

A Few Nuclear Power Myths & Facts

Why nuclear power is part of the problem
and not part of the solution

**XXI Conferència Catalana per un Futur sense Nuclears
I Energèticament Sostenible**

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Myth #1: The Nuclear Moratoria



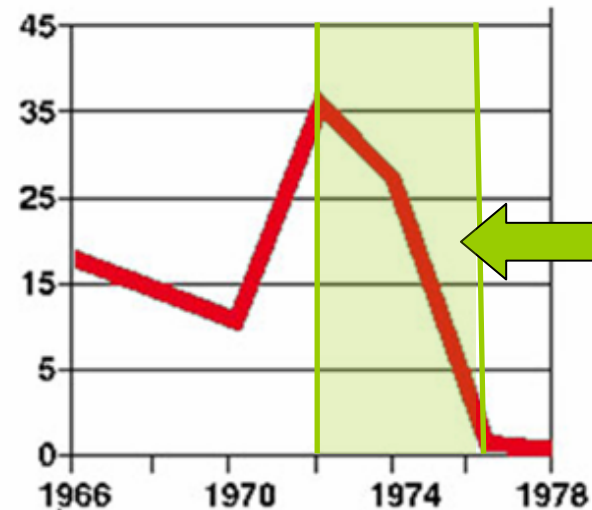
Why nuclear power fell out of industry and public's favor in the late 1970's ?

- At the beginning of the 1970's nuclear power was initiating an explosive growth path that would have resulted in it becoming the preferred electricity generating technology, first in developed countries and later on around the world.
- This trajectory of success was broken due to the Harrisburg Three Mile Island's accident in 1979 and the ensuing No-Nukes green-ecology movement. It was further damaged by the Chernobyl disaster in 1986.
- As a result of these events, public opinion turned against nuclear power for security fears and an extended "moratoria" was imposed on nuclear energy. Since 1979 not a single reactor has been ordered in most OCDE countries, most notably in the USA.
- In Spain we have a nuclear moratoria since 1983.

