



[Introduction](#)

[Economic Failure](#)

[The Fallacy of Competitiveness](#)

[The Unseen Costs](#)

[The Implications of Nuclear Expansion](#)

[Radioactive Waste : The Problem with No Solution](#)

[The Horror of Nuclear Accidents and the Threat to Health](#)

[Nuclear Weapons: Uncontrollable Worldwide Proliferation](#)

[The United Nations IPCC View: "The security threat... would be colossal"](#)

[Conclusion](#)

[Appendix: Commercial Renewable Energy Technologies](#)

## References

---

### Introduction

The nuclear industry is in near-terminal decline world-wide, following its failure to establish itself as a clean, cheap, safe or reliable energy source. The on-going crisis in nuclear waste management, in safety and in economic costs have severely undermined the industry's credibility. It is currently desperate to find a valid rationale and justification for renewed state support and funding. It is promoting the claim that as nuclear power stations do not emit carbon dioxide, the major greenhouse gas, switching from fossil fuels to nuclear power is the only way to cut Carbon Dioxide (CO<sub>2</sub>) without radically changing consumption patterns. However, even the most perfunctory examination of the issue shows that nuclear power has no role whatever in tackling global climate change. In fact quite the opposite is true; any resources expended on attempting to advance nuclear power as a viable solution would inevitably detract from genuine measures to reduce the threat of global warming.

There has been a marked downward world-wide trend in the fortunes of the nuclear industry throughout the last two decades. By the end of 1998, it is expected that no new reactors whatever will be under construction anywhere in either North America or in Western Europe<sup>1</sup>. Global orders have declined from a high point in 1968, when over 40 GW of nuclear plant orders were placed, to the position today where the industry is barely able to replace the capacity of those reactors being closed.

It is clear that immediate action is needed to halt climate change. Instant cuts in CO<sub>2</sub> emissions must be made. Electricity production is a major source of CO<sub>2</sub>. To tackle global warming, we therefore have to look for ways of producing and using electricity which significantly lessen the CO<sub>2</sub> burden. And in deciding how best to tackle global warming, we have to take into account both the cost effectiveness of alternatives to fossil fuels, the cost of their environmental impact and their impact on global security.



### Economic Failure

According the American business magazine 'Forbes', "The failure of the US nuclear power program ranks as the largest managerial disaster in business history"<sup>2</sup>.

Early hopes of cheap nuclear energy were based on an expectation that whilst nuclear power stations would be more expensive than fossil fuel plants, their running and maintenance costs would be extremely low. Experience has shown that the early optimism was totally misplaced.

The cost of nuclear activity at all levels has exceeded those early predictions. In many countries, the construction costs of nuclear power plants have proved to be much higher than first expected. Plants have taken longer to build and there have been many unforeseen technical problems. Running costs have also been much less predictable than was first thought. The costs of increased safety demands and regular equipment breakdowns have been compounded by the expensive question of how to deal with the nuclear waste. In addition, the predicted cost of decommissioning power stations has also escalated<sup>3</sup>.

### Reactor Orders v Start-up

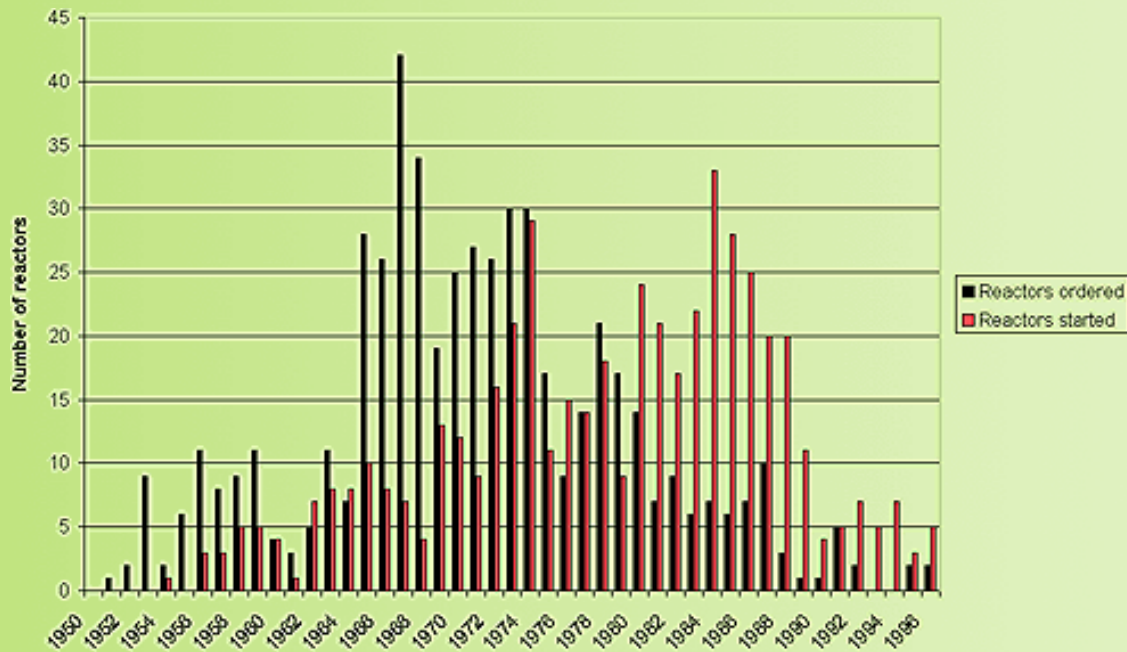


Figure 1: The declining role of nuclear power (Nuclear Engineering International Handbook, 1997<sup>4</sup>).

Reliable figures on nuclear generating costs are difficult to obtain. According to a current international study<sup>5</sup>, which examined the cost information provided by nuclear operators, industry figures are frequently dubious or inaccurate. The assumptions on which they are based are often over-optimistic. Alternative options, which are risk-free and less CO<sub>2</sub> intensive are in fact cheaper.

In the United States, for example, no new nuclear power stations have been ordered since 1978. This has happened in a country which launched the Pressurised Water Reactor design and which houses many more nuclear reactors than any other country. Construction and operating costs have risen so dramatically, especially since the extra safety demands made after the accident at Three Mile Island, that some companies have faced bankruptcy<sup>6</sup>.

In the United Kingdom, after a review of the privatisation of the nuclear power industry, the government dismissed the industry's demands for public funding to build new reactors to combat global warming. Six months later, British Energy cancelled two proposed stations, leaving the UK for the first time in over 40 years with no plans for new nuclear power stations<sup>7</sup>.



## The Fallacy of Competitiveness

Since the oil crisis of the 1970's, several 'new' forms of electrical power generation have emerged, and of these a handful are now considered 'mature' and 'bankable'. This means that they are considered to be reliable and durable power production systems and are therefore able to secure private investment. Many of these technologies are therefore coming into main-stream use, with hundreds of megawatts installed each year. On the other hand it has become clear that nuclear power is not bankable. In particular the World Bank states<sup>8</sup>:

"Bank lending for the energy sector requires a review of sector investments, institutions and policies. Nuclear plants in the power sector would not be economic; they are large white elephants".

Furthermore the Asian Development Bank write<sup>9</sup>:

"The Bank is very much aware of this background [on nuclear power] and has not been involved in the financing of nuclear power generation projects in the Developing Member Countries due to a number of concerns. These concerns include issues related to transfer of nuclear technology, procurement limitations, proliferation risks, fuel availability and procurement constraints, and environmental and safety aspects. The Bank will maintain its policy of non involvement in the financing of nuclear power generation".

Wind power, hydro electric, photovoltaic, land-fill gas and biomass all derive their energy from the sun, whether by direct conversion using solar cells, the global thermal currents created by heating, potential energy imparted through the water cycle or through the energy absorbed by plant life which is released with decomposition. Since the sun is expected to be shining for several million years, these energy forms may be taken as sustainable. Nuclear power on the other hand uses a finite fuel.

In the late 1990's, the renewable industries have been aggressively competitive. The following table shows the competitiveness of renewable energy technologies, even ignoring the environmental costs associated with fossil and nuclear generated electricity (for further information on Renewable Energy Technologies, see [Annex I](#)).

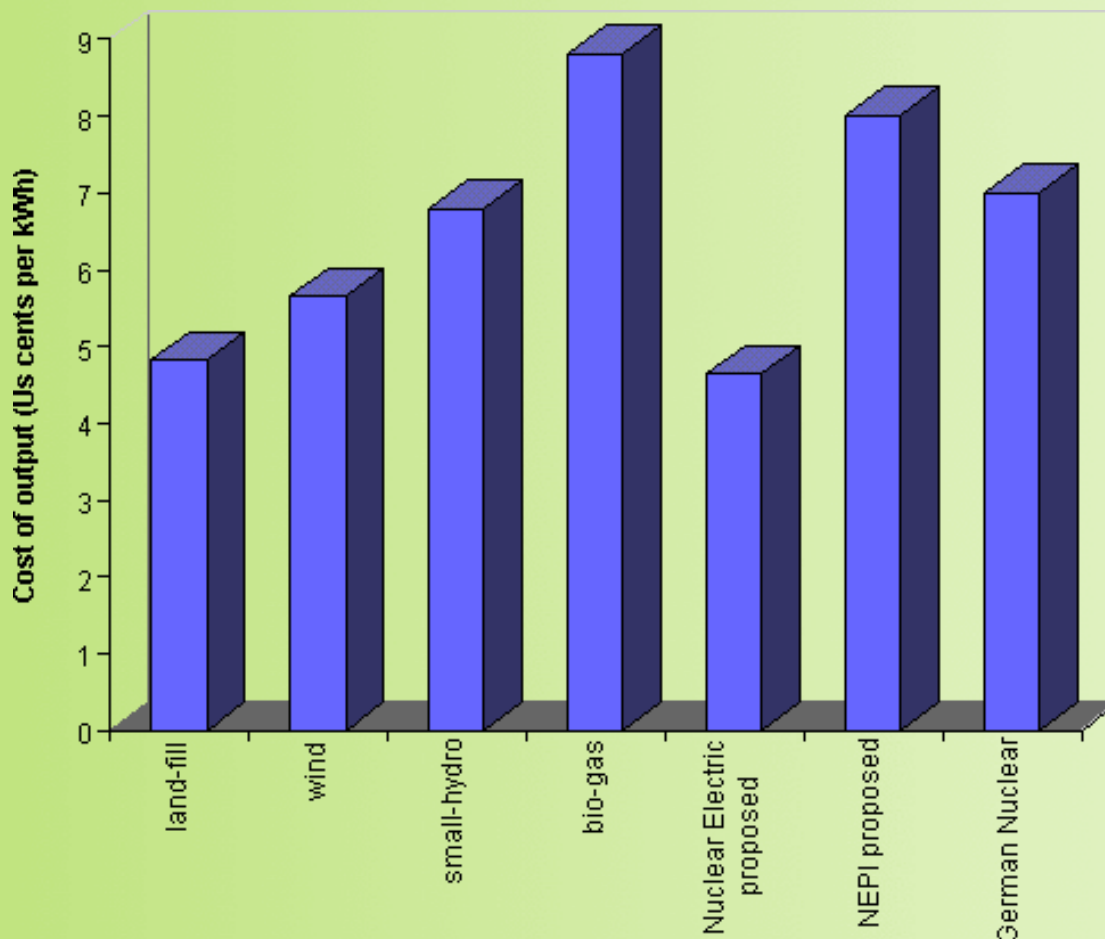


Figure 2 : Commercial renewables against proposed and actual nuclear costs (NEPI: Nuclear Energy Policy Issues Proposal for Sizewell C, 1994; NUFFO figures from Grubb & Vigotti, 1997<sup>10</sup>).

