

# The Nuclear Endgame



**The Greens | European Free Alliance**  
in the European Parliament

*Nuclear power is  
dangerous,  
linked to weapons,  
a terrorist target,  
dirty,  
expensive,  
inefficient,  
outdated,  
in decline and  
unwanted.*

*The 20<sup>th</sup> Century was nuclear;  
the 21<sup>st</sup> Century will be energy intelligent!*

The international nuclear lobby is full of confidence: "Our industry is not in the defensive mindset that it was in before. On the contrary, we must now make the most of the nuclear revival and go on the offensive."<sup>1</sup>

What nuclear revival? How relevant is nuclear energy? Has the nuclear sector solved its problems? Are the facilities safe and a new Chernobyl excluded? Is nuclear waste safely stored for the millennia to come? Are all the costs paid for, now and forever? Is misappropriation of nuclear material impossible? Does nuclear energy prevent climate change? Do people want nuclear power?

In fact, the nuclear industry has never solved its historic problems and new problems have constantly popped up.

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<sup>1</sup> Frank Deconinck, Chairman of the European Nuclear Society, 13 February 2006



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## Dangerous as Ever Forever

There is no nuclear proponent that pretends the facilities are 100% safe. Dozens of accidents in various countries since the Chernobyl disaster in 1986 have come **very close to a new major catastrophe**, including the following:

- **1993, Russia:** an explosion at the reprocessing plant Tomsk-7 releases significant amounts of plutonium and other radioisotopes into the environment;
- **1995, Japan:** a sodium leak and subsequent fire at the plutonium fuelled fast breeder reactor Monju, which has remained shut-down since;
- **1998, France:** a large 30m<sup>3</sup> per hour primary coolant leak at the most recent French reactor at Civaux can only be isolated after 10 hours;
- **1999, Japan:** two workers are killed and several hundred people exposed to radiation following a criticality accident at a fuel fabrication plant in Tokai, Japan.
- **2002, USA:** a 130–200cm<sup>2</sup> hole is discovered at the Davis Besse plant that goes right through the 17cm thick reactor pressure vessel head down to a thin internal liner of stainless steel cladding not designed to withstand operating pressure.
- **2003, Hungary:** the majority of 30 spent fuel elements are broken in a cleaning tank leaving 3.6 tons of uranium pellets at the bottom of the container; the situation remains unsolved to date;
- **2005, UK:** a leak of over 80m<sup>3</sup> of nitric acid containing some 22t of uranium and 200kg of plutonium is discovered, eight months after its beginning, at the dissolver of reprocessing plant THORP that has been shut down since.

## Remember Chernobyl? Remember Chernobyl!

Twenty years after the unit number four of the Chernobyl nuclear power plant exploded people remain surprisingly unaware of the dramatic consequences of the disaster:

→ The World Health Organisation (WHO) has estimated that the total radioactivity released from Chernobyl was **200 times** that of the *combined* releases from the atomic bombs dropped on **Hiroshima** and **Nagasaki**.

→ About **350,000 people** were **evacuated** from particularly contaminated areas. However, 9,500 people still live in zones of compulsory evacuation.

→ Some **7 million people** are entitled to **special allowances, pensions and health care** privileges as a result of being categorised as in some way affected by Chernobyl.

→ The cumulated economic damage to Ukraine alone is estimated to exceed **165 billion euro** by 2015.

→ Up to 2005, about 4,000 cases of **thyroid cancer** have occurred in **Belarus, Ukraine** and **Russia** in those aged under 18 at the time of the accident.

→ Official reports put the number of fatal cancers to be expected at 9,000. Independent scientists estimate that between **30,000 and 60,000 people will die** from Chernobyl induced cancer.

→ The number of people designated as **permanently disabled** by the Chernobyl accident (and their children) increased from 200 in 1991 to 64,500 in 1997 and over **91,000 in 2001**;

→ In the United Kingdom, over 2,500 kilometres from the source of the disaster, 374 sheep farms with **200,000 sheep** are still subject to **restrictions** because of contamination from the Ukrainian reactor accident. The contaminated fields in the UK cover an area of over **750 km<sup>2</sup>**.

→ In certain regions of **Germany, Austria, Italy, Sweden, Finland, Lithuania** and **Poland** wild game (including boar and deer), wild mushrooms, berries and carnivore fish from lakes and still reach caesium-137 contamination levels of several thousand becquerel per kilogram.<sup>2</sup>

The European Commission does not expect any change soon and concludes<sup>3</sup>: "The **restrictions** on certain foodstuffs from certain Member States must therefore continue to be **maintained for many years to come.**"

The Chernobyl disaster will continue and nobody will ever know the true extent of the damage to people and the environment. But we do know enough to say that nobody could seriously accept the slightest risk of this happening again!

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<sup>2</sup> The EU limit is 600 becquerel of caesium-137 per kilogram of foodstuffs.