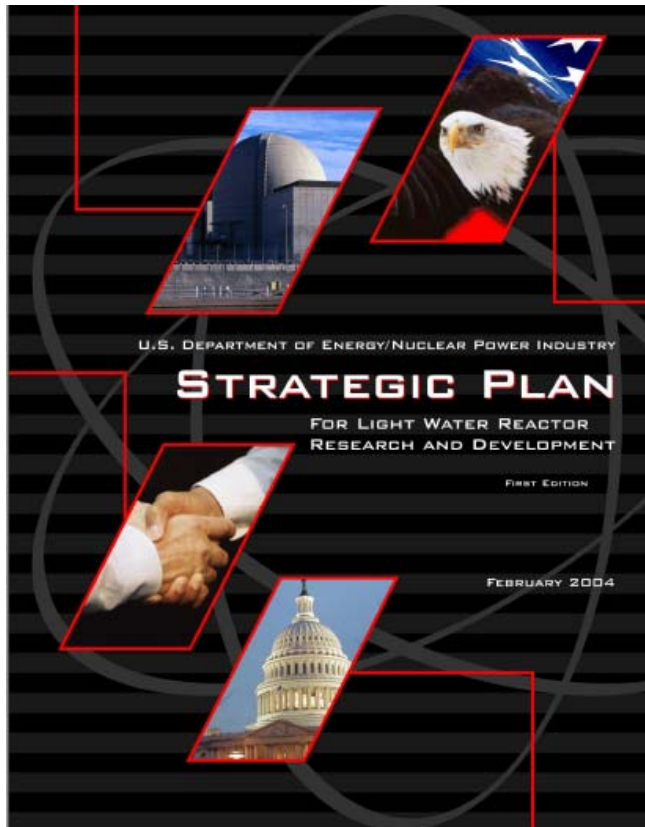
Facts #1: The Real Nuclear Moratoria



Nuclear Plant Orders in USA



← not completed



... not a single

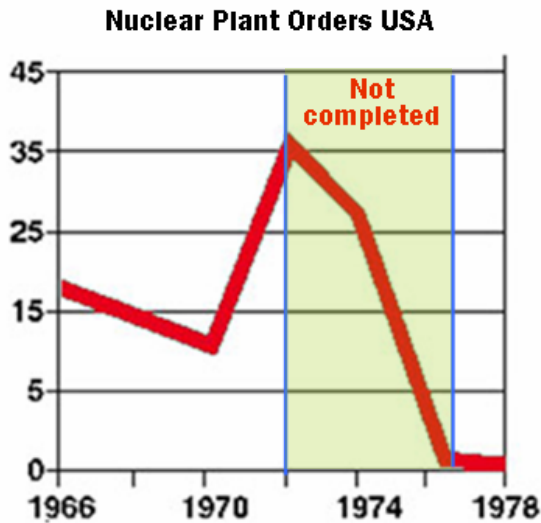
nuclear power plant has been ordered by an electric utility in the United States since 1978, and no plant ordered after 1973 has been completed.⁴

It is a myth that the accident at Three Mile Island in 1979 caused the demise of the nuclear industry. As can be seen here, the number of new nuclear plants ordered reached a high of 35 in 1972, and then collapsed to zero

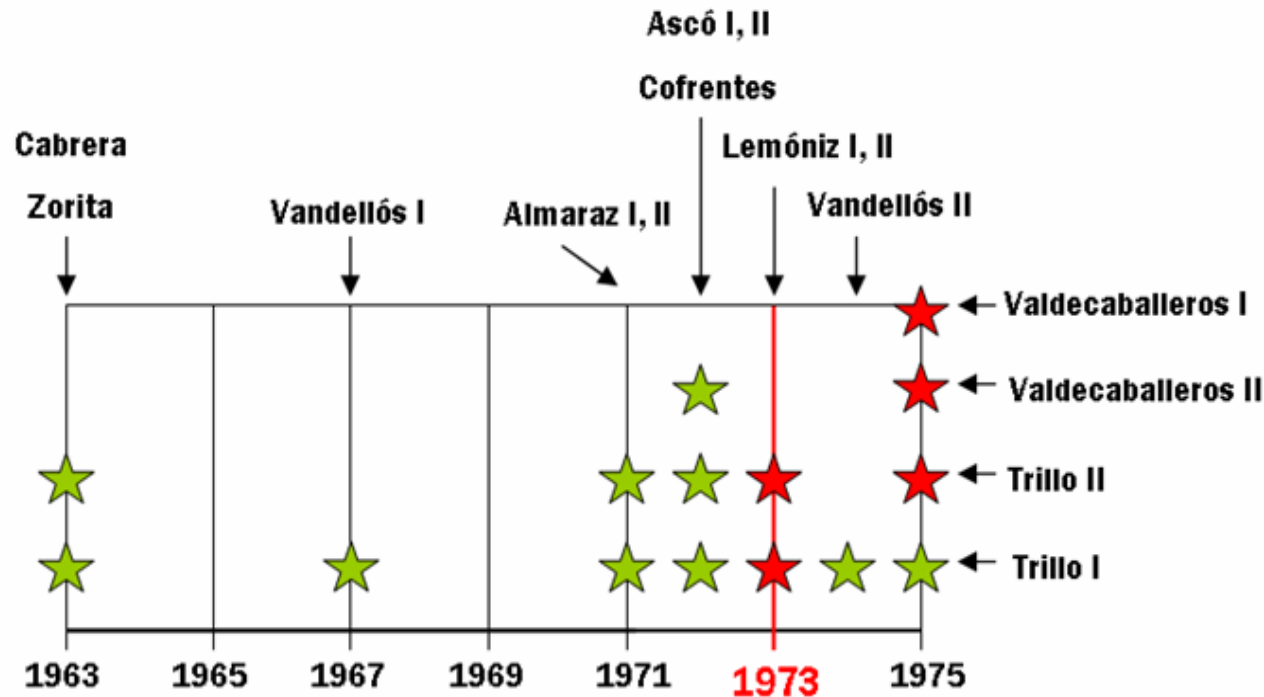
... before 1978

Source: Atomic Industrial Forum

Facts #1: The Real Nuclear Moratoria



Exactly the same happened in Spain



Debido a circunstancias de todos conocidas, se clausuró Lemóniz en lugar de Vandellós II y Trillo I

Facts #1: The Real Nuclear Moratoria



What did it really mean the “moratoria”? And what was it for?

“On May 6th, 1983, the newly elected PSOE government signed the Protocol of Agreement with the Electric Utilities ... we introduced and quantified a bonus system ... and decided that 50% of the rate increase had to be devoted to restore the financial health of the electricity industry as the sector was, to say it plainly, broke”.