The production of new generating capacity is not the only way of meeting the expanding demand for new power. The growth in demand can also be addressed directly. In 1990, Bill Keepin and Gregory Kats of the Rocky Mountain Institute, Colorado, conducted a detailed analysis of the potential roles of nuclear power and energy efficiency measures in reducing CO<sub>2</sub> emissions. They concluded:

"The estimated costs of generating electricity from new nuclear power plants was around 13.5 US cents/kWh in 1987, assuming a capital cost of \$3,000 per kW. Meanwhile, a number of studies analysed the cost and savings potential of electrical efficiency improvements. Several technologies were considered, including compact fluorescent lamps, improved refrigerators and water-heaters and motor improvements. While the best electric-efficiency costs less than 1 cent per kWh of electricity saved, the average cost weighted over a wide range of electric efficiency improvements was around 2 cents."

Based on these results, assuming a strategy of displacing coal-fired power, 50 kWhs of energy can be displaced by a dollar spent on electric efficiency, compared to 7.4 kWhs spent on subsidising nuclear power.



### The Unseen Costs

In addition to compensating for the industry's optimistic assumptions, the true cost of any power source must include external costs. Such costs do not appear on the operators' balance sheets, however, and are therefore hidden.

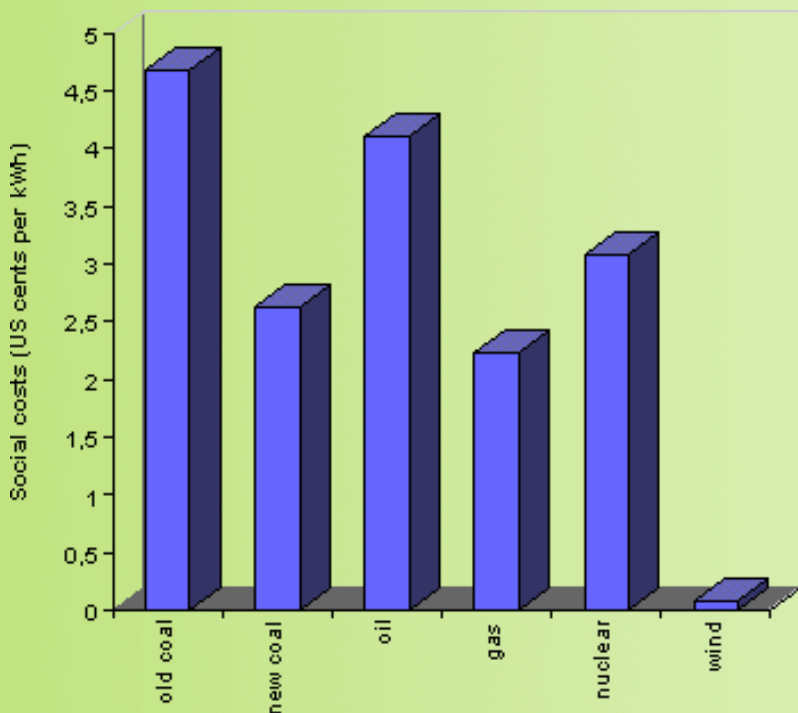


Figure 3 : External costs of fossil, nuclear and renewable power, US cents/kWh (Pearce, 1992<sup>11</sup>).

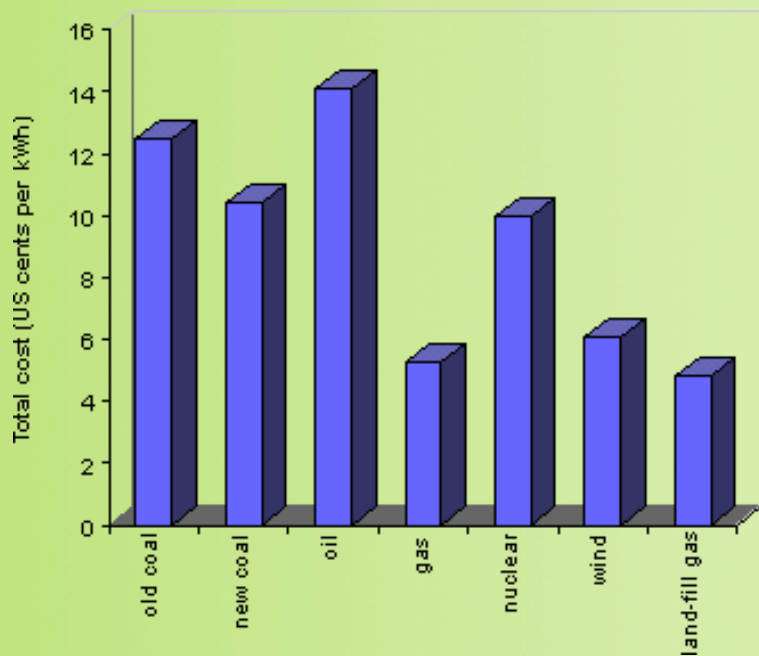


Figure 4 : Total cost of fossil, nuclear and renewable energy, UScents/kWh (Pearce, 1992<sup>12</sup> and Grubb & Vigotti, 1997<sup>13</sup>).

The external costs of nuclear power include the cost of environmental damage, the effect on human health and society following an accident, damage to human health and the environment during routine operation of nuclear facilities and also long term problems associated with nuclear waste and decommissioning of nuclear facilities. 'Externalities' that lend themselves to monetary quantification include economic effects, employment, environment, environmental impacts, health effects & government subsidies, Figure 3.

When such quantifiable social costs are added to the core price of electricity, the total costs of nuclear power are extremely high. As Figure 4 shows, nuclear power no longer stays competitive against the latest generation of renewable energy, see.



### The Implications of Nuclear Expansion

Sustainable energy sources can clearly be more effective as non-CO<sub>2</sub> emitting energy sources than nuclear power. However, there are also a number of environmental problems associated with nuclear power which go beyond direct quantification as 'externalities'. These make nuclear power unacceptable from an environmental perspective.

Taking the idea of "nuclear power to protect the climate" to its logical conclusion, it is necessary to ask how many nuclear power stations must be built to achieve internationally-agreed climate protection goals. The consequences of only doubling nuclear power's contribution to the world-wide primary energy mix demonstrates the legal and technical impracticality of this proposal.

Currently, around 440 nuclear power stations provide approximately 5 % of the global primary energy mix. If this figure is doubled, a corresponding number of new nuclear power stations would have to be built in the coming years. Despite this enormous effort, nuclear energy's contribution to the primary energy mix would not be twice as high but would decrease, because, in absolute terms, world energy demand is expected to increase by at least one half in the next 25 years. To double nuclear energy's share in the "business as usual" scenario, would in fact require not a doubling, but a tripling, of the number of reactors. Not 440 but 1,320 nuclear reactors would have to be on the grid in 25 years' time.

With an optimistic construction time of 10 years, this scenario would mean that one reactor would have to be put into operation each week, starting from the year 2007. Even then, nothing much would have been gained from the point of view of climate protection. In the medium term, climate protection requires a reduction in CO<sub>2</sub> emissions by 80%. Nuclear energy's share in the increasing primary energy consumption would therefore have to be further increased in the future in order to make a significant contribution to climate protection. Even the construction of 1,320 new reactors would not be enough, and a much larger number would eventually have to be built .

Such a massive expansion of nuclear power would require the removal of political obstacles such as moratoria on the construction of new plants and the reversal of long standing public and political decisions to abandon nuclear power currently in place in many countries. Today, in the European Union, 14 out of the 15 Member States either do not have any nuclear reactors, intend to phase out nuclear power or have no plans to build new reactors in the foreseeable future. Indeed, many E.U. countries have turned away from nuclear power due to public opposition. The nuclear industry lost in national referenda held in Sweden, Italy, Austria and Switzerland.

The main technical constraints to substantial expansion would be construction lead times and industrial capabilities for building nuclear power plants and fuel-cycle facilities. Any expansion of nuclear power would also involve extensive deployment of nuclear technology, including radioactive waste dump sites and fuel cycle facilities around the world.

### Radioactive Waste : The Problem with No Solution

It is often said that nuclear power is now a mature technology as it has been operating for over 40 years. Despite this, there is still no environmentally appropriate programme of dealing with any form of radioactive waste. This problem is made worse on a daily basis by the continual production of radioactive waste.

Nuclear waste is produced at every stage of the nuclear fuel cycle, from uranium mining to the reprocessing of spent nuclear. Much of this waste will remain hazardous for thousands of years, leaving a deadly radioactive legacy to future generations.

At nuclear power stations, highly radioactive waste has to be regularly removed from the reactor and at most sites this 'spent' fuel is being stored temporarily in water-filled cooling ponds. According to independent experts<sup>14</sup>, the global quantity of spent fuel produced without a climate based radical expansion of nuclear power is expected to increase from 145,000 tonnes in 1994, to 322,000 tonnes by the year 2010. Whilst a variety of disposal methods have been under discussion for decades, there is still no demonstrated method for isolating nuclear waste from the environment for adequate time periods.

As part of the routine operation of every nuclear power station, some waste materials are also discharged directly into the environment. Liquid waste is discharged into the sea and gaseous waste is released into the atmosphere.

### The Horror of Nuclear Accidents and the Threat to Health

The problems of reactor safety are three fold:

- (a) Reactors approaching the end of their design lives are a recognised hazard which is not being addressed.
- (b) The poor safety management appears to be endemic in some national industries and an ongoing problem.
- (c)

The safety of current and future reactor designs cannot be demonstrated to the necessary degree given the serious consequences of a nuclear accident.

Around the world nuclear power plants are getting older, both in the East and in the West. Although much public and political concern has centred on the hazards of the older Soviet-designed reactors, experience has shown that problems and signs of ageing are also occurring in western reactors. By the turn of the century some 200 reactors will have been in operations for 20 years. Half of these will be over 25 years old. The safety problems posed by ageing reactors are being largely ignored by the industry. Given the enormous consequences of nuclear accidents such as Chernobyl, great attention must be devoted to the ageing process of nuclear reactors. Unfortunately, instead of placing more stringent requirements on older plant, safety is often cut back to permit continued operation<sup>15</sup>.

In the former Soviet Union at least 9 million people have been effected by the Chernobyl disaster; 2.5 million in Belarus; 3.5 million in Ukraine; and 3 million in Russia<sup>16</sup>. In total over 160,000 km<sup>2</sup> of land is contaminated in the three republics<sup>17</sup>.

