

## Climate Change - Nuclear not the answer

**The future of the planet's climate, the lives and livelihoods of billions of people depend on the energy generation choices being made today. We have the opportunity to stabilise climate change, end the nuclear nightmare and tackle the inequity of fuel poverty afflicting one in three people on the planet. Two billion people currently live without reliable access to life enhancing energy services like light and heat.**

**For the planet and its people we must all make the right choice. We must choose efficient and safe renewable energy sources over dirty and dangerous nuclear power.**

### Introduction

The potential of renewable energy is vast and far greater than that of nuclear power or climate changing fossil fuels. With today's technology we can generate almost six times the current global energy demand.<sup>1</sup>

Why listen to the nuclear industry, which time and time again has offered us false promises and lies? Why let it drag us backwards to the past and believe that nuclear power is needed to tackle climate change when we can look to the future, a clean future based on renewable energy sources; a future free of more radioactive waste and the nuclear proliferation nightmare that accompanies nuclear power?

The choice is not just about how to replace existing power plants. One third of the world's population, some two billion people have no reliable access to energy supplies, this inequity cannot be relieved by the 1950s nuclear nightmare, but only by the efficient use of diverse and decentralised renewable energy systems.

The promotion of nuclear power as the answer to climate change is a dangerous diversion from the real solutions: a massive uptake of renewable energy and the adoption of energy efficiency are the only effective ways to combat climate change. They are available now; they are clean, cheap and have the added benefit of providing energy security.

Nuclear power belongs in the dustbin of history; it is a target for terrorists, and a source of nuclear weapons. The future can be nuclear free. Renewable energy is peaceful energy and it is available today.

While the nuclear industry's 1950s dream of clean energy that would be too cheap to meter lies in economic and environmental tatters that same industry is now desperately trying to convince us that it is the solution to climate change. While the world is struggling to manage the vast mountains of radioactive waste, which have been produced over the last half-century, many in the finance industry dismiss it as 'too expensive to matter'.

It is sobering to remember that 21 years ago on April 26, the industry was brought to a standstill by the world's worst nuclear accident at Chernobyl; an accident, which emitted an unstoppable and deadly plume of radioactivity that travelled the world and the effects of which can still be measured today; an accident, which could be repeated by any one of the world's 400 or so nuclear reactors.

Nuclear power has not suddenly become safer or cleaner. The legacy of the nuclear waste remains unsolved and accidents happen across the world daily. However, the nuclear industry is using climate change as an excuse to save and even expand its ailing business. The industry has a history of broken promises and lies; lies, which continue with its claim to be the solution to climate change.

The environmental, social, security and proliferation problems that have always plagued the nuclear industry continue to do so, despite over half a century of attempts to find solutions. We should not be conned into accepting one environmental threat on the premise that it will avert another when a future free of both nuclear and dangerous climate change is possible through the speedy deployment and development of renewable energy technologies and energy efficiency.

With the use of existing technology, Japan achieves energy intensity one seventh of that of China (that's seven times more energy service per unit of energy used)<sup>2</sup>. Organization for Economic Cooperation and Development (OECD) nations could save 30% of energy, and developing nations up to 50%<sup>3</sup>. Lighting an average European household uses only a third of the energy used for lighting in U.S. households.

---

<sup>1</sup> Source: ISES

<sup>2</sup> <http://www.eia.doe.gov/emeu/cabs/chinaenv.html>

<sup>3</sup> IEA Renewables Information 2003, [http://www.erec-renewables.org/documents/RES\\_in\\_EUandCC/Policy\\_reviews/EU\\_15/Sweden\\_policy\\_final.pdf](http://www.erec-renewables.org/documents/RES_in_EUandCC/Policy_reviews/EU_15/Sweden_policy_final.pdf)

Sweden gets 29% of its total energy supply - 51% of its electricity - from renewables (2001 - EU averages of 5.8% and 15.5% respectively<sup>i</sup>).

### **Key reasons against nuclear**

The key reasons why the self-serving nuclear industry arguments about its role in helping to fight climate change are wrong.

- Nuclear energy is an expensive diversion from the task of developing and deploying renewable energy, energy efficiency and the more decentralised energy systems required for a low carbon future
- We can reduce carbon emissions much more cheaply and more effectively using renewable energy and energy efficiency measures
- No proven solution exists for dealing with radioactive waste
- Expanding nuclear power internationally would hugely increase the risks from terrorism and nuclear weapons proliferation
- Nuclear power plants cannot be built in time to make even the smallest difference

### **Replacing Global Warming with a Nuclear Winter is not the answer**

The Massachusetts Institute of Technology (MIT) and other studies estimate that for nuclear power to have any effect on global warming, we would need to build a minimum of 1,000 reactors worldwide. This is a wildly unrealistic scenario, given that the current growth in nuclear electricity is at about 4%, and investors refuse to buy into nuclear power's dubious economics.