Carlos Solchaga (then Minister of Industry), El Siglo 5/29/2005

Is there a moratoria right now?

No se considera necesario que el Estado se reserve para sí el ejercicio de ninguna de las actividades que integran el suministro eléctrico. Así, **se abandona la noción de servicio público ...**

En la generación de energía eléctrica, se reconoce el **derecho a la libre instalación** y se organiza su funcionamiento bajo el **principio de libre competencia**.

Ley 54/1997, de 27 de noviembre del Sector Eléctrico

Myth #2: High Oil&Gas prices favor nuclear build



High oil & natural gas prices and considerations of energy “security” favor the renaissance of nuclear power.

- As fossil fuels become progressively scarce and therefore pricy, nuclear power will become comparatively cheaper and therefore will eventually out compete them as a primary source of energy, first for electricity generation and later on for the production of oil substitutes (oil sands, oil shale’s, hydrogen ...)
- By increasing our reliance on nuclear energy, advanced societies will no longer be at the mercy of unstable unfriendly regimes or greedy Russians that hate us.
- Nuclear power is a domestic source of energy.
- Not yet industrialized countries will benefit most from this energy source to generate the electricity they need to develop their economies.

Facts #2: Oil and Nuclear Power

Nuclear Energy Institute


Nuclear Plant Orders USA



It is a myth that the accident at Three Mile Island in 1979 caused the demise of the nuclear industry. As can be seen here, the number of new nuclear plants ordered reached a high of 35 in 1972, and then collapsed to zero after the "oil crisis" of 1973.

Source: Atomic Industrial Forum

FACT
SHEET



Three Mile Island: Myths and Facts

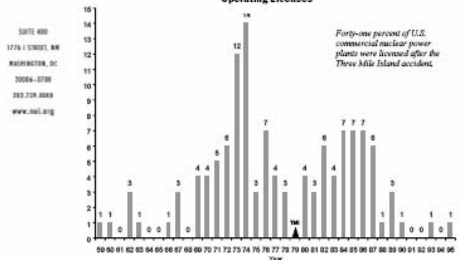
March 2004

The Myth
The TMI accident caused a decline in America's nuclear energy industry.

The Facts
The accident hurt the nuclear energy industry's public image, however, it also was the catalyst for significant institutional and operational changes that resulted in dramatic improvements in plant safety and efficiency. After a one-year reconstruction on plant licensing, while the industry and the Nuclear Regulatory Commission (NRC) studied the accident, new nuclear power plants once again began to enter service. In fact, 41 percent (51 reactors) of the 123 commercial nuclear reactors licensed between 1999 and 1995 began operation after the accident. Five of these reactors are in Pennsylvania.

The addition of new plants significantly expanded nuclear energy's role in America's electricity supply after the TMI accident. In 1980, nuclear energy generated more electricity than oil and overtook natural gas in