Although the nuclear industry continues to refute evidence on the widespread health effects and prevalence of diseases resulting from Chernobyl, it is now widely accepted that the accident has resulted in a massive increase in thyroid cancers in those three countries. The President of the European Thyroid Cancer Association, Dilwyn Williams, has stated that thousands of children exposed to radiation will contract thyroid cancer in the next 30 years<sup>18</sup>.

The effect of the global increase in the number of ageing reactors is a serious increase in global health risk from nuclear power plants.

The current round of reactor closures in Canada demonstrates that the managerial and procedural inadequacies that lead to Chernobyl are also very much alive in western, OECD nuclear industries. A commissioned "brutally honest" report by Carl Andognini, a U.S. nuclear expert, resulted in the closure of seven nuclear reactors in Ontario on safety grounds. Andognini stated that, "this is not a technology problem. It's a managerial problem", with lack of staff training, minimally acceptable radiation protection and minimal emergency preparedness cited<sup>19</sup>.

### Nuclear Weapons: Uncontrollable World-wide Proliferation

Plutonium is an inevitable consequence of nuclear power production. The plutonium is contained in the spent nuclear fuel. It is one of the most radiotoxic and dangerous substances in existence. A single microgram, smaller than a speck of dust, can cause fatal cancer if inhaled or ingested and a sphere of plutonium smaller than a tennis ball can be used to make a nuclear bomb capable of killing many thousands of people.

The links between the civilian use of nuclear technology and military applications is one of the most disturbing aspects of the nuclear age. The very first, crude nuclear reactors were specifically built in the 1940s and 1950s to produce plutonium for the US, former Soviet Union and British bombs. Only later were they adapted to generate nuclear electricity.

As nuclear technology spreads around the globe, so does the risk of nuclear proliferation. Nuclear weapons can be constructed using plutonium from either military or civilian sources.



The United Nations IPCC View: "The security threat... would be colossal"



The Intergovernmental Panel on Climate Change (IPCC), several hundred scientists and contributors, all recognised internationally as experts in their field, was brought together by the UN and World Meteorological Society to assess climate change. The IPCC has considered several scenarios into climate change mitigation responses, of which one includes the global expansion of nuclear power.

In 1995 the IPCC published a study which reported as follows<sup>20</sup>:

Region	2025			2050			2075			2100		
	Nuclear Elect. Gen. (TWh/yr)	Nuclear Share of Total Elect. (%)	Nuclear Capacity (GW/e)	Nuclear Elect. Gen. (TWh/yr)	Nuclear Share of Total Elect. (%)	Nuclear Capacity (GW/e)	Nuclear Elect. Gen. (TWh/yr)	Nuclear Share of Total Elect. (%)	Nuclear Capacity (GW/e)	Nuclear Elect. Gen. (TWh/yr)	Nuclear Share of Total Elect. (%)	Nuclear Capacity (GW/e)
Africa	56	5	8	208	10	31	434	15	66	678	20	103
Asia	1583	21	240	3672	27	556	6479	36	982	9510	45	1442
Australasia and New Zealand	7	5	1	17	10	3	25	15	4	37	20	6
Eastern and Centr. Europe	1184	30	179	2187	40	331	3349	50	507	4527	60	686
Latin America	204	10	31	849	20	98	1289	30	195	2000	40	303
Middle East	89	10	15	212	12	32	342	15	52	471	17	71
North America	1053	30	159	1525	39	231	2008	48	304	2566	57	389
Western Europe	634	30	96	1090	45	165	1598	60	242	2159	75	327
<b>Total</b>	<b>4764</b>	<b>23</b>	<b>721</b>	<b>9352</b>	<b>30</b>	<b>1447</b>	<b>15524</b>	<b>38</b>	<b>2352</b>	<b>21948</b>	<b>46</b>	<b>3327</b>

The IPCC developed the above scenario using projections derived from penetration curves in each region, based upon the present status and trends of national nuclear programs. The asymptotic share of nuclear power in electricity generation was estimated by region, taking into account the availability of alternative energy sources and the size of the grid-connected electricity network.

Under this set of assumptions and constraints, the installed nuclear capacity would grow from the present 330 GW to about 3,300 GW in 2100. This assumes a tenfold increase in the number of nuclear reactors over the next century. With this increase in the number of reactors operating, there would also be a massive increase in the amount of spent nuclear fuel and radioactive waste generated. The IPCC calculates that if this scenario is followed, it would lead to some 6.3 million tons of accumulated spent fuel by 2100, using the technology currently available.

The IPCC also analysed the possibility of reprocessing i.e. the process of chemically separating out plutonium from the spent nuclear fuel, for use in Fast Breeder Reactors, which burn plutonium instead of uranium as fuel. The accumulated volumes of high level nuclear waste to be disposed of would be some 200,000 m<sup>3</sup> by 2100. Between 0.1 - 3 million kg/yr of plutonium would be generated, depending on the mix of technologies used, resulting in a plutonium inventory of between 50-100 million kg. The security threat that such massive amounts of plutonium would pose would be colossal. A nuclear bomb powerful enough to destroy a city requires a mere 10 kg of plutonium.

If the majority of spent fuel was to be reprocessed, and if for example 3 million kg/yr of plutonium was to be generated, global plutonium production would follow the pattern below:

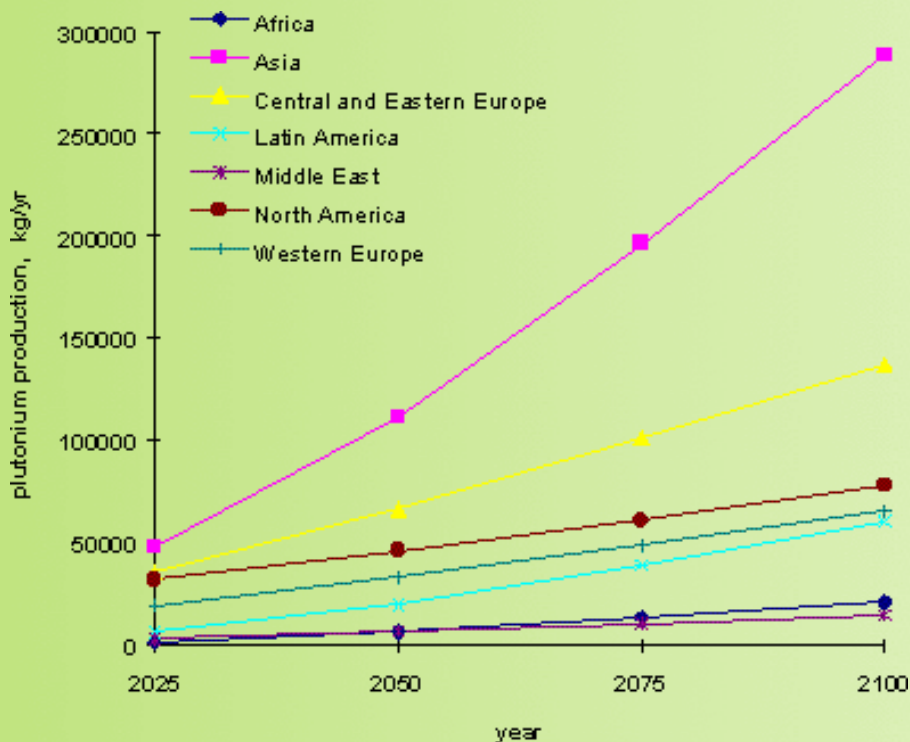


Figure 5 : Plutonium production per year by region based on IPCC scenario.



## Conclusion

The nuclear industry's disingenuous claims to a role in alleviating climate change must be rejected for what they are: dangerous and self-serving fantasies which would create a serious legacy of deadly radioactive waste, increase the risks of catastrophic nuclear accidents and also vastly increase the threat of nuclear weapons proliferation.

Environmental impacts aside, nuclear economics preclude its use to combat global warming. It is not the cheapest of the non-fossil fuel alternatives; nor is it the cleanest. A host of renewable technologies have outstripped nuclear power in development and performance, while energy efficiency measures remain the most cost effective way to address the need for new power.

The challenge posed by climate change raises important questions about what kind of world we wish our children to inherit: one in which the inseparable technologies of military and civil nuclear power are prevalent in every nation or one in which energy is used wisely and generated through the use of sustainable renewable energy systems.

The choice is ours.



## Appendix: Commercial Renewable Energy Technologies

### Wind power

The wind as a source of energy has been used for 4,000 years. From its early start in the pumping water in Persia, it has become one of the most successful of the new renewable energy industries, both in terms of turnover and also newly installed capacity. The technology has changed from slow multi-blade rotors such as the American farm wind mill to sleek, three bladed rotors which are optimised for grid-connected electricity generation.

In the same way that an aeroplane wing is able to create lift by moving forward through the air, the wind turbine also uses a lift force on its blades to turn the rotor around its circular path and so extract energy from the flow of air. Machines of 1.5MW are now available off the shelf and wind farm installations totalled 6,500MW in 1996. It is anticipated that large wind farms will increasingly be placed off-shore where the higher cost of installation is overcome by cleaner and more consistent winds, while visual, noise and land-use limitations are avoided.

### Solar Photovoltaic

Each day the sun pours 15,000 times more energy upon the earth than we generate ourselves from fossil and nuclear sources<sup>21</sup>. Photovoltaic systems are already a billion dollar business, with over 80MWp of solar cell capacity shipped in 1996 (US\$1.12 billion). A PV cell is made from a sliver of silicon which is doped with small amounts of other elements. These impurities are arranged to give it a net excess of electrons on one surface and net deficit of electrons on the other surfaces. Since one side is more negatively charged than the other, an electric field is created. Nothing moves under the action of this field until a particle of light, a photon, kicks an electron out of its place in the crystal of silicon. The liberated electron can move and the space it leaves allows movement of electrons between the two sides of the wafer, Hence a current flows through a circuit joining the two surfaces. The technology is very similar to that of transistors which drive almost all modern electronics. Much younger in their development, PV systems continue to drop in price. The bulk of the current industry is in stand alone power systems that require no maintenance, though in the later part of the 1990s they are now being adopted as roofing materials for grid connected generation.

### Solar Thermal

Solar thermal systems use the same approach as a child with a pocket lens burning a hole in a piece of paper. The lens is replaced by a series of mirrors and the piece of paper is replaced by the a tube of water. The tube acts as a boiler. For power generation the intensity of heat the boiler is increased and the resulting steam is used to drive a steam turbine and generator. Though solar thermal power stations are not yet mainstream the most popular use of solar thermal energy is for providing hot water. It is already popular in a number of countries including China, and in certain other countries a solar hot water heater is now a standard building requirement

### Hydro-Electric Power

Environmentally sound hydro-electricity has come to mean run-of-river turbines, or installations that make use of the flow from existing dams. The vision of thousand megawatt hydro-electric power stations as an ample source of green power has undergone substantial revaluation in the nineties. The public protests at destruction of river systems through flooding have now been joined by a recognition that the decomposition of the submerged forests and vegetation results in the production of large quantities of methane (a considerably more potent greenhouse gas than CO<sub>2</sub>) and the loss of a carbon sink.