After half a century of producing deadly long-lived radioactive waste, not one country in the world has a method of isolating these wastes from the environment for the hundreds of thousands of years they will remain a threat. Monitoring and maintaining waste dumps over a period spanning 20 times the length of known civilisation is an unacceptable burden to place on all future generations – with no guarantees of long-term safety.

**Even if it were climate-friendly, nuclear power could do little or nothing in the fight against global warming. Nuclear power is used only to generate electricity. It represents a mere 16% of the world's electricity. Electricity itself only accounts for approximately one third of greenhouse gases.**

**Nuclear power presents unacceptable risks to life on this planet: its small contribution to power is far outweighed by its inherent dangers. Nuclear power cannot deliver in the fight against global warming.**

Tackling climate change effectively means reducing global greenhouse gas emissions by 50% by 2050. If we build more nuclear power plants, this would serve only to create more radioactive waste, more targets susceptible to terrorism and require massive expenditure of public subsidy. There are many more effective ways to reduce carbon emissions. For example, research carried out for the European Union concluded that when looking at the whole cycle of nuclear generation, from mining the uranium to decommissioning the plants, nuclear power stations would produce around 50% more greenhouse gas emissions than wind power.

### **Renewable energy potential outstrips nuclear**

Many countries, such as the UK, China, and Egypt, have enough wind power to meet their energy needs many times over. As tidal, wave, solar and biomass technologies develop, a diverse renewable energy industry will emerge. Even if it were climate-friendly, nuclear power could do little or nothing in the fight against global warming. Nuclear power is used only to generate electricity. It currently accounts for only 16% of the world's electricity while electricity itself only accounts for around one third of greenhouse gases.

### **Rising construction times**

Analysis undertaken by the World Energy Council has shown that worldwide construction times for nuclear reactors have increased. The average construction time for nuclear plants has increased from 66 months for completions in the mid 1970s, to 116 months (nearly 10 years) for completions between 1995 and 2000. The longer construction times are symptomatic of a range of problems including managing the construction of increasingly complex reactor designs. In contrast, renewable energy is ready now and action to combat climate change needs to happen now. For example, The first offshore wind farm in the UK at North Hoyle in North Wales took only eight months to build.

MIT and other studies estimate that for nuclear power to have any effect on global warming, we would need to build a minimum of 1,000 reactors worldwide. This is a wildly unrealistic scenario, given that the current growth in nuclear electricity is at about 4%, and investors have yet to buy into nuclear power's uncertain financials.

## Rising construction costs

The economic performance of nuclear power is heavily dependent on the construction costs, and delays in construction have had a significant impact on the economics of nuclear power, interest on the capital borrowed to build the plant will increase with construction time. These economic problems can be seen in different regions around the world.

In country after country nuclear construction programmes have gone considerably over-budget. In the United States, an assessment of 75 of the country's reactors showed predicted costs to have been USD 45 billion (€34bn) but the actual costs were USD145 billion (€110bn). In India, the country with the most recent and current construction experience, completion costs of the last 10 reactors have averaged at least 300% over budget.

## Falling construction demand

There are currently only 22 reactors under active construction in the world. The majority (17) are being built in Asia. 16 of the 22 are being built to Chinese, Indian or Russian designs, though none of these are likely to be exported to OECD countries. Construction on five reactors began over 20 years ago, which raises real doubts as to the likelihood of new reactors being built to their current timetable. There are a further 14 reactors on which construction is now suspended, 10 of which are in Central and Eastern Europe.

## Rising operational costs

Nuclear power is not cheap. Costs associated with safety and security, insurance and liability in case of accident or attack, waste management, construction and decommissioning are rising substantially for nuclear power. The economics of nuclear power have always been bad, and the industry only really got off the ground as a mask for nuclear weapons programmes. The fact that consumers or governments have traditionally borne the risk of investment in nuclear power plants meant that utilities were insulated from these risks and were able to borrow money at rates reflecting a reduced risk.

However, following the introduction of competitive electricity markets in many countries, the risk that the plant would cost more than the forecast price was transferred to the power plant developers, who are constrained by the views of financial organisations such as banks, shareholders and credit rating agencies. Such organisations view investment in any type of power plant as risky. However, builders of non-nuclear power plants were willing to take these risks, as are vendors of energy efficiency services.

Consequently, when consumers no longer bear the economic risk of new plant construction, nuclear power, which combines uncompetitive high prices with poor reliability and serious risks of cost overruns, has no chance in countries that have moved to competitive power procurement. Any attempt to revive the nuclear industry would significantly undermine the growing confidence in renewable energy and divert funds away from real solutions to climate change.

