

## *Why Triodos Bank is not financing nuclear power*

### Position paper nuclear power

Nuclear power is back on the political and popular agenda. But despite its relatively low carbon emissions it remains an inherently dangerous technology, which is yet to resolve how it safely disposes of the waste it creates. Given these safety and environmental concerns, Triodos Bank does not invest in companies with involvement in the nuclear industry. Instead, it focuses on energy efficiency measures and renewable energy technologies as an alternative to both diminishing fossil fuels and nuclear power. Triodos Bank is committed to profound, positive change, helping to build sustainable patterns of energy use.

#### INTRODUCTION

Today nuclear power is used globally, offering low-emission energy production. It has recently attracted renewed interest because it reduces dependence on oil, but it is not without environmental drawbacks, prompting sustainability concerns among politicians, NGOs and Government alike. Nuclear power is electricity generated from uranium. During the production process enriched uranium is brought to a controlled process of nuclear fission. This process creates the heat that's used to produce steam that drives turbines to generate electricity.

Nuclear power is a significant source of electricity. It accounts for 16% of electricity generation worldwide. Currently, 440 nuclear power plants operate in 31 countries and some 28 new plants are under construction. There are also more nuclear research reactors and some nuclear reactors powering ships and submarines<sup>1</sup>.

Following the development of the atomic bomb during World War II, nuclear power was widely considered to represent the future of energy supply. However, research on the harmful effects of radiation as well as serious accidents with nuclear power plants changed public opinion and the prospects for nuclear power. In Europe, many countries seemed to be on a course to phase out nuclear power at the end of the last century.

But nuclear power is back on the political agenda, as the subject of two debates. The first concerns climate change. This is an ever-growing issue as CO<sub>2</sub> emissions rise as a result of human activities, and nuclear power is promoted as a solution providing a relatively low-

emission electricity production method. The second debate is about energy security. Oil and gas reserves are spread thinner with new economic powers such as China and India increasing their demands on world energy reserves. Russia has emerged as a key player in supplying the energy needs of the Eurasian region. In response, Western countries feel the need to reduce their energy dependency. Again, nuclear power is presented as a key alternative.

In this paper Triodos Bank evaluates the pros and cons of nuclear power and details its position on the issue. In reaching its decision, the bank focuses on the sustainability of nuclear power. Other elements of the debate are excluded, such as the industry's commercial viability versus state subsidy, estimates of electricity price developments, central versus decentralised electricity generation, the development of nuclear fusion and the medical application of nuclear science. Although these are important issues, they are not directly relevant to nuclear energy as a sustainable source of commercial electricity.

#### NUCLEAR CONTAMINATION AND WASTE

Radiation from enriched uranium is extremely harmful to living organisms. It damages cell-structures, causes cancer, early mortality or reduced reproductive success.<sup>2</sup> The genetic effects of damage from nuclear contamination and therefore the risks to human health remain for several generations. Contamination by radioactive material can have different causes, such as nuclear power plant accidents, leakages, dumping of nuclear waste from power or reprocessing plants<sup>3</sup>, and carelessly decommissioning old nuclear machinery. Once released, radioactive material can spread over large

<sup>1</sup> There are some 280 nuclear research reactors in 56 different countries, and some 220 reactors to power ships and submarines ([www.world-nuclear.org](http://www.world-nuclear.org)).

<sup>2</sup> Holm L.E. In *Journal of Environmental Radioactivity* 2004; 72(1-2):57-63.

<sup>3</sup> The sites of Sellafield (UK) and La Hague (France) are known for their controversies and were often targeted by NGO's such as Greenpeace.

areas, contaminating water, vegetation and agricultural crops. It can enter into the food chain as people and animals eat contaminated material, as occurred after the Chernobyl disaster. The harmful effects of a nuclear accident or disaster are potentially enormous as radioactive material contaminates areas far beyond the site of the production facility itself, or location of any accident.

Although research into nuclear technology has contributed to the efficiency and safety of nuclear power plants, even the most modern are not commonly considered to be inherently safe.<sup>4</sup> A 'fourth generation' of nuclear power plants which can survive a critical meltdown without major consequences for the outside world, is estimated to be operationally feasible after 2030<sup>5</sup>.

In addition to safety concerns, there is the issue of nuclear waste. Radioactive waste from power plants still has to be temporarily stored in secured facilities, waiting for a definitive solution. Developments have been made, including speeding up natural decay processes and shortening the period in which the radioactive waste is harmful. Research on underground storage in stable earth-strata is also ongoing. A final, sustainable solution for safely disposing of nuclear waste has not yet been found. As long as this remains unresolved, the production of nuclear power builds up a reserve of highly radioactive material that continues to present a serious danger to society, because of the risks of leakages, or intentional use by terrorists, for example. And, even when effective transmutation techniques are available, nuclear waste remains radioactive and therefore dangerous for several hundreds of years<sup>6</sup>.

#### URANIUM MINING AND WASTE TAILINGS

The mining of the raw material, uranium, is also a cause of concern. It carries the problems associated with the conventional mining industry including widespread excavation, and the considerable impact to the environment and local populations that this entails. Workers are exposed to and often poisoned with radiation, sulphuric-acid and radon gas. Waste tailings remain radioactive for thousands of years,

and even when properly covered, they severely limit future activities in the area. Waste tailings can also seriously contaminate groundwater sources. In some countries, instead of mining, a 'leaching' process is used. Chemicals are injected in the ground to dissolve the uranium so it can be pumped up. This process is also not without risks for environmental damage such as soil and groundwater contamination.

Besides the environmental effects, there is debate about uranium reserves. The United Nations estimates that current reserves will last another 50 years. However, a 2005 study by the OECD Nuclear Energy Agency and the International Atomic Energy Agency states that there is much more uranium available to be mined in the future. It seems, for the next hundred years at least, the supply of uranium will not be an issue. Some experts even claim that as reuse-techniques develop and breeder reactors might become commercially viable, reserves will last for over a thousand years.

#### CLIMATE CHANGE

A positive aspect of nuclear power is its relatively small carbon footprint. Although there is debate about accurate emission figures when taking into account the complete life cycle, experts agree that CO<sub>2</sub> emissions of nuclear power are lower than those produced by gas or coal fired plants. However, exact figures are subject to ongoing debate. In different studies, the emission of nuclear power production ranges from a few percent, to twenty to thirty percent of the emission of a gas-fired plant.<sup>7</sup> Calculations depend on the type of plants compared and the exact way the production chain of nuclear power is calculated.

Despite low emission advantages, the contribution of nuclear power to the reduction of climate change will only be limited. The share of nuclear power as part of the world's total electricity production is roughly 16%, but of total energy used it is a mere 6.4%.<sup>8</sup> Although a number of new nuclear power plants are planned worldwide, the International Energy Agency (IEA) expects the share of nuclear power in global electricity production to decline.<sup>9</sup> This trend is expected to reverse between 2030 and

4 Het nucleaire landschap