### Biomass

Biomass simply refers to organic material that may be burned to produce energy, such as wood. If the rate of consumption

is equal to the rate of renewal of the supply then the cycle is sustainable. For power generation the most common form of sustainable biomass is the combustion of timber waste in managed forests.

Variations include the use of sugar crops to provide alcohol as an automotive fuel as is used by over 10 million cars in Brazil<sup>22</sup>, the use of organic waste in dedicated digesters to produce methane or biogas and the extraction of methane in sewerage systems that not only power the sewerage plants but sell excess energy into the grid. It should be noted that toxic additives such as pesticides in organic matter result in the production of toxic gases unless appropriate emission controls are applied\*.

### Land-fill Gas

Decomposing organic matter produces methane. Household waste has traditionally been rich in organic waste and so the land-fills where the waste is deposited provide a concentrated supply of methane for two or three decades. By placing a cap on the land fill to seal it, then sinking gas extracting tubes into the area, the methane is drawn off as it is produced and combusted in 1MW engines adapted for the task. As with biomass, emission controls are required to avoid the production of toxic gases\*.

Typical land-fills provide between 2MW and 5MW of power. As with biomass, land-fill gas is carbon dioxide neutral as it essentially uses crop waste. Land-fill gas is currently one of the cheapest of the renewables, with costs often less than 5 US cents. However, as recycling - including the composting of household waste - becomes a more productive use of organic waste, the output of future landfills will deteriorate. For the next three decades or so land-fill gas will provide a very cheap form of power and a transition supply as the other technologies further develop.

\* The most effective way to prevent the formation of the dioxins and similar toxic byproducts of combustion is to avoid inputs of halogenated species or to remove such chemicals from gases to be combusted prior to combustion.



### References

- 1 World Nuclear Industry Handbook 1997, Nuclear Engineering Int., Wilmington Business Publishing.
- 2 J. Cook (1985). Nuclear Follies. Forbes, 11th Feb, 1985.
- 3 Pasqualetti, M. J (1990) Ed.. Nuclear Decommissioning and Society, Public Links To A New Technology, Edited by Martin J Pasqualetti, Published by Routledge, 1990.
- 4 World Nuclear Industry Handbook 1997, Nuclear Engineering International, Wilmington Business Publishing.
- 5 The Cost and Potential of Conventional and Low-Carbon Electricity Options in Western Europe (1990) Energy Policy In The Greenhouse Volume II Part 3E. IPSEP 1990.

6

Nuclear Power Shut It Down Volume 1, The Ecologist,

7

Construction of N-plants axed, Financial Times 12th December 1995, UK

8

World Bank (1992). Guideline for Environmental Assessment of Energy and Industry Projects. World Bank technical paper No. 154./1992. Environmental Assessment Sourcebook, Vol III.

9

Asian Development Bank (1995) Bank Policy for Energy Sector. May 1995.

10

Grubb, M. & Vigotti, R. (1997). Renewable Energy Strategies for Europe, Volume II. Royal Inst. of International Affairs, Energy and Environment Program. Earthscan Publ'ns. ISBN 1 85383 284 7.

11

Pearce, D. W., Bann, C. & Georgiou, E. (1992). The Social Cost of Fuel Cycles. Report to the Department of Trade and Industry, HMSO publications. ISBN 011-4142-882.

12

Ibid

13

Grubb, M. & Vigotti, R. (1997). Renewable Energy Strategies for Europe, Volume II. Royal Inst. of International Affairs, Energy and Environment Program. Earthscan Publ'ns. ISBN 1 85383 284 7.

14

Albright, D., Berkout, F. and Walker, W. (1996) Plutonium and Highly Enriched Uranium, 1996 World Inventories, Capabilities and Policies.

15

Meyer, N. (1996) Ageing in Nuclear Power Plants. April 1996.

16

Strengthening of the Co-ordination of Humanitarian and Disaster Relief Assistance of the United Nations, Report of the Secretary General of the United Nations, November 1995

17

Ibid

18

Terrifying outlook for Chernobyl's babies. New Scientist, 2nd December 1995

19

Crone, G. & Brennan, R. (1997) Ontario Hydro knew how to build nuclear reactors but it didn't know how to run them. Southam News, Toronto, Canada.

20

IPCC working group II (1995) Impacts, Adaptions and Mitigation of Climate Change : Scientific-Technical Analyses. Climate Change 1995 IPCC working group II.

21

Boyle, G (1996) Ed.. Renewable Energy: Power for a Sustainable Future. Oxford University Press/Open University. ISBN 0-19-856452-X.

22

Ibid



Moved

This document has moved. If the new document does not load click [Here](#)



[14 June 2002:](#) COUNTDOWN TO GLOBAL PLUTONIUM TRANSPORT AS BRITISH FREIGHTER ARRIVES IN JAPAN: EN-ROUTE NATIONS CITE SECURITY FEARS



[7 June 2002:](#) JAPANESE SECURITY FOR NUCLEAR TRANSPORTS FATALLY INCONSISTENT DURING WORLD CUP



[20 May 2002:](#) HUMAN TRAGEDY OF RUSSIAN PLUTONIUM PRODUCTION PORTRAYED IN PHOTOGRAPHIC EXHIBITION



[11 May 2002:](#) NUCLEAR TRANSPORT VESSEL ENTERS PANAMA CANAL UNDER HEAVY GUARD TO RETRIEVE FAULTY PLUTONIUM MOX FROM JAPAN



[10 May 2002:](#) GREENPEACE AND THE SHUT SELLAFIELD CAMPAIGN URGE THE IRISH GOVERNMENT TO STEP UP ITS OPPOSITION TO THE SELLAFIELD PLUTONIUM FACILITY



[8 May 2002:](#) UNIQUE PLUTONIUM SHIPMENT THREAT TO THE CARIBBEAN



[29 April 2002:](#) BRITISH GOVERNMENT ACCUSED OF FUELLING JAPANESE PROLIFERATION AS GREENPEACE SENDS SHIP TO OPPOSE RETURN PLUTONIUM SHIPMENT



[26 April 2002:](#) BNFL SETS NUCLEAR TIMEBOMB TICKING ON THE ANNIVERSARY OF THE CHERNOBYL DISASTER



[17 April 2002:](#) PLUTONIUM SHIPMENT POSES SECURITY THREAT TO WORLD CUP, GREENPEACE WARNS FIFA AND JAWOC



[15 April 2002:](#) CIVIL LIBERTIES TRIED AND TESTED; STAR WARS ACTIVISTS & JOURNALISTS WALK FREE



[7 April 2002:](#) OZAWA CONFIRMS NUCLEAR WEAPONS POTENTIAL OF JAPAN'S PLUTONIUM PROGRAM AS FURTHER NUCLEAR TRANSPORTS LOOM



[27 March 2002:](#) BNFL NUCLEAR TRANSPORT SHIP FIRE RAISES SAFETY CONCERNS



[15 March 2002:](#) TODAY'S SCHEDULED US MISSILE TEST – “ANOTHER KICK IN THE TEETH FOR ARMS CONTROL”





[27 February 2002](#): IMMINENT THREAT FROM JAPANESE PLUTONIUM TRANSPORT – PERFECT TERRORIST TARGET



[28 January 2001](#): ANOTHER SAFETY SCANDAL SHAMES EUROPE'S NUCLEAR INDUSTRY



[8 January 2002](#): US ATTORNEY'S OFFICE DROPS FELONY CHARGES AGAINST GREENPEACE STAR WARS 17



[30 November 2001](#): GREENPEACE WELCOMES STOP TO CHERNOBYL REPLACEMENT REACTORS



[29 November 2001](#): JAPAN PREPARES SECRET NUCLEAR WASTE SHIPMENT; GREENPEACE WARNS THAT TRANSPORT IS "FLOATING CHERNOBYL"



[26 November 2001](#): EUROPEAN COMMISSION EXPOSES PRO-NUCLEAR STANCE AS IT SEEKS TO BLOCK IRELAND GOVERNMENT OVER SELLAFIELD



[19 November 2001](#): UNITED NATIONS COURT OPENS IRISH PLUTONIUM CASE AGAINST BRITISH GOVERNMENT



[8 November 2001](#): GOVERNMENT FORCED TO DEFEND ITSELF IN HIGH COURT OVER SELLAFIELD PLUTONIUM PLANT



[16 October 2001](#): TRAVEL RESTRICTIONS LIFTED FOR GREENPEACE ACTIVISTS AND FREELANCE JOURNALISTS



[5 October 2001](#): GREEN GROUPS LAUNCH LEGAL CHALLENGE TO STOP NUCLEAR PLANT



[3 October 2001](#): UK GOVERNMENT PUTS TERROR GROUPS A STEP NEARER TO NUCLEAR BOMBS



[20 July 2001](#): U.S. COURT REJECTS PROSECUTORS APPEAL ON THE STOP STAR WARS 17



[18 July 2001](#): U.S. GOVERNMENT DEMANDS STOP STAR WARS DEFENDANTS REMAIN IN PRISON UNTIL TRIAL



[17 July 2001](#): 15 GREENPEACERS AND TWO PRESS MEN COULD FACE JAIL FOR STAR WARS ACTION



[14 July 2001](#): STAR WARS TEST – A FAILURE FOR WORLD PEACE



[15 July 2001](#): INTERNATIONAL PROTEST AGAINST STAR WARS CONTINUES



[14 July 2001](#): GREENPEACE FORCES DELAY OF STAR WARS TEST



[13 July 2001](#): BUSH ADMINISTRATION ORDERS ARREST OF ONE MAN IN A TENT PROTESTING STAR WARS TEST



[11 July 2001](#): GREENPEACE CONDEMNS PUTIN FOR GIVING GREEN LIGHT TO NUCLEAR WASTE IMPORTS



[5 July 2001](#): GREENPEACE ENDS OCCUPATION OF US SPY BASE



[4 July 2001](#): GREENPEACE INVADES US SPY BASE FOR SECOND DAY



[3 July 2001](#): 100 GREENPEACE ACTIVISTS INVADE US SPY BASE



[28 June 2001](#): GREENPEACE URGES PUTIN TO VETO NUCLEAR WASTE IMPORTS



[26 June 2001](#): SELLAFIELD PLANS MASSIVE INCREASES IN DISCHARGES OF NUCLEAR WASTE TO SEA



[21 June 2001](#): GREENPEACE ACTIVISTS INVADE DUTCH NUCLEAR POWER PLANT IN PROTEST AT COMPANY RENEGING ON 2004 CLOSURE DATE



[8 June 2001](#): US CONDITIONS CAST DOUBT ON FUTURE OF RUSSIAN PLANS TO IMPORT NUCLEAR WASTE



[6 June 2001](#): GREENPEACE CALLS ON PRESIDENT BUSH TO VETO EXPORTS OF US CONTROLLED NUCLEAR WASTE TO RUSSIA



[4 June 2001](#): ECONOMICS OF BNFL'S PLUTONIUM MOX FUEL WORSE THAN 12 MONTHS AGO WARNS REPORT AS UK GOVERNMENT CONSIDERS LICENSING NEW MOX PLANT