Operating Licenses

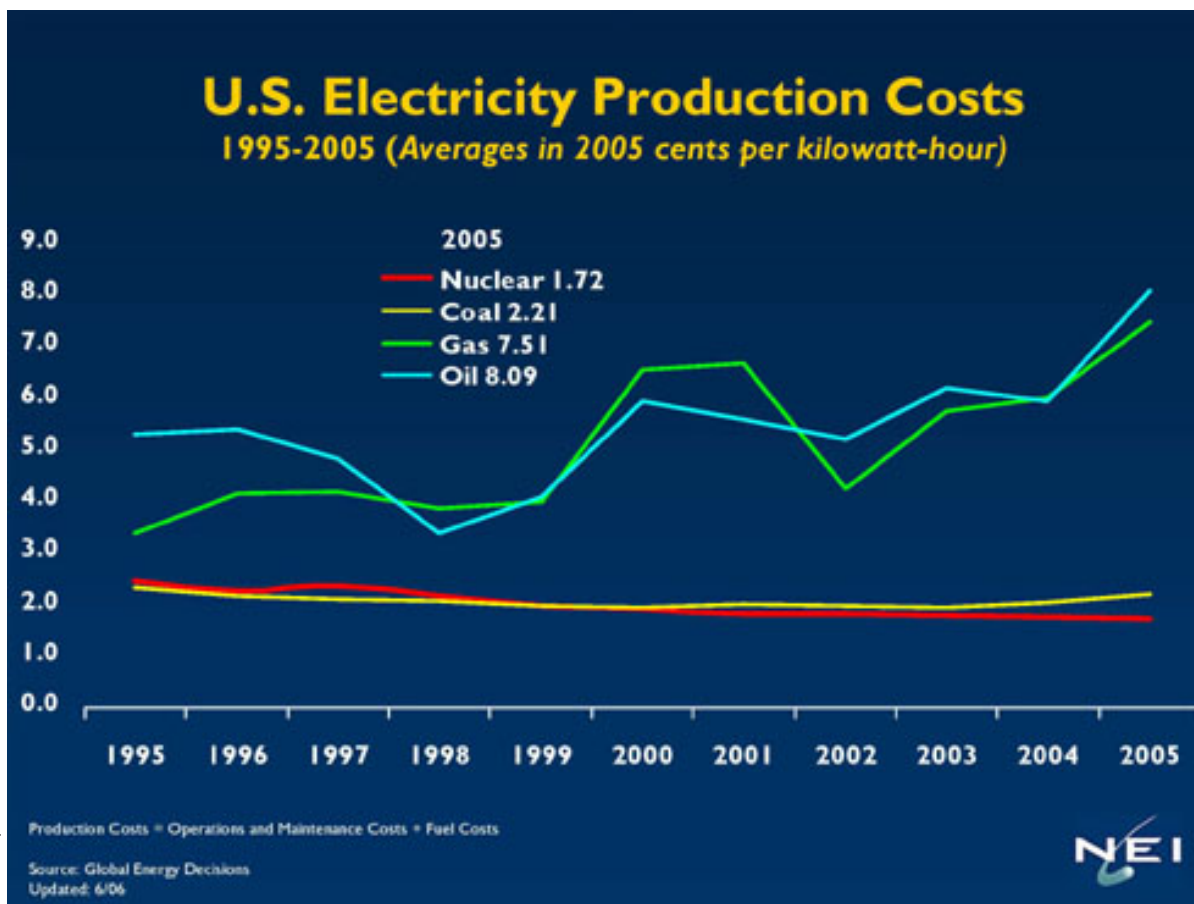


Forty-one percent of U.S. commercial nuclear power plants were licensed after the Three Mile Island accident.

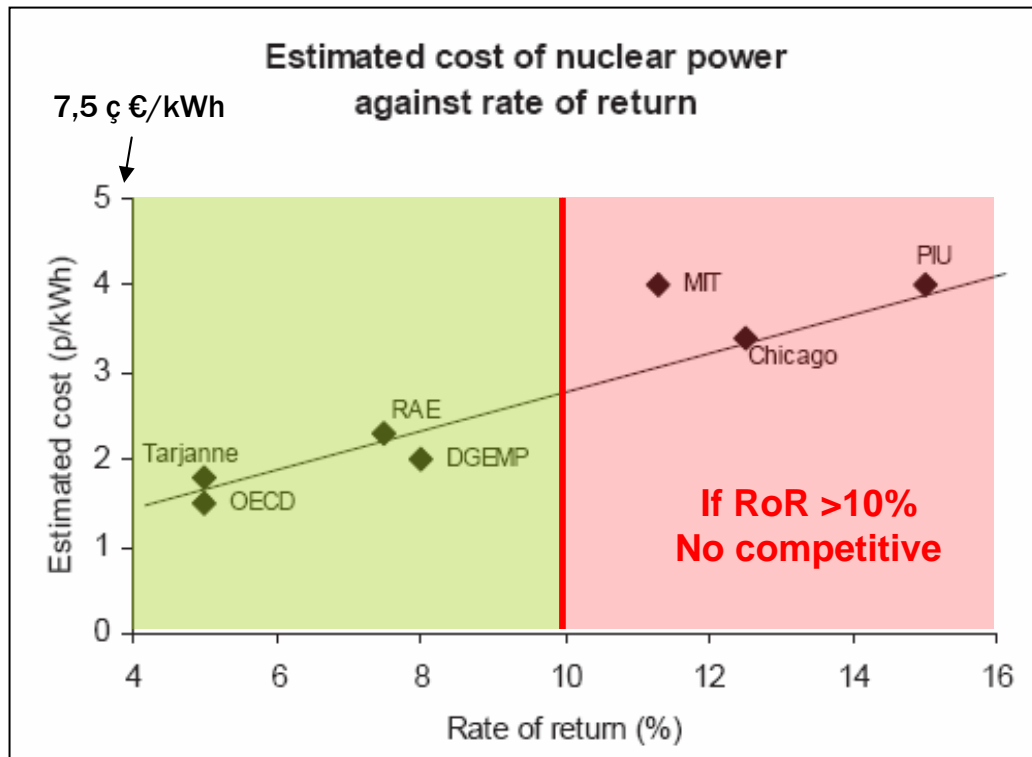
Most plant cancellations can be traced to the 1973 oil embargo, which led to high interest rates and low economic growth—and in turn halved growth in electricity demand from an average annual increase of 7 percent to less than 3 percent.