## The nuclear threat

Nuclear power provides the basic ingredients for nuclear weapons, dirty bombs and provides an obvious target for terrorists. A global nuclear power construction programme large enough to achieve drastic greenhouse gas reductions would entail construction in all areas of the world, whether stable or not. Renewable energy installations on the other hand are flexible, cheap to construct and pose no terrorist or proliferation threat.

Nuclear technology, such as uranium enrichment is also used in nuclear weapons production, and therefore a proliferation risk. There are now more than 40 countries civil nuclear power programmes giving them the tools for nuclear weapons. Nuclear technology will always carry the risk that it will be used to construct weapons of mass destruction.

## Untested technology

The nuclear industry is promoting a new generation of reactors (Generation III and III+) and hoping that a wave of orders will be placed for them in the next few years. However, these are relatively untested and far from proven.

- **Generation III reactors** - The only Generation III reactors currently in operation are the Advanced Boiling Water Reactors (ABWR) developed in Japan. By the end of 2006, four ABWRs were in service and two under construction in Taiwan. Total construction costs for the first two units were well above the forecast range. Further problems have now arisen as cracking has been found in the blades of the turbines of two plants.
- **Generation III+ reactors** - No Generation III+ plant has yet been completed and only one is under construction. The most widely promoted of these latest designs are the new generation of Pressurised Water Reactors (PWRs), in particular Areva's European Pressurised Water Reactor (EPR) and the Westinghouse AP1000.

- Other designs being developed include the **Advanced CANDU Reactor** (ACR-1000) and **High Temperature Gas Reactors** (HTGRs). The most developed of the latter is a South African version of the **Pebble Bed Modular Reactor** (PBMR).
- **Generation IV reactors** - Even more speculative are the 'paper' designs for Generation IV plutonium-fuelled reactors. While several designs are being produced, technical difficulties make it unlikely they will be deployed for at least two decades, if at all, while the economics of fuel reprocessing also remain unproven.

### **Renewables – there is no alternative**

Renewable energies could cover the global energy demand six times over with today's engineering – sustainably, peacefully, cleanly and infinitely. Every dollar invested in electricity efficiency displaces up to seven times as much carbon dioxide as a dollar invested in nuclear power.

There is no energy shortage. More energy falls on the Earth each day than its 5.9 billion inhabitants would use in 27 years. Solar generated power could provide the current world energy use 10,000 times over. Offshore wind in the North Sea alone could produce nearly twice the electricity needs of neighbouring countries.

To install renewable energy generators is faster, cheaper and more reliable than the installation of nuclear power plants. Construction time e.g. for wind turbines is approx 2 weeks, plus an average planning time of 1 to 2 years. Wind farms can "follow" growing demands from developing countries such as India and China easier than very slow and uncertain nuclear projects.

The German wind industry alone installed and generated more power within one decade than the nuclear industry did within a decade when they forced nuclear power onto the market.<sup>4</sup> Most renewable energy technologies will be competitive against conventional fuels within the next 10 to 15 years – despite the massive subsidies still going to these conventional industries. Wind will be competitive within the next 5 to 7 years – based on current fossil fuel prices. Oil, coal and gas prices have been rising for years and will continue to do so, as growing economies will increase their energy demand.

### **Case study: Olkiluoto 3 in Finland:**

The Olkiluoto 3, an EPR, construction project in Finland is rapidly becoming an example of all that can go wrong in economic terms with nuclear new build. It demonstrates the key problems of construction delays due to safety concerns, cost overruns, as well as hidden state subsidies that are now facing various legal challenges. In December 2006, after only 16 months of construction, Areva announced the reactor was already 18 months behind schedule, and it now seems likely that the project will fall at least €700m over budget.

### **The alternatives - energy efficiency and renewables**

There is enormous potential for reducing our consumption of energy, while providing the same level of energy 'services'. The Greenpeace Energy [R]evolution scenario details a series of energy efficiency measures, which together can substantially reduce demand in industry, homes, business and services. The solution to our future energy needs lies in greater use of renewable energy sources. Nuclear power is not the solution as it poses multiple threats to people and the environment.

### **In Summary**

The nuclear industry has seized on the problem of climate change to try to revive its dying industry. It argues that nuclear power can help achieve the dramatic cut in carbon emissions necessary to seriously address climate change, but the reality is that wasting yet more time and money pursuing the nuclear nightmare would be too late, too expensive, too risky, and could lead to nuclear weapons proliferation, because the majority of nuclear technologies and materials needed for a civil nuclear power programme are also essential to develop a nuclear weapons programme. The massive subsidies needed by the nuclear industry threaten to undermine the renewable energy revolution that is the real solution to climate change.

---

<sup>4</sup> BWE – German Wind Energy Association, <http://www.wind-energie.de>