[27 May 2001](#): JAPANESE CITIZENS REJECT PLUTONIUM MOX USE - MAJOR SETBACK FOR NUCLEAR PROGRAM, BRITISH NUCLEAR FUELS AND COGEMA



[25 May 2001](#): REFERENDUM PUTS JAPAN'S PLUTONIUM PROGRAM IN SPOTLIGHT



[13 May 2001](#): LEAKED DOCUMENTS REVEAL BNFL IN CRISIS WITH CUSTOMERS DISSATISFIED AND THREATENING LEGAL ACTION



[26 April 2001](#): GREENPEACE: EUROPEAN UNION EXAMINES LIFE TIME EXTENSION FOR CHERNOBYL TYPE REACTORS



[18 April 2001](#): GREENPEACE SEES SECOND DUMA READING AS BREAKTHROUGH FOR STOPPING SPENT NUCLEAR FUEL IMPORTS TO RUSSIA



[9 April 2001](#): NO NUCLEAR WASTE TO FRANCE! TRUCK FOR TRAIN STOPPED IN GREENPEACE ACTION AGAINST NUCLEAR SHIPMENTS



[3 April 2001](#): COGEMA ALLOWED TO UNLOAD AUSTRALIAN SPENT NUCLEAR FUEL BUT GREENPEACE TO LAUNCH NEW LEGAL CHALLENGE



[29 March 2001](#): TOKYO ELECTRIC DECISION AGAINST PLUTONIUM MOX USE DEVASTATING BLOW AGAINST BNFL/COGEMA BUSINESS



[28 March 2001](#): GREENPEACE WELCOMES DISMISSAL OF ADAMOV AND CALLS ON RUSSIAN PARLIAMENT TO REJECT HIS RADIOACTIVE WASTE IMPORT SCHEME



[27 March 2001](#): GREENPEACE OCCUPIES BRIDGE IN PROTEST AT NUCLEAR WASTE SHIPMENT



[24 March 2001](#): BRITISH SHIP LOADED WITH PLUTONIUM FUEL ARRIVES IN JAPAN AMID PROTEST AND UNCERTAIN FATE



[22 March 2001](#): DUMA DELAYS DECISION AS POLITICAL OPPOSITION GROWS TO LAW ALLOWING RADIOACTIVE WASTE IMPORTS TO RUSSIA



[17 March 2001](#): ONE-THOUSAND PROTESTORS MARCH IN KASHIWAZAKI AGAINST PLUTONIUM MOX AS SHIPMENT NEARS JAPAN



[14 March 2001](#): KOREAN GOVERNMENT URGED TO BAN DANGEROUS JAPANESE PLUTONIUM SHIPMENT FROM COASTAL WATERS



[12 March 2001](#): RUSSIAN SUPREME COURT ACCEPTS GREENPEACE PETITION TO INVESTIGATE ILLEGAL REJECTION OF SIGNATURES OPPOSING RADIOACTIVE WASTE IMPORTS



[5 March 2001](#): EU RUSSIAN "DISARMAMENT" FUNDING COULD INCREASE RUSSIAN STOCKS OF WEAPONS-USABLE PLUTONIUM



[2 March 2001](#): GREENPEACE REVEALS DOCUMENTS PROVING CORRUPTION BY RUSSIA'S ATOMIC MINISTER AND CALLS FOR HALT TO HIS PLANS TO IMPORT RADIOACTIVE WASTE



[1 March 2001](#): PLUTONIUM SHIPS SIGHTED OFF SOUTHERN AUSTRALIA



[18 February 2001](#): NUCLEAR-FREE TASMAN FLOTILLA DEPARTS ON MISSION TO BEAR WITNESS TO PLUTONIUM SHIPS



[15 February 2001](#): JAPANESE MOX FUEL PROGRAMME IN DISARRAY AS PREFECTURES ANNOUNCE DELAY IN LOADING OF FUEL



[8 February 2001](#): GREENPEACE LOCATES DEADLY PLUTONIUM SHIPS OFF SOUTH AFRICAN COAST



[2 February 2001](#): DEADLY PLUTONIUM SHIPMENT APPROACHES THE SOUTH AFRICAN COASTLINE



[24 January 2001](#): PLUTONIUM SHIPMENTS TO JAPAN SHOULD BE ABANDONED AFTER IMPORTING COMPANY ADMITS MOX PLAN COULD BE SCRAPPED



[22 January 2001](#): NEW POLAR ROUTE PLANS FOR JAPANESE NUCLEAR SHIPMENTS ARE DESPERATE MADNESS



[20 January 2001](#): GREENPEACE CONDEMNS NEW PLUTONIUM THREAT TO SOUTHERN AFRICA AND THE PACIFIC



[19 January 2001](#): PLUTONIUM TRANSPORT LEAVES FRANCE FOR JAPAN



[19 January 2001](#): GREENPEACE ACTIVISTS ARRESTED IN SEA-BASED PROTEST AGAINST LOADING OF JAPANESE PLUTONIUM FUEL




[18 January 2001](#): DUTCH NUCLEAR TRANSPORT ARRIVES AT LA HAGUE AS PLUTONIUM/MOX PREPARES FOR DEPARTURE TO JAPAN



[17 January 2001](#): GREENPEACE FRANCE PROTESTORS ARRESTED DURING NIGHT OF ARMED PLUTONIUM TRANSPORTS



[16 January 2001](#): BNFL AND COGEMA ABUSE FRENCH JUSTICE SYSTEM TO PREVENT PEACEFUL PROTEST



[15 January 2001](#): DEADLY PLUTONIUM SHIPMENT SET TO LEAVE EUROPE THIS WEEK – GREENPEACE WARNS EN-ROUTE COUNTRIES



[11 January 2001](#): GREENPEACE SHIP DENIED RIGHT TO SAIL - ENVIRONMENTAL GROUP FORCED TO STOP ITS OPERATIONS IN CAPE HORN



[11 January 2001](#): ARGENTINE COURT BANS JAPANESE NUCLEAR WASTE SHIPMENT - NAVY INSTRUCTED TO FORCE BRITISH SHIP OUT OF ARGENTINE WATERS



[10 January 2001](#): GREENPEACE VESSELS SAILS TODAY TO PROTEST NUCLEAR TRANSPORT



[26 December 2000](#): EUROPEAN NUCLEAR FUEL INCREASES RISKS OF CATASTROPHIC ACCIDENT IN JAPANESE REACTOR, DENOUNCES GREENPEACE



[26 December 2000](#): EUROPEAN NUCLEAR FUEL INCREASES RISKS OF CATASTROPHIC ACCIDENT IN JAPANESE REACTOR, DENOUNCES GREENPEACE



[21 December 2000](#): GREENPEACE CALLS ON DUMA TO REJECT CHANGES TO ENVIRONMENT LAW TO ALLOW IMPORT OF FOREIGN NUCLEAR WASTE



[20 December 2000](#): GREENPEACE CONDEMNS FRANCE, UK AND JAPAN AS NUCLEAR WASTE SHIPMENT HEADS FOR SOUTH AMERICA



[15 December 2000](#): GREENPEACE CONDEMNS FRANCE, UK AND JAPAN FOR IGNORING SAFETY OF ENROUTE COUNTRIES AS LARGEST NUCLEAR WASTE SHIPMENT STARTS FROM UK



[15 December 2000](#): CHERNOBYL CLOSES: GREENPEACE CALLS FOR THE CLOSURE OF THE THIRTEEN REMAINING CHERNOBYL TYPE REACTORS



[13 December 2000](#): GREENPEACE CALLS ON EUROPEAN COMMISSION NOT TO FUND NEW HAZARDOUS NUCLEAR REACTORS TO REPLACE CHERNOBYL



[7 December 2000](#): EBRD IGNORES SAFETY CONCERNS WITH APPROVAL OF CHERNOBYL REPLACEMENT REACTORS IN THE UKRAINE



[30 November 2000](#): NUCLEAR REACTORS REPLACING CHERNOBYL "HAZARDOUS" SAYS LEAKED GOVERNMENT REPORT, GREENPEACE CALLS FOR DELAY ON FUNDING DECISION



[29 November 2000](#): GREENPEACE CONDEMNS RUSSIAN REJECTION OF NUCLEAR WASTE IMPORTS REFERENDUM



[2 November 2000](#): PREPARATIONS CONTINUE FOR JAPANESE PLUTONIUM MOX SHIPMENT DESPITE COURT INVESTIGATION INTO FUEL SAFETY DATA AND QUALITY CONTROL



[24 October 2000](#): 2.5 MILLION RUSSIANS SAY NO TO RADIOACTIVE WASTE IMPORTS AND CALL FOR NATIONAL REFERENDUM



[9 October 2000](#): GREENPEACE AND RUSSIAN VILLAGERS DELIVER RADIOACTIVE SOIL TO DUMA IN CALL FOR AN END TO GOVERNMENT PLANS TO IMPORT THOUSANDS OF TONS OF RADIOACTIVE WASTE



[4 September 2000](#): GREENPEACE CALLS ON EUROPEAN COMMISSION NOT TO SUPPORT NUCLEAR REACTORS TO REPLACE CHERNOBYL IN THE UKRAINE



[9 August 2000](#): GREENPEACE WARNS OF NEW PLUTONIUM MOX FUEL SHIPMENT FROM FRANCE TO JAPAN AND LAUNCHES A LEGAL CHALLENGE AGAINST PLUTONIUM FUEL USE IN JAPAN



[25 July 2000](#): TURKEY LEAVES INTERNATIONAL NUCLEAR LOBBY IN THE DARK



[11 July 2000](#): GREENPEACE CONDEMNS UK DECISION TO TAKE BACK FALSIFIED PLUTONIUM FUEL FROM JAPAN



[29 June 2000](#): NORTH EAST ATLANTIC COUNTRIES CALL ON UK AND FRANCE TO END NUCLEAR REPROCESSING



[29 June 2000](#): GREENPEACE SENDS CLEAR MESSAGE TO OSPAR MEETING – STOP RADIOACTIVE DISCHARGES NOW!



