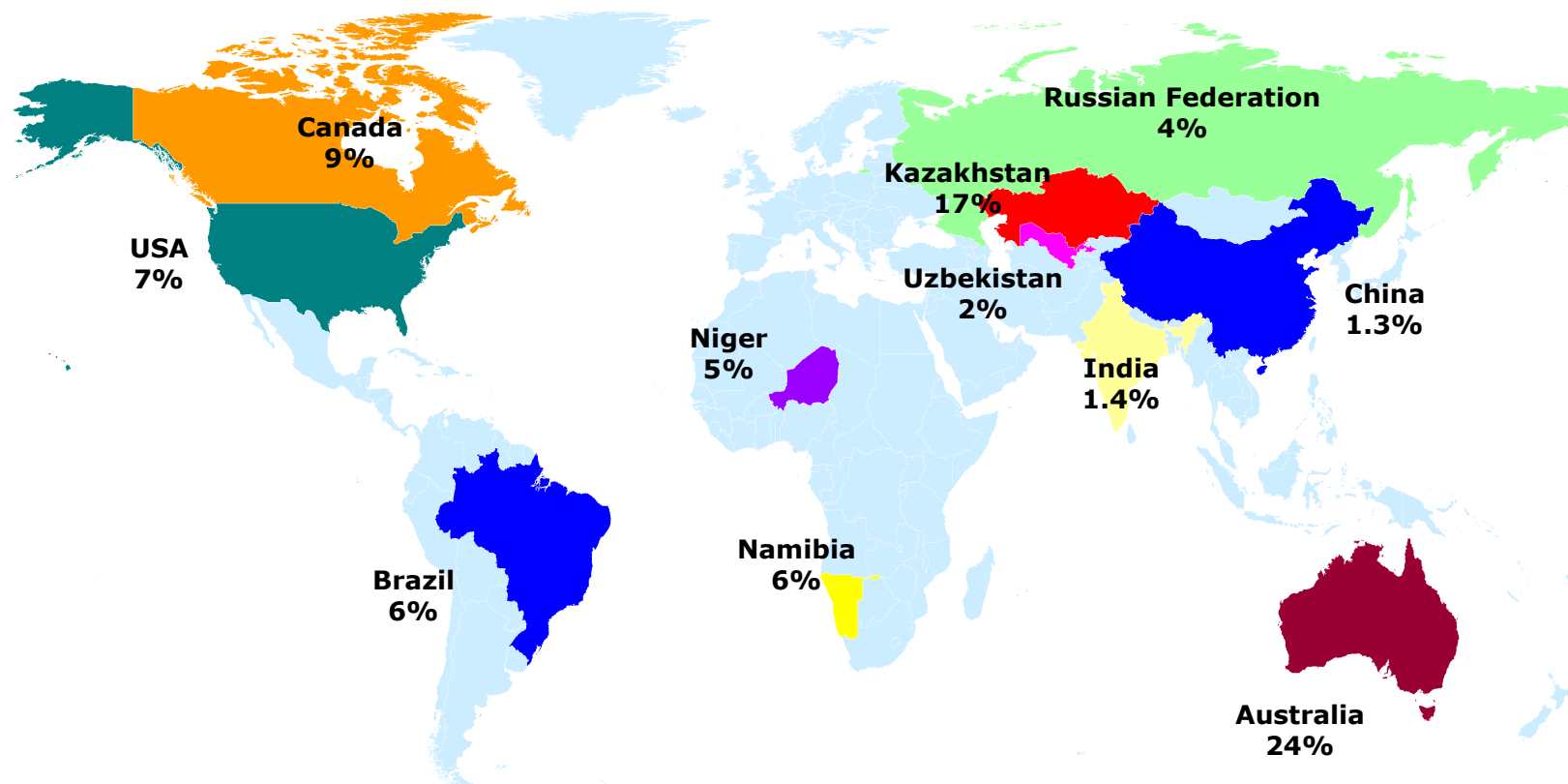
plentiful,

secure,

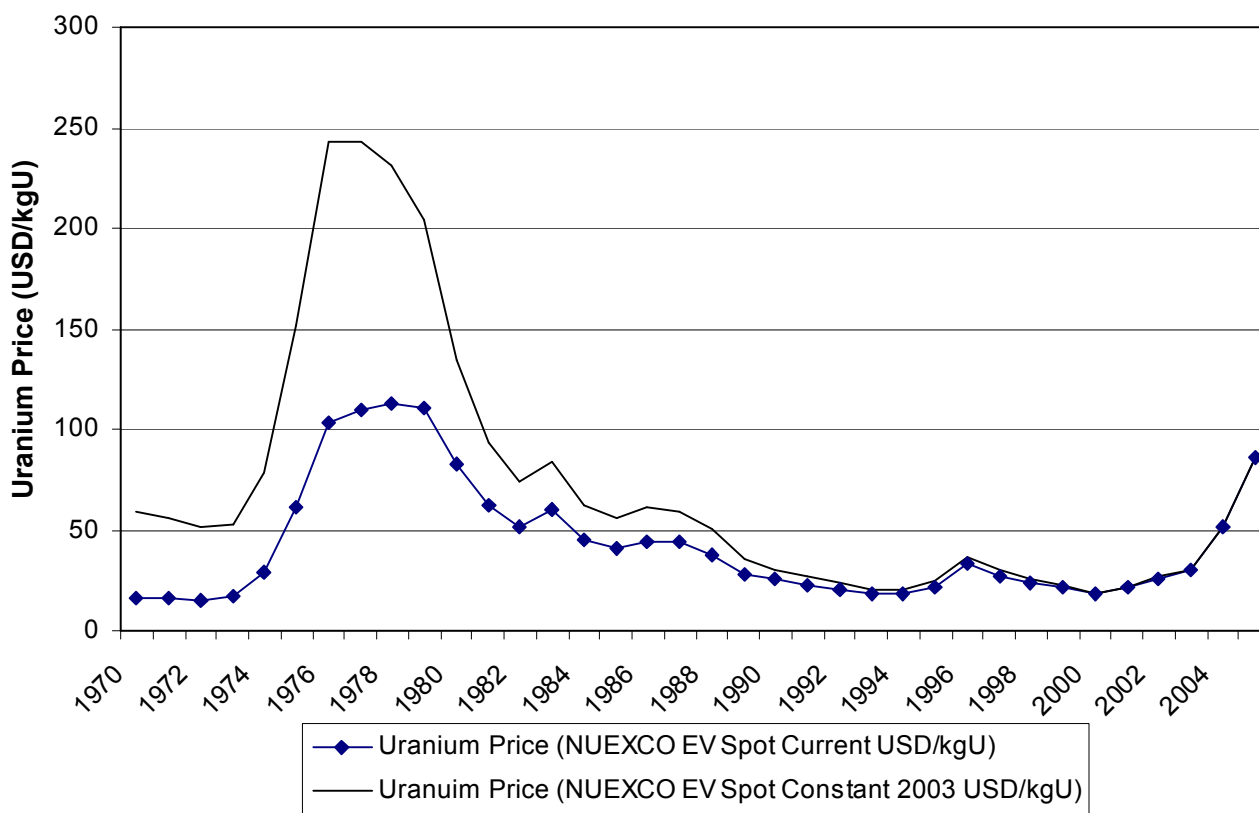
expandable



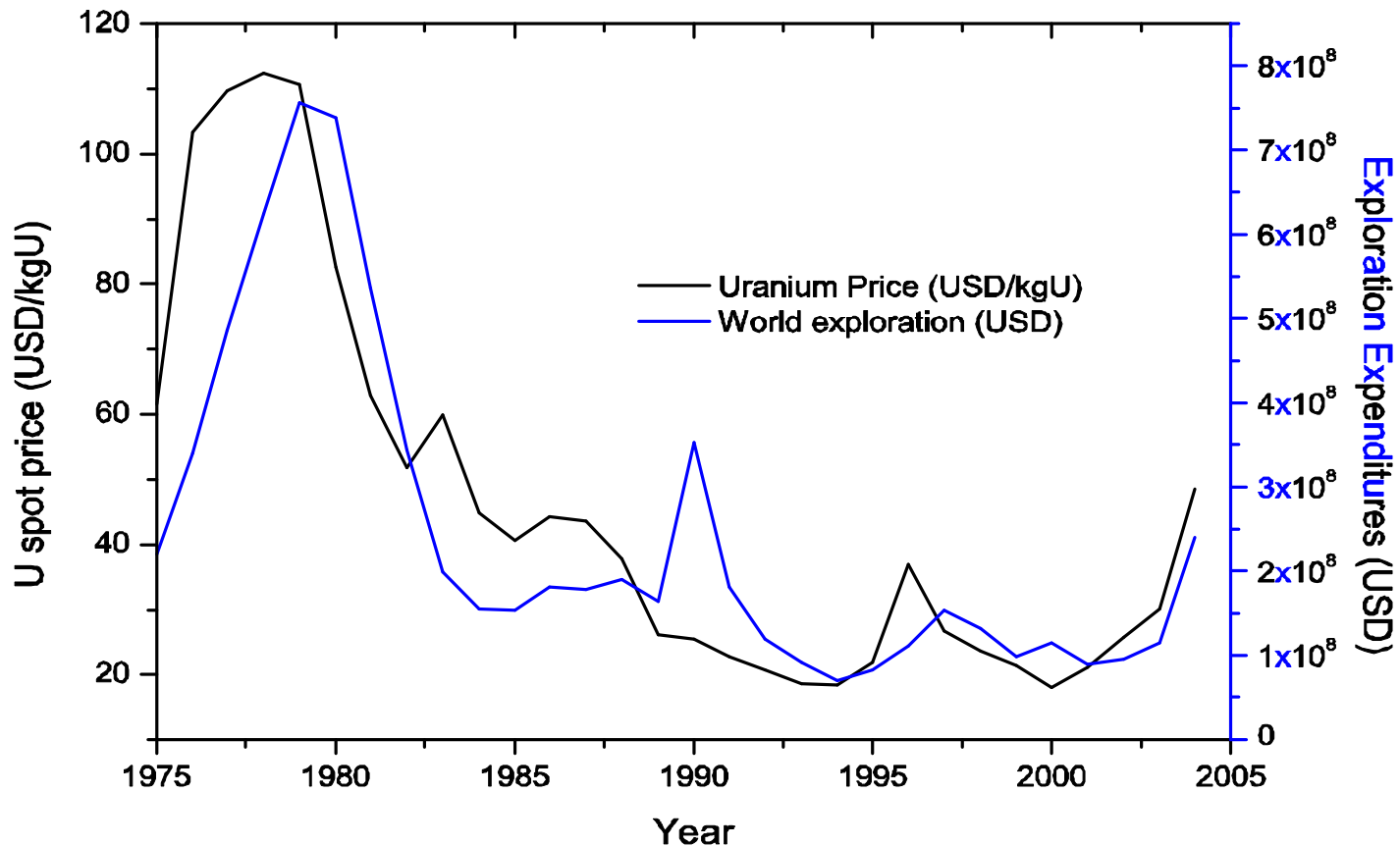
World distribution of the main identified resources



Uranium spot price - \$/kgU (1970-2005)



Exploration expenditures and spot price - current \$ (1975-2004)



Uranium resources in short

- ◆ ***Plentiful, Secure, Expandable***
- ◆ **Not a reason to waste them**
 - **Sustainable Development**
 - ❖ **Best use of natural resources**
 - ❖ **Minimisation of ultimate waste**
- ◆ **Market mechanisms function**
 - **prices ↗ ⇒ exploration expenditures ↗**

***Do not talk about available resources,
without talking of prices***

- ◆ **Resources in deposits ≠
resources available for the market**

GIF - Generation IV International Forum

*To foster collaborative
R&D aiming at
developing future
generation nuclear
energy systems*



8 common goals

- sustainability
- economics
- safety and reliability
- proliferation resistance and physical protection