Myth #3: Nuclear Power is cheap and competitive

Nuclear power is a cheap way to generate electricity and will become more competitive as oil and gas prices rise.



Facts #3: Nuclear Power costs



- 60 to 75% of nuclear kWh cost is financial
- Above comparisons assume uranium cost of 30\$/kg. Current spot price > 150\$/kg

- Do not fall into the trap of comparing current nuclear costs with future alternative sources costs.
- Current reactors were built when energy was plenty and cheap.
- Finland's EPR reactor cost has increased 10% in one year due to raw materials price increases.
- Not all costs internalized.
- Can you predict interest rates over 40 years?

Myth #4: Nuclear Power is clean and green



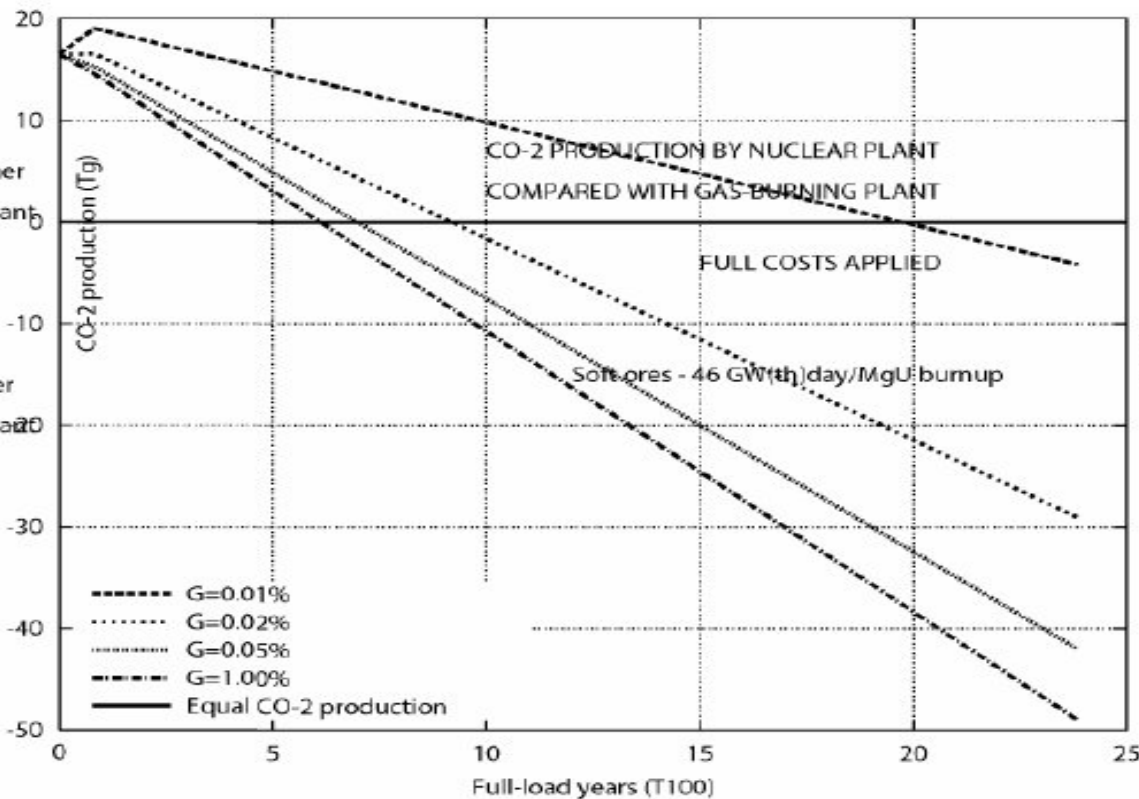
We need nuclear power to avoid climate change

- As global energy consumption is posed to increase significantly over the next century, we need emission-free powerful energy sources to avoid worst-case scenarios of climate change.
- Nuclear power is a large, reliable and clean baseload energy source.
- Therefore, nuclear power must be, at the least, a component of our future energy mix.
- Nuclear power does not compete with renewable energy sources but it is a good complement.
- If you are ecologically minded and look at the facts without prejudices, you should support nuclear energy.
- Nuclear energy is the only hope to avoid climate Armageddon and save civilization (James Lovelock).