[28 June 2000](#): GREENPEACE INSTALLS ITS 'OSPAR' DEVICE AT THE END OF FRENCH NUCLEAR WASTE DISCHARGE PIPE



[25 June 2000](#): OVERWHELMING POPULAR SUPPORT FOR PROPOSED BAN ON NUCLEAR DISCHARGES



[26 June 2000](#): GREENPEACE INSTALLS WEBCAM AT THE END OF FRANCE'S NUCLEAR REPROCESSING DISCHARGE PIPE 'TO OPEN THE EYES OF GOVERNMENTS'



[19 June 2000](#): THOUSANDS OF RADIOACTIVE WASTE BARRELS RUSTING AWAY ON THE SEABED: GREENPEACE RESEARCH UNVEILS NUCLEAR LEGACY



[7 June 2000](#): GREENPEACE CONDEMNS FRENCH PLANS TO INCREASE RADIOACTIVE DISCHARGES FROM LA HAGUE NUCLEAR REPROCESSING PLANT



[5 June 2000](#): CHERNOBYL NUCLEAR POWER PLANT TOO DANGEROUS TO CONTINUE OPERATING, REPLACEMENTS MUST NOT BE NUCLEAR : GREENPEACE



[11 May 2000](#): BNFL'S BIGGEST CUSTOMER CALLS FOR AN IMMEDIATE END TO NUCLEAR REPROCESSING AS NORWAY JOINS INTERNATIONAL POLITICAL INITIATIVE TO CLOSE SELLAFIELD AND LA HAGUE



[27 April 2000](#): GREENPEACE FINDS EVIDENCE OF BREACH BY COGEMA, CALLING ON THE FRENCH GOVERNMENT TO END COGEMA'S ILLEGAL RADIOACTIVE DISCHARGES



[24 April 2000](#): GREENPEACE: MONEY BLOWN UP ON NUCLEAR WEAPONS BETTER SPENT ON SUSTAINABLE DEVELOPMENT



[21 April 2000](#): RUSSIA'S RATIFICATION OF TEST BAN TURNS THE HEAT ON THE US TO DO LIKEWISE - GREENPEACE



[31 March 2000](#): LEAKED NUCLEAR AGENCY FIGURES BACK DANISH INITIATIVE TO END NUCLEAR REPROCESSING



[30 March 2000](#): CHERNOBYL IS A TIMEBOMB AND SHOULD BE SHUT DOWN NOW - WARNS GREENPEACE



[23 March 2000](#): RUSSIAN CABINET EXPECTED TO APPROVE PLANS TO IMPORT NUCLEAR WASTE



[7 March 2000](#): MANIPULATION OF LASER MEASUREMENTS CAST NEW DOUBTS ON SAFETY OF BNFL NUCLEAR FUEL



[28 February 2000](#): SWISS NUCLEAR REGULATORY OFFICIALS VISIT SELLAFIELD TO CHECK FUEL SAFETY DATA AS BNFL CHIEF RESIGNS



[7 February 2000](#): PRESSURE ON UK AND FRENCH GOVERNMENTS TO END NUCLEAR REPROCESSING AFTER U.S. DEAL TO END PLUTONIUM EXTRACTION IN RUSSIA



[29 December 1999](#): PLUTONIUM INDUSTRY'S NEW MILLENNIUM GIFT TO THE WORLD: 'FLOATING CHERNOBYL' SETS SAIL FROM EUROPE TO JAPAN



[23 December 1999](#): BNFL PLUTONIUM FUEL SCANDAL EXTENDS TO SWITZERLAND



[16 December 1999](#): GREENPEACE WELCOMES JAPANESE DECISION TO REJECT UK PLUTONIUM FUEL



[15 November 1999](#): GREENPEACE SOUNDS ALARM ABOUT NEW CHERNOBYLS IN THE EU & CALLS ON EU FOREIGN MINISTERS TO DEMAND EARLY CLOSURE OF HIGH-RISK REACTORS



[11 October 1999](#): RADIATION EXPOSURE OF POPULATION HIGHER THAN GOVERNMENT ESTIMATES: GREENPEACE





[4 October 1999](#): TOKAI ACCIDENT SITE STILL EMITTING RADIATION ABOVE SAFETY LIMITS



[1 October 1999](#): GREENPEACE TO SEND INTERNATIONAL TEAM TO JAPAN



[30 September 1999](#): TOKAIMURA NUCLEAR ACCIDENT EXPOSES JAPAN'S FAILED SAFETY CULTURE ON EVE OF ARRIVAL OF PLUTONIUM SHIPMENT



[29 September 1999](#): GREENPEACE CONDEMNS EU COMMISSION BACKDOWN ON BOHUNICE V1 - WARNS THAT EU COMMISSION'S WEAKNESS JEOPARDISES EARLY SHUTDOWN OF OTHER DANGEROUS REACTORS IN CEE



[27 September 1999](#): GREENPEACE VESSEL SURROUNDED BY JAPANESE MARITIME SAFETY COMMANDOS WHILE "BEARING WITNESS" TO DEADLY PLUTONIUM FUEL SHIPMENT



[24 September 1999](#): GREENPEACE URGES FUKUI PREFECTURE TO REJECT KEPSCO ASSURANCES THAT PLUTONIUM-MOX IS SAFE



[22 September 1999](#): PLUTONIUM SHIPS STRANDED OFF JAPANESE COAST IN BAD WEATHER; GREENPEACE URGE LAST CHANCE REJECTION OF PLUTONIUM FUEL USE IN JAPAN



[18 September 1999](#): JAPANESE ARMED SHIPS DEPLOYED AGAINST GREENPEACE: GREATER SECURITY THAN FOR WEAPONS-USABLE PLUTONIUM SHIPS



[17 September 1999](#): BUSINESS NOT SAFETY IS BNFL PRIORITY: GREENPEACE CALL FOR INDEPENDENT INVESTIGATION ON MOX FUEL



[9 September 1999](#): SIEMENS, FRAMATOME, AECL, WESTINGHOUSE AND MITSUBISHIBID TO BUILD NUCLEAR REACTORS IN TURKISH EARTHQUAKE ZONE



[8 September 1999](#): FIJI GOVERNMENT CALLS ON JAPAN TO STOP PLUTONIUM SHIPMENTS; GREENPEACE APPLAUDS PROTEST, CALLS FOR STRONG NATIONAL AND REGIONAL ACTION



[5 September 1999](#): GREENPEACE FINDS SECRET JAPANESE PLUTONIUM TRANSPORT IN TASMAN SEA; WARNS SOUTH PACIFIC NATIONS THAT HAZARDOUS CARGO IS FAST APPROACHING



[1 September 1999](#): CONFIDENTIAL DIPLOMATIC DOCUMENTS REVEAL U.S. PROLIFERATION CONCERNS OVER JAPAN'S PLUTONIUM PROGRAM: GREENPEACE ACCUSES CLINTON ADMINISTRATION OF POLICY FAILURE IN NORTH-EAST ASIA



[3 September 1999](#): SECRET PLUTONIUM FUEL SHIPS ENTER AUSTRALIAN EEZ



[2 September 1999](#): MEDICAL EVACUATION MADE FROM JAPANESE PLUTONIUM FREIGHTERS; NEW ZEALAND PARLIAMENT PASSES MOTION AGAINST NUCLEAR SHIPMENTS



[30 August 1999](#): GREENPEACE ANNOUNCES ARRIVAL OF CAMPAIGN SHIP IN ADVANCE OF PLUTONIUM SHIPMENT FOR CONTROVERSIAL JAPANESE PROGRAMME



[13 August 1999](#): TEN PLUTONIUM FUEL CARGOES A YEAR TO GO VIA CAPE OF GOOD HOPE: GREENPEACE URGES EN ROUTE NATIONS TO BAN THESE DEADLY TRANSPORTS



[30 July 1999](#): NUCLEAR COMPANY LIFTS FREEZE ON GREENPEACE BANK ACCOUNT



[23 July 1999](#): GREENPEACE FIGHTS FREEZE ON BANK ACCOUNT



[22 July 1999](#): MOX SHIPMENT HEADS FOR JAPAN VIA SOUTH AFRICA AND THE SOUTH WEST PACIFIC OCEAN



[21 July 1999](#): GREENPEACE PROTESTS DEPARTURE OF MOX WHILE "FINANCIAL TERRORISM" AGAINST THE GROUP ESCALATES



[20 July 1999](#): UK GOVERNMENT IMPOSES DRACONIAN BAN ON GREENPEACE VESSEL TO SILENCE OPPOSITION TO PLUTONIUM TRANSPORTS



[19 July 1999](#): PLUTONIUM SHIPMENTS DEPART BARROW FOR JAPAN



[19 July 1999](#): GREENPEACE PROTESTS FIRST STAGE OF PLUTONIUM SHIPMENT TO JAPAN



[16 July 1999](#): SILENT PROTEST IN FRONT OF CHERBOURG COURT HEARING



[16 July 1999](#): HIGH COURT GRANTS INJUNCTION AGAINST GREENPEACE OVER PLUTONIUM SHIPMENT TO JAPAN



[16 July 1999](#): BRITISH NUCLEAR INDUSTRY LAUNCHES LEGAL BLITZ IN UK AND FRANCE TO PREVENT PROTESTS AGAINST NUCLEAR WEAPONS-USABLE PLUTONIUM SHIPMENT TO JAPAN



[13 July 1999](#): GREENPEACE REVEALS THAT FRENCH STATE OWNED PLUTONIUM FACTORY IS ILLEGAL; GROUP CALLS ON COURTS AND BELGIAN GOVERNMENT TO SHUT FACTORY



[10 July 1999](#): GREENPEACE "RAINBOW WARRIOR" IS IN CHERBOURG: "DANGEROUS AND UNNECESSARY FIRST-EVER PLUTONIUM FUEL SHIPMENT SHOULD BE CANCELLED", SAYS GREENPEACE



[11 July 1999](#): GREENPEACE ACTIVISTS OCCUPY CHERBOURG CRANES PRIOR TO IMMINENT PLUTONIUM SHIPMENT



[9 July 1999](#): MV GREENPEACE SAILS FROM DUBLIN TO BARROW, NEAR SELLAFIELD: TO OPPOSE SECRET PLUTONIUM FUEL TRANSPORT.



[26 February 1999](#): NUCLEAR WASTE SHIPMENT HEADING FOR CARIBBEAN/PANAMA; GREENPEACE WARNS SHIPMENT IS "FLOATING CHERNOBYL"



[8 June 1999](#): UK GOVERNMENT RETHINK ON NEW SELLAFIELD PLUTONIUM PLANT: GREENPEACE CALLS FOR INVESTIGATION INTO PROLIFERATION CONSEQUENCES



[19 April 1999](#): ACS HEADS OF STATE CONDEMN NUCLEAR TRANSPORTS; GREENPEACE CALLS ON JAPAN, FRANCE AND BRITAIN TO HONOUR WILL OF WIDER CARIBBEAN REGION



[8 July 1999](#): GREENPEACE CALLS UPON THE BRITISH, FRENCH AND JAPANESE GOVERNMENTS TO BAN THE IMMINENT SHIPMENT OF WEAPONS-USABLE PLUTONIUM FUEL FROM EUROPE TO JAPAN



[24 June 1999](#): PLUTONIUM SHIPS BEGIN SEA TRIALS BEFORE SECRET VOYAGE TO JAPAN



[17 June 1999](#): GREENPEACE PROTEST IN KIEV AGAINST G7 FINANCING UKRAINIAN NUCLEAR REACTORS AND RELEASE LEGAL ANALYSIS FINDING FINANCING AGREEMENT NON-BINDING



[16 June 1999](#): GREENPEACE TAKES PROTEST TO UKRAINE OVER LIKELY WESTERN FUNDING OF NUCLEAR POWER PLANTS TO REPLACE CHERNOBYL



[14 June 1999](#): PLUTONIUM SHIP LEAVES BARROW DOCKS FOR SEA TRIALS BEFORE VOYAGE TO JAPAN



[13 June 1999](#): TRANSPORT OF JAPANESE WEAPONS-USABLE PLUTONIUM-MOX FROM BELGIUM TO FRANCE IMMINENT: GREENPEACE URGES US TO INTERVENE OVER LAX SECURITY