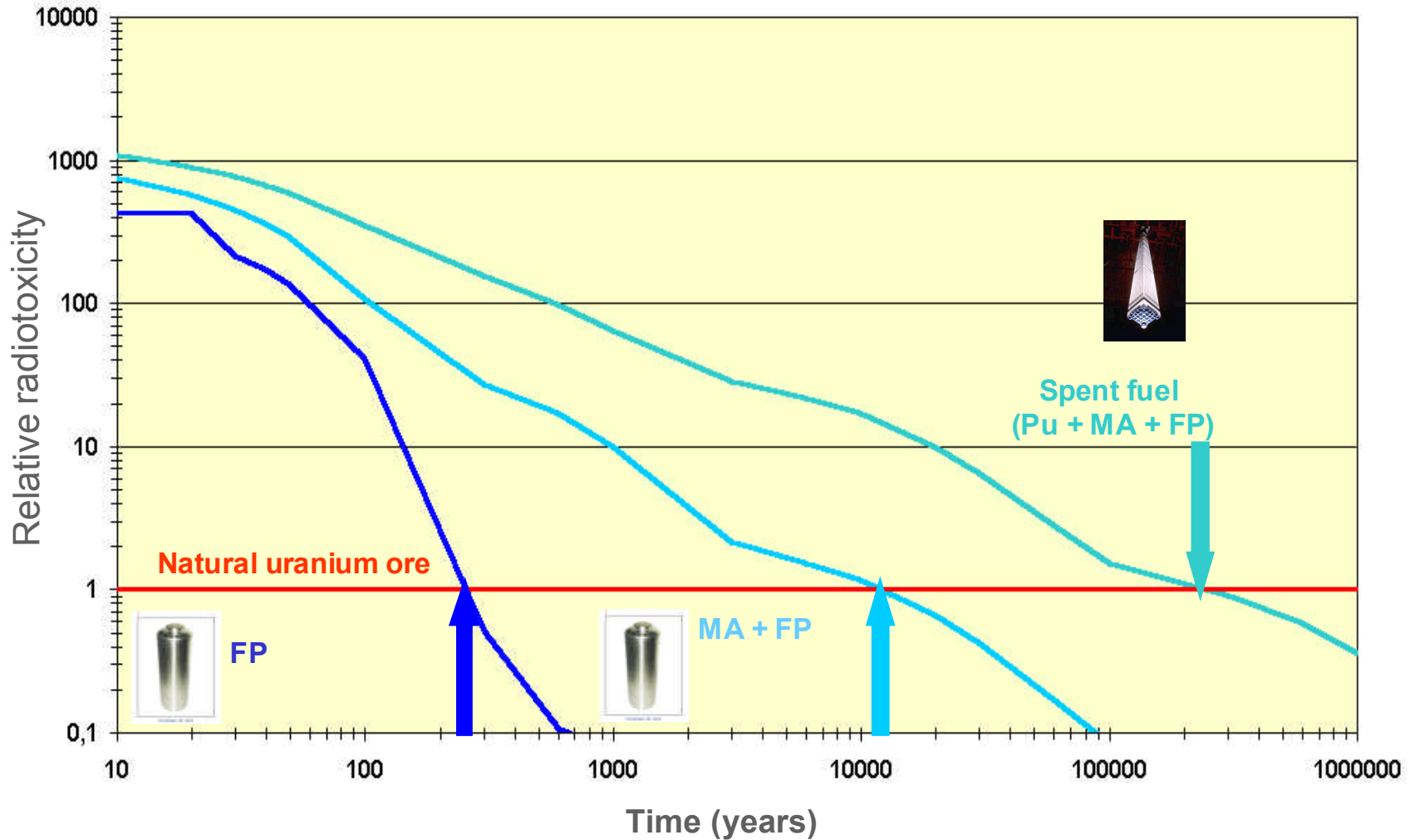
*Euratom joined (7/2003)
China, Russia (11/2006)*

**Intergov. Agreement
Washington (2/2005)**

Generation IV Systems

<i>Acronym</i>		<i>Spectrum</i>	<i>Fuel cycle</i>
SFR	Sodium Cooled Fast Reactor	fast	closed
LFR	Lead Alloy Cooled Reactor	fast	closed
GFR	Gas Cooled Fast Reactor	fast	closed
VHTR	Very High Temperature Reactor	thermal	once-through
SCWR	Supercritical Water Cooled Reactor	th. & fast	once-t. & closed
MSR	Molten Salt Reactor	thermal	closed

Radiotoxicity and Spent Fuel Management



Radioactive Waste

3 categories : low, intermediate and high level

◆ **Disposal of LLW and most ILW, mature practice**

◆ **HLW**

- **~ 1% of total volume, ~ 99% of total radioactivity**
- **deep geological disposal considered as practicable by the scientific and technical community**
- **little societal consensus**
- **actual risk vs perceived risk**
- **ethical considerations**

◆ **Greater involvement of stakeholders and better communication needed**

To avoid this

....

***we must
convince that
HLW can be
safely
managed in
the long term***



Concluding Remarks

- ◆ No ideal or magic solution to avoid the “*dirty, insecure and expensive*” energy future that the current trends prepare
- ◆ All energy technologies will be needed
- ◆ Uranium resources are available
- ◆ Advanced nuclear technologies are developed
- ◆ From a sustainable development perspective, nuclear energy has a major role to play
 - reduction of CO₂ emissions
 - security of energy supply
 - diversity of supply & price stability
- ◆ Role of governments key to provide stability