Facts #4: Nuclear Power is not emission free



You need to look at the full life-cycle, not only to the generation stage.

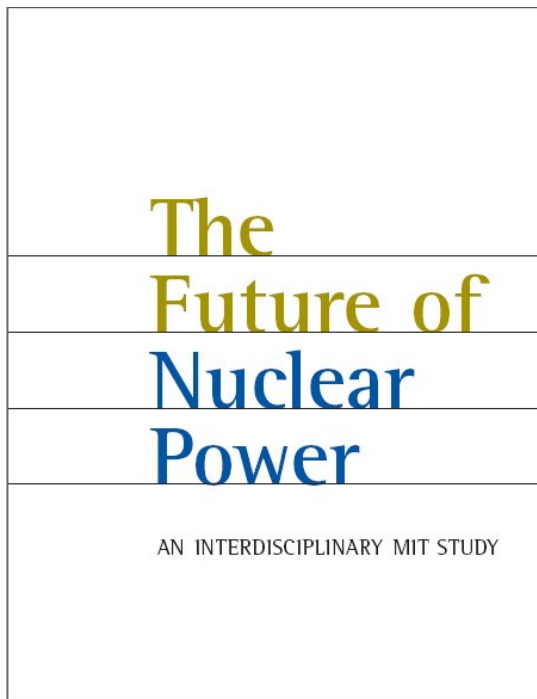


- With soft ores with concentrations below 0,01% or hard ores below 0,02%, you generate more CO₂ in mining&refining than avoided in generation, as compared with natural gas.

Facts #4: Nuclear Power will not save us



Let's assume we'll find plenty of good ores. How many emissions can we avoid?



- Assume we multiply by 3 the number of nuclear reactors by 2050 (= 1.200).
- Will produce around 20% of electricity with nuclear reactors worldwide.
- Will avoid 800 million tones of CO₂ compared with gas generation.
- This is approximately 8% of the reference scenario emissions by 2050.
- Isn't there simpler and cheaper ways to avoid 8% of emissions?
- What about the other 92% ?

Myth #5: We have or will have a solution for nuclear waste



No source of energy is problem-free, but we can deal properly with nuclear residues.

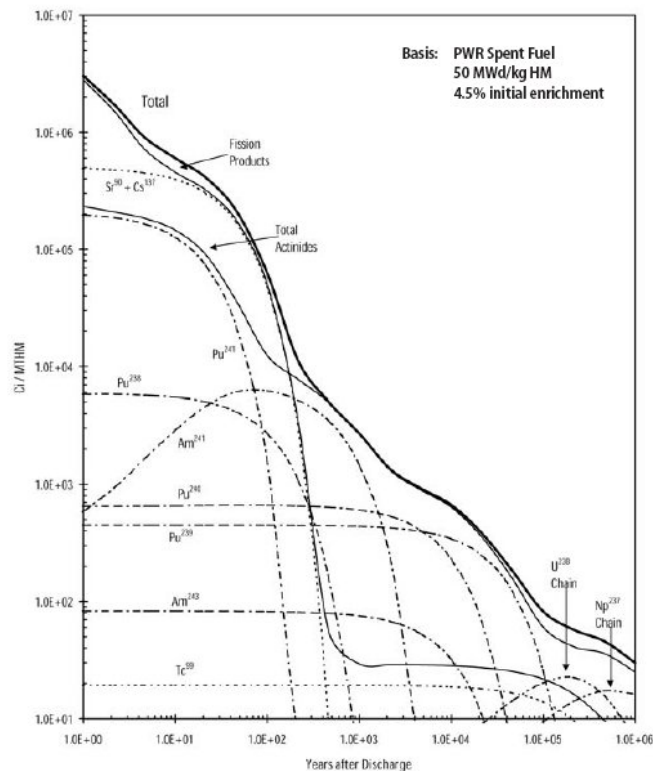
- Nuclear residues are comparatively small (by volume and weight), can easily be confined, and we know how to dispose of them safely, at least for the time being.
- We are intensely researching and will eventually find the way to either dispose of them safely in deep geological repositories, or will be able to transmute them into short-life radioactive isotopes further reducing the need for geological storage.
- In reality, these residues are not a liability for future generations but will eventually become an asset for them as they learn how to extract the +90% of original energy they still contain.
- Meanwhile, the best strategy is to keep them in Temporal Centralized Storage for the next 100 years.