[7 June 1999](#): DUTCH AUTHORITIES SEIZE RADIOACTIVE EFFLUENT BOUND FOR SWITZERLAND AS SWISS GOVERNMENT ANNOUNCES BAN ON FUTURE NUCLEAR REPROCESSING



[3 June 1999](#): GREENPEACE STEPS UP PRESSURE ON RADIOACTIVE POLLUTERS AND RETURNS RADIOACTIVE WASTE TO DUTCH NUCLEAR PLANT



[1 June 1999](#): FRENCH POLICE FORCIBLY REMOVE GREENPEACE PROTESTORS AFTER 20-HOUR ACTION AGAINST COGEMA'S NUCLEAR WASTE DUMPING INTO THE OCEAN



[31 May 1999](#): FRENCH POLICE STOP GREENPEACE RETURNING NUCLEAR WASTE TO FRENCH GOVERNMENT



[27 May 1999](#): GREENPEACE PROTEST AT GERMAN EMBASSY WITH CALLS FOR CLOSURE OF HIGH RISK NUCLEAR REACTOR AFTER SLOVAKIAN GOVT RENEGES ON PROMISE TO CLOSE BY 2000



[28 May 1999](#): JAPANESE PLUTONIUM TRANSPORT IMMINENT: GREENPEACE WARNS OF SAFETY AND SECURITY RISKS



[28 May 1999](#): JAPANESE PLUTONIUM FUEL TRANSPORT FROM BELGIUM DELAYED: GREENPEACE DEMANDS ITS CANCELLATION



[27 May 1999](#): GREENPEACE COLLECTS RADIOACTIVE EFFLUENT DISCHARGED INTO THE ENGLISH CHANNEL FROM LA HAGUE NUCLEAR REPROCESSING COMPLEX FOR RETURN TO CUSTOMER COUNTRIES



[21 May 1999](#): GOVERNMENT AND COGEMA FAIL TO REDUCE SEA BED RADIOACTIVE CONTAMINATION OFF LA HAGUE REPROCESSING PLANT



[17 May 1999](#): GREENPEACE QUESTIONS EUROPEAN PARLIAMENT CANDIDATES ON HIGH-RISK REACTORS AS EU APPLICANTS RENEGE ON CLOSURE DATES



[26 April 1999](#): ONE OF THE WORLD'S MOST DANGEROUS NUCLEAR REACTORS TO STAY OPEN AS SLOVAKIA REVERSES COMMITMENT TO CLOSE, ON CHERNOBYL DAY



[9 April 1999](#): PLUTONIUM TRANSPORT ACCIDENT RISKS INCREASED AS NUCLEAR INDUSTRY OPT FOR CHEAPEST SECURITY AND ARM CIVILIAN SHIPS



[25 March 1999](#): GREENPEACE DENMARK: IT'S CLOSING TIME FOR BARSEBAECK



[18 February 1999](#): GREENPEACE CALLS ON SCHROEDER TO REJECT EXPORTS OF RADIOACTIVE WASTE FROM EU COUNTRIES TO RUSSIA



[3 February 1999](#): GREENPEACE CONDEMNS MOVES TO TURN RUSSIA INTO THE WORLD'S NUCLEAR DUMP



[23 January 1999](#): NEW LEAKED DOCUMENT REVEALS PLANS TO DUMP EUROPEAN AND ASIAN NUCLEAR WASTE IN RUSSIA



[19 January 1999](#): GREENPEACE ATTACKS UK/JAPAN PLANS TO SHIP PLUTONIUM FUEL



[12 January 1999](#): LEAKED DOCUMENT REVEALS SECRET NEGOTIATIONS TO DUMP SWISS NUCLEAR WASTE IN RUSSIA



[14 December 1998](#): NO WESTERN FINANCING FOR NEW CHERNOBYLS IN UKRAINE, SAYS GREENPEACE



[18 November 1998](#): COGEMA VIOLATING RADIOACTIVE DISCHARGE LICENSE - GREENPEACE CHARGES



[16 November 1998](#): GREENPEACE WARNS EU EXPANSION PROCESS COULD LEAD TO MORE PUBLIC MONEY WASTED ON FAILED EU NUCLEAR SAFETY PROGRAMMES



[12 November 1998](#): NEW DATA ON AERIAL DISCHARGES REVEAL HIGH LEVELS OF RADIOACTIVE CARBON CONTAMINATION AROUND THE FRENCH REPROCESSING PLANT



[9 November 1998](#): LA HAGUE RADIOACTIVE AIR 90,000 TIMES HIGHER THAN BACKGROUND - GREENPEACE RELEASES FIRST SAMPLE RESULTS



[23 October 1998](#): GREENPEACE URGES UK GOVERNMENT TO REJECT NEW SELLAFIELD RADIOACTIVE DISCHARGES LICENCE



[23 October 1998](#): GREENPEACE RETURNS TO LA HAGUE TO BEGIN NEW RESEARCH PROGRAMME INTO AERIAL RADIOACTIVE DISCHARGES FROM COGEMA PLUTONIUM FACTORY



[16 October 1998](#): US\$1.4 BILLION IN NUCLEAR REPROCESSING CONTRACTS FOR BRITAIN AND FRANCE LIKELY TO BE CANCELLED FOLLOWING GERMAN GOVT DECISION TO PHASE OUT NUCLEAR POWER



[9 October 1998](#): SELLAFIELD AS HEAVILY CONTAMINATED WITH RADIOACTIVITY AS CHERNOBYL



[29 September 1998](#): NUCLEAR INDUSTRY: 17 MILLION US\$ COGEMA OPERATION FAILS TO RECOVER RADIOACTIVE WASTE OFF NORMANDY COAST



[8 September 1998](#): FRENCH PLUTONIUM COMPANY TO DREDGE RADIOACTIVE SEA-BED; GREENPEACE SENDS SHIP WARNING OPERATION IS RISKY AND ILL-CONCEIVED



[23 July 1998](#): GERMANY'S SIEMENS MISLEADING TURKISH OFFICIALS AND THE PUBLIC



[22 July 1998](#): TURKISH POLICE DETAIN GREENPEACE ACTIVISTS



[7 July 1998](#): GREENPEACE GIVES FRENCH GOVERNMENT 'RED CARD' FOR RESTART OF NUCLEAR TRANSPORTS



[3 July 1998](#): GREENPEACE REVEALS PLUTONIUM COMPANY'S FLAWED EFFORTS TO CAPTURE RADIOACTIVE PARTICLES



[2 July 1998](#): TURKISH REACTOR TO BE BUILT NEXT TO ACTIVE FAULT LINE, ACCORDING TO 1991 STUDY



ASSESSMENT

[25 June 1998](#): LA HAGUE: COGEMA ANNOUNCES CONTROVERSIAL DREDGING OPERATION; GREENPEACE WARNS OF ACCIDENTS AND DEMANDS IMPACT



[16 June 1998](#): BRITISH RADIOACTIVE POLLUTION CONTAMINATES NORDIC COASTS; GREENPEACE CALLS FOR END TO SELLAFIELD DISCHARGES



[12 June 1998](#): GREENPEACE FLIES ANTI-NUCLEAR BALLOON OVER TAJ MAHAL



[5 June 1998](#): GREENPEACE STATEMENT IN RESPONSE TO UK GOVERNMENT ANNOUNCEMENT THAT DOUNREAY IS TO CLOSE



[4 June 1998](#): BNFL REMOVES NUCLEAR WASTE FROM PIGEON GARDEN "PROBLEM NOT SOLVED" ACCUSES GREENPEACE



[31 May 1998](#): UNITED NATIONS MUST ESTABLISH NEGOTIATIONS BETWEEN INDIA AND PAKISTAN TO AVERT NUCLEAR CRISIS IN ASIA: GREENPEACE



[28 May 1998](#): PAKISTAN TESTS SHOW URGENT NEED FOR GLOBAL NUCLEAR DISARMAMENT, SAYS GREENPEACE



[27 May 1998](#): NEW DATA PROVE BNFL'S RADIOACTIVE DISCHARGES MAKE SEA-BED NUCLEAR DUMP



[24 May 1998](#): NEW LEAK AT SELLAFIELD THREATENS FUTURE OF PLUTONIUM FACTORY



[20 May 1998](#): NEW RESEARCH REVEALS SELLAFIELD PIGEONS HEAVILY CONTAMINATED WITH PLUTONIUM - GREENPEACE DEMANDS GOVERNMENT INTERVENTION



[16 May 1998](#): GREENPEACE CALLS ON G8 LEADERS NOT ONLY TO DENOUNCE INDIAN TESTS BUT TO COMMIT THEMSELVES TO NUCLEAR DISARMAMENT



[13 May 1998](#): GREENPEACE URGES INDIA TO RENOUNCE ITS NUCLEAR OPTION AND SIGN THE CTBT



[12 May 1998](#): GREENPEACE TO START SELLAFIELD SAMPLING OPERATION AS BNFL DATA CONFIRMS INCREASE IN SEAFOOD CONTAMINATION



[11 May 1998](#): GREENPEACE: THREAT OF RADIOACTIVE CONTAMINATION FOR CYPRUS AND MIDDLE EAST FROM TURKISH REACTOR



[11 May 1998](#): GREENPEACE CONDEMNS INDIA'S NUCLEAR TESTING



[27 April 1998](#): COGEMA'S NUCLEAR WASTE DISCHARGE PIPE STILL IRRADIATING PUBLIC BEACH



[24 April 1998](#): DOUNREAY URANIUM: STORE DON'T REPROCESS. GREENPEACE INVESTIGATES LEGALITY



[21 April 1998](#): RESPONSE TO NEWS THAT GEORGIAN WEAPONS GRADE NUCLEAR MATERIALS ON ROUTE TO SCOTLAND



[8 April 1998](#): SELLAFIELD'S RADIOACTIVE PIGEONS EXPOSE FAILURE TO CONTROL RADIATION



[18 March 1998](#): WESTERN ENVIRONMENTALISTS VISIT PROPOSED NUCLEAR SITE IN TURKEY



[13 March 1998](#): TROUBLES OF NUCLEAR WASTE SHIPMENT UNDERSCORE NEED TO HALT REPROCESSING, NUCLEAR SHIPMENTS





[12 March 1998](#): PIGEONS BECOME NUCLEAR WASTE AT BNFL PLUTONIUM FACTORY; GREENPEACE WARNS OF SERIOUS ENVIRONMENT/HEALTH HAZARD



[23 February 1998](#): REPROCESSED NUCLEAR WASTE WILL STAY IN FRANCE, BELGIAN GOVERNMENT REVEALS



[17 February 1998](#): RADIOACTIVE PIGEON EXCLUSION ZONE LEADS TO CALL FOR GOVERNMENT ACTION



[7 February 1998](#): JAPANESE NUCLEAR WASTE SHIPMENT SAILS INTO PACIFIC, LEAVING CONTROVERSY IN CARIBBEAN AND LATIN AMERICA



[6 February 1998](#): NUCLEAR WASTE SHIPMENT ENTERS PANAMA CANAL FLYING GREENPEACE BANNER - STOP PLUTONIUM !