<sup>3</sup> Andris Piebalgs, European Commission, written answer to Question P-1234/05DE by MEP Rebecca Harms dated April 4, 2005



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## Siamese Twins: the Reactor and the Bomb

Nuclear knowledge can be used to produce electricity or nuclear explosive devices. The separation of civil and military uses is a myth. Several countries have developed bomb programs on the basis of technology provided by other countries “for civil purposes”. The Non-Proliferation Treaty (NPT) actually guarantees “the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination”. As long as the International Atomic Energy Agency (IAEA) under full access does not come up with proof of non-declared weapons related activities, all Members to the NPT, including Iran, have the right to access nuclear technology, including uranium enrichment and plutonium separation. The NPT is actually a “Proliferation Treaty”, the IAEA a broker of nuclear technology.



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## Royal Gifts for Terrorists

Nuclear facilities, plutonium and radioactive waste shipments constitute prime targets for terrorists. The hijacking of a significant amount of plutonium or highly enriched uranium and a credible threat with a crude nuclear explosive device would challenge any democracy in a so far unprecedented extent. A massive attack on a large spent fuel or plutonium store could dwarf the Chernobyl accident in short- and long-term fatalities and environmental contamination.



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## Dirty from Mine to Waste

The nuclear fuel “cycle” is a myth. The nuclear system, rather a spiral, generates large amounts of waste at each single step from uranium mine – hundreds of millions of tons of waste in the world already – to plutonium separation, called reprocessing. The only two large-scale plutonium plants worldwide at Sellafield (UK) and La Hague (France) discharge huge amounts of radioactivity and cause over 80% of the collective dose to Europeans. There is no solution to the safe storage of high-level radioactive waste for thousands of years.

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## Benefits Privatized, Costs Mutualized

The total cost of a nuclear kWh most likely will never be known. Costs for waste management, decommissioning and clean-up are constantly on the rise and are generally expected to be paid for by the taxpayer, while in many countries beneficial power generation has been privatized. However, according to most international cost assessments, nuclear power generates by far the most expensive delivered energy. For new nuclear power to become competitive it would need substantial State subsidies in particular to provide guarantees against substantial financial and economic risks. <sup>4</sup>

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<sup>4</sup> see for example Steve Thomas, *The Economics of Nuclear Power*, commissioned by Heinrich-Böll-Stiftung, December 2005

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## Nuclear Power Destroys Efficient Climate Change Policy

Every Euro invested in nuclear power is wasted because it could achieve greater greenhouse gas abatement if invested in energy conservation and efficiency. Large-scale power plants lead to overcapacities and therefore consumption incentives and waste of electricity as well as large losses in distribution networks. There is little or no link between oil and nuclear energy. Nuclear power increases the *dependence on non-sustainable energy and resource imports*. Energy *service* security is the answer.

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## Decentralised High-Tech Plants Outpace Ancient Technology

Nuclear is *old technology*. Most of the operating plants were designed between the 1950s and 1970s. Today, high-tech, decentralised cogeneration and renewable energy plants already outpace nuclear: they surpassed nuclear power's total installed capacity in 2002 and its annual output in 2005. In 2004 they added about 6 times as much net capacity and almost 3 times as much annual electricity generation as nuclear power.

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## Very Limited Role in Securing Energy Supply

Nuclear power covers only a *minor share of energy services* in the world: 6% of commercial final energy in the EU and ca. 2% in the world. Even in France, the *most nuclearised* country in the world, nuclear power provides only 17.5% of commercial final energy while over 70% of the consumption is covered by fossil fuels. Nuclear power does not make the EU any more independent of energy imports, since **all the uranium** for the fabrication of nuclear fuel has to be **imported**.

## Insignificant Market Share In New Capacity

In total 26 nuclear units are listed by the International Atomic Energy Agency (IAEA) as “under construction”, but nine of these have been listed there for between 18 and 30 years. Only one reactor is under construction in the EU (Olkiluoto-3 in Finland). Nuclear power represents **between 1% and 2% of the world market** for new electricity generating capacity.

## Ongoing Decline – No Sign of Revival

In March 2006, there are 148 units operating in the EU25, which is **24 units less** than at the historic peak in 1989. For the first time in 15 years in 2005 a single building site was started up (Finland), however, two units were shut down the same year (Germany, Sweden). The decline continues.

## Rapid Aging – Slow Decline

The world’s nuclear plants are rapidly aging. Until 2015 about 80 units will reach age 40, by 2025 an additional 200 reactors will have operated for four decades. Even if it was possible to practically double the current operating age (about 22 years) of all reactors, their replacement at age 40 would mean to connect to the grid a unit every month and a half until 2015 and one every 18 days between 2015 and 2025. Considering the long lead times of nuclear power plants of at least ten years, such a scheme is impossible. Even if China did build 20 additional units and other countries a few more by 2025, the **numbers of nuclear plants operating will decline**. Unless the operating age would be stretched *on average* significantly beyond 40 years, which would raise not only the question how 50 year old reactors could possibly stand for the term “revival” but also a new dimension of severe nuclear safety issues.



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## People “Fairly or Totally Opposed” to Nuclear Power

The latest opinion poll published by the European Commission shows that **55%** of the EU25 citizens questioned are fairly or totally **opposed to nuclear energy**. Political leaders that call for more nuclear power ignore their public opinions. People want a sustainable energy future based on conservation, efficiency and renewable energy in which nuclear power has no place.

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