Facts #5 Residues: The most intractable problem



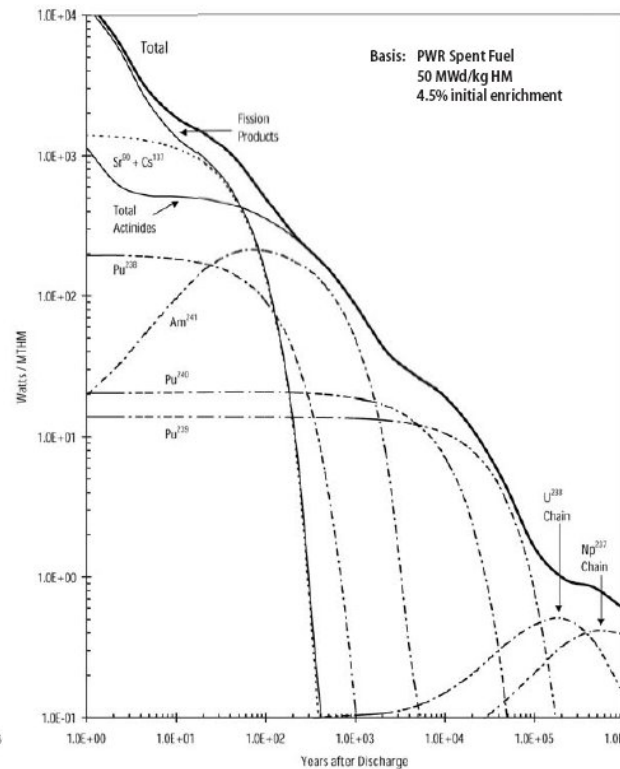
It's really a hell of a problem, look at the time axis: 10^6 years !!!

Figure 7.1 Radioactivity profile of spent fuel (curies/MTHM)



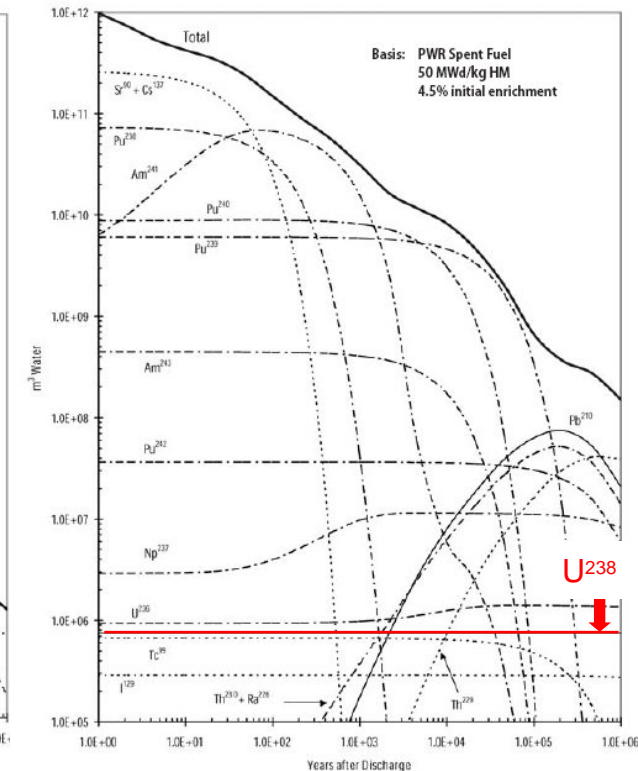
Radioactive Decay

Figure 7.2 Decay Heat Profile of Spent Fuel



Heat Decay

Figure 7.3 Radiotoxicity Index for 1MT of Spent Fuel

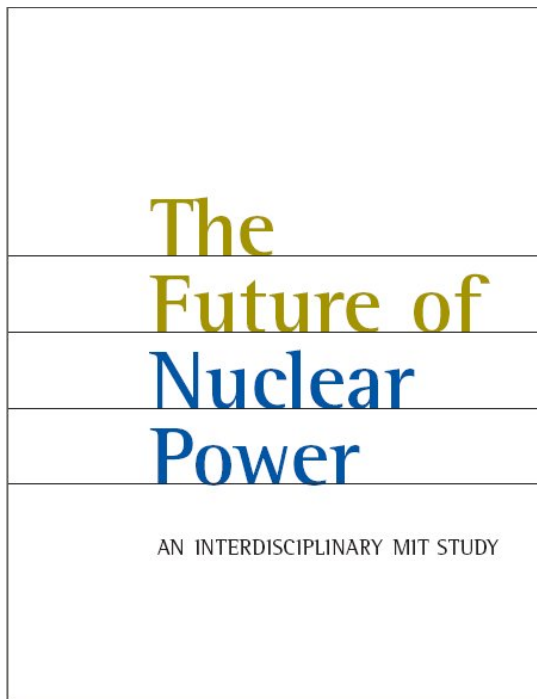


Radiotoxicity Index

Facts #5 Residues: The most intractable problem



After 50 years of nuclear reactor operation, no country has been able to deal effectively with them.



- After more than 15 years and billions of dollars spent, Yucca Mountain does not even have a date when we will know the date of operations start, nor do they have a budget figure.
- Its planned capacity (70 kT) will be exhausted before it is completed.
- A 1.000 reactors program would require one Yucca Mountain repository every 3 or 4 years around the world.
- Temporal Centralized Storage facilities are not a solution but the recognition that we do not currently have any solution.

Myth #6: Another Chernobyl is impossible



- Chernobyl was the result of ancient technology, bad management, no culture of public accountability: i.e. a soviet accident.
- Western reactors are safer, our companies are safety conscious and corporate accountability is effective.
- Our nuclear plants are closely supervised by strict Safety and Regulatory bodies.
- Modern designs are even safer, with in-built intrinsically safe mechanisms, gravity-based.
- After all, nobody died in TMI and “only” a few hundreds died as a direct consequence of Chernobyl.
- Coal, for example, produces many deaths each year.

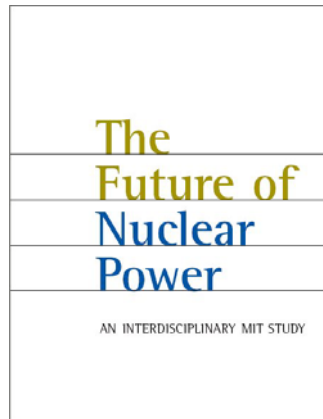
Facts #6: Why then ...?



No private insurance company is willing to insure a nuclear power station for civil damages.

- The Price-Anderson Act (1954) limits utility liabilities to a low figure. All other claims would have to be settled by the State (... if so).
- The Price-Anderson Act was extended in 2005 for 20 more years by President Bush.
- Only health expenditures of Chernobyl amounted to 50 billion dollars .
- Look at any of your insurance documents (house, car, life, etc.). In very small type, you will always read: Damages from nuclear accidents excluded.

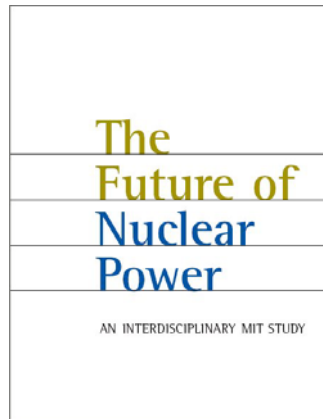
In Summary:



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To preserve the nuclear option for the future requires overcoming the four challenges described above—costs, safety, proliferation, and wastes. These challenges will escalate if a significant number of new nuclear generating plants are built in a growing number of countries. The effort to overcome these challenges, however, is justified only if nuclear power can potentially contribute significantly to reducing global warming, which entails major expansion of nuclear power. In effect, preserving the nuclear option for the future means planning for growth, as well as for a future in which nuclear energy is a competitive, safer, and more secure source of power.

In Summary:



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We have not found, and based on current knowledge do not believe it is realistic to expect, that there are new reactor and fuel cycle technologies that simultaneously overcome the problems of cost, safety, waste, and proliferation.

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