[6 February 1998](#): GREENPEACE BOARDS NUCLEAR WASTE SHIPMENT AS IT APPROACHES PANAMA CANAL



[5 February 1998](#): GREENPEACE OFFERS BNFL THE OPPORTUNITY TO FUND ENVIRONMENTAL RESEARCH ON NUCLEAR CONTAMINATION



[3 February 1998](#): NUCLEAR WASTE SHIPMENT ENTERS CARIBBEAN DESPITE INTENSE REGIONAL OPPOSITION



[2 February 1998](#): GREENPEACE: RADIOACTIVE NUCLEAR WASTE WILL PASS THROUGH PANAMA CANAL WITHOUT ENVIRONMENTAL IMPACT STUDY.



[2 February 1998](#): MEDIA INVITATION: NUCLEAR WASTE TO BE SHIPPED FOR THE FIRST TIME VIA PANAMA CANAL DESPITE INTERNATIONAL PUBLIC PROTEST



[28 January 1998](#): JAPAN CONFIRMS LAST SPENT NUCLEAR FUEL SHIPPED TO FRANCE IN DECEMBER 97



[23 January 1998](#): GREENPEACE ACCUSES: NUCLEAR INDUSTRY VIOLATES PLEDGE OF OPENNESS



[21 January 1998](#): HIGH LEVEL WASTE SHIPMENT DEPARTS FRANCE AMIDST CARIBBEAN OPPOSITION



[17 January 1998](#): PRESS ADVISORY ON CONGRESSIONAL LETTER ON SHIPMENT



[13 January 1998](#): GREENPEACE REVEALS THAT NUCLEAR WASTE WILL BE SHIPPED FOR THE FIRST TIME THROUGH PANAMA CANAL



[23 December 1997](#): GERMAN PLUTONIUM SHIPMENT LEAVES FOR SCOTLAND.



[22 December 1997](#): GREENPEACE BLOCKS PLUTONIUM TRANSPORT ON BOARD ROLL ON -ROLL OFF VESSEL



[19 December 1997](#): GERMANY PREPARES PLUTONIUM SHIPMENT FOR DOUNREAY



[17 December 1997](#): GREENPEACE DEMANDS THAT TAIWAN OFFICIALLY CANCELS RADIOACTIVE WASTE



[16 December 1997](#): GREENPEACE PROTESTS ARRIVAL OF NUCLEAR SHIP TO FRANCE,



[18 November 1997](#): DANGEROUS NUCLEAR WASTE SHIPMENT CLOAKED IN SECRECY



[14 October 1997](#): GREENPEACE REAFFIRMS DANGER OF COGEMA'S PARTICULE



[10 October 1997](#): GREENPEACE DIRECTORS APPEAL TO CLINTON TO POSTPONE CASSINI



[3 October 1997](#): NO AGREEMENT ON FUTURE OF NUCLEAR POWER



[2 October 1997](#): ILLEGAL RADIOACTIVE PARTICLES DISCOVERED IN COGEMA'S LIQUID WASTE



[29 September 1997](#): IAEA 40TH ANNIVERSARY: "NUCLEAR DEATH IS NO ANSWER TO CLIMATE



[7 August 1997](#): JAPANESE HIGH LEVEL NUCLEAR WASTE CARGO HEADING TO TROUBLED EUROPEAN REPROCESSING FACTORIES OF LA HAGUE AND SELLAFIELD



[1 August 1997](#): PLUTONIUM FOUND IN TEETH OF CHILDREN THROUGHOUT BRITAIN;



[10 July 1997](#): ACCESS TO LA HAGUE RESTRICTED FOLLOWING EVIDENCE OF RADIOACTIVE CONTAMINATION OF THE ENVIRONMENT



[30 June 1997](#): GREENPEACE BLOCKS ENTRANCE OF TURKISH ENERGY MINISTRY



[24 June 1997](#): DUTCH POWER PLANT REFUSES TO TAKE BACK ITS OWN NUCLEAR



[20 June 1997](#): GREENPEACE REVEALS THAT COGEMA PUMPS NUCLEAR WASTE INTO OCEAN; DISCHARGES ARE OVER 17 MILLION TIMES MORE RADIOACTIVE THAN SEA



[18 June 1997](#): GOVERNMENT STUDY CONFIRMS LEUKEMIA AROUND LA HAGUE; GREENPEACE



[17 June 1997](#): GREENPEACE ACCUSES COGEMA OF ARMED ROBBERY



[15 June 1997](#): GREENPEACE SHIP ARRIVES TO SUPPORT PLUTONIUM



[13 June 1997](#): COGEMA'S RADIOACTIVE DISCHARGES MAKE SEA-BED NUCLEAR DUMP



[6 June 1997](#): IRISH SEA LOBSTERS CONTAMINATED BY BRITISH PLUTONIUM FACTORY



[5 June 1997](#): "DISINGENUOUS AND DECEPTIVE": D.O.E. CONFIRMS



[27 May 1997](#): GREENPEACE CALLS ON ENVIRONMENT MINISTER



[22 May 1997:](#) FRENCH AUTHORITIES SUPPRESS LETTER REQUESTING THAT BEACH BE



[21 May 1997:](#) NEW STUDY REVEALS MINATOM HAS NO ECONOMIC FUTURE



[15 May 1997:](#) TAIWAN POWER COMPANY MISREPRESENTS

Moved

This document has moved. If the new document does not load click [Here](#)

**no.nukes**

**renewable energy**



---

## Power for Change

renewable energy and energy efficiency case studies

There are so many compelling reasons why it is time to move away from using nuclear power and fossil fuels to generate energy: climate change, radioactive contamination, nuclear proliferation, the unsolved problem of nuclear waste, air and water pollution, resource depletion, and of course the need to create a sustainable energy system based on indigenous renewable resources. Greenpeace believes a global commitment must be made to phase-out nuclear power and fossil fuels.

Against this background, Greenpeace worked with the International Institute for Energy Conservation (IIEC) to research this report which gives examples of energy efficiency and renewable energy technology currently in use and being developed in Central and Eastern Europe. It shows how countries in the region can reduce their dependence on nuclear power and fossil fuels. The report outlines case studies in Russia, Ukraine, Czech and Slovakia, but there are more examples in these countries and other countries in the region. These case studies are just the beginning, they give a brief glance at what is already available.

---

## Nuclear Energy

### No Solution to Climate Change

The nuclear industry is in near-terminal decline world-wide, following its failure to establish itself as a clean, cheap, safe or reliable energy source. The on-going crisis in nuclear waste management, in safety and in economic costs have severely undermined the industry's credibility. It is currently desperate to find a valid rationale and justification for renewed state support and funding. It is promoting the claim that as nuclear power stations do not emit carbon dioxide, the major greenhouse gas, switching from fossil fuels to nuclear power is the only way to cut Carbon Dioxide (CO<sub>2</sub>) without radically changing consumption patterns. However, even the most perfunctory examination of the issue shows that nuclear power has no role whatever in

tackling global climate change. In fact quite the opposite is true; any resources expended on attempting to advance nuclear power as a viable solution would inevitably detract from genuine measures to reduce the threat of global warming.

---

### "New Energy Deal"

The "Atoms for Peace" dream turned out to be a failure. None of its promises have been realised. In spite of the massive financial and scientific investments and prioritisation above all other energy sources, nuclear power did not solve the energy problem. It did not provide the world with an abundant supply of electricity that is "too cheap to meter". Ten years after the Chernobyl accident, it has become even clearer that nuclear power is an ultimate problem, rather than the ultimate solution...

Since the very beginning of its existence, Greenpeace campaigned to unveil the "Atoms for Peace" myth. Now Greenpeace is helping to contribute to the realisation of a realistic, safe and sustainable alternative that will fulfil all the promises which the "Atoms for Peace" deal could not. This "New Energy Deal" is the only way out of the dead end street of the nuclear era...

---

### Windmills in Russia

Russia is currently involved in extensive discussions on the future energy strategy for the country. The decline in industry over the past 7 years has created a decrease in electricity consumption of about 20%. This means that there is now a unique chance to get rid of dangerous nuclear power plants, replacing them with energy efficiency and renewable energy technology...

---

Moved

This document has moved. If the new document does not load click [Here](#)



**no.nukes**

**nuclear maps**



## **Nuclear Waste Shipment to Japan**

January 1998



## **German Plutonium Transport to Dounreay**

December 1997



## **Central and Eastern Europe - Commercial Reactors**

November 1996



## **Nuclear Power Plants in the Former Soviet Union**



## **Russian Nuclear Fuel Cycle**

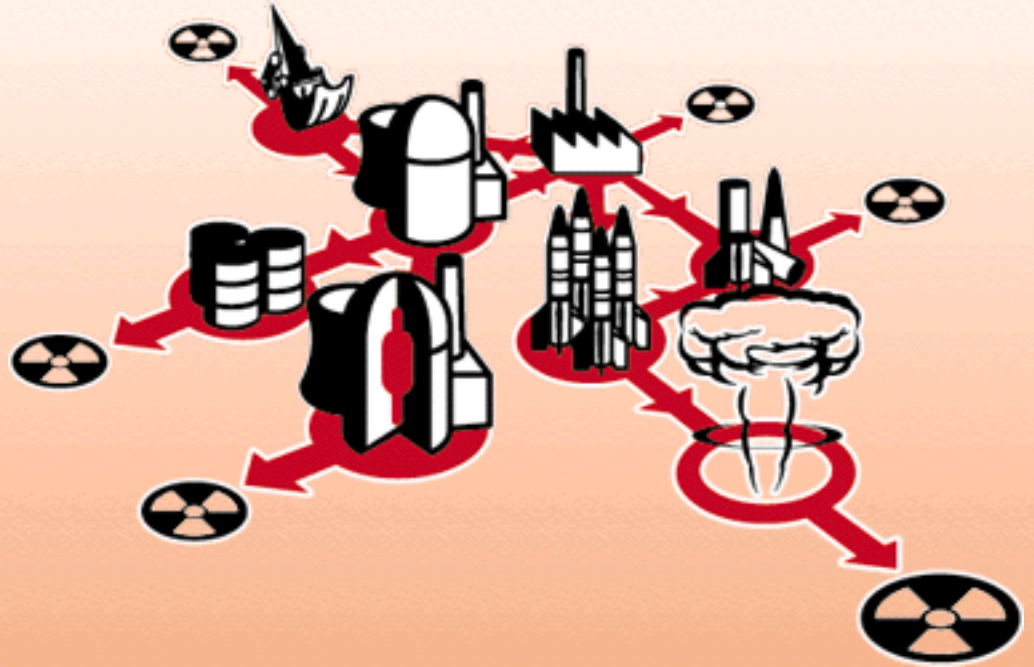
Moved

This document has moved. If the new document does not load click [Here](#)

# no.nukes



# pathways to destruction



spent fuel



mining and fabrication



decom-missioning



reactors



reprocessing



testing



plutonium stockpiles



weapons



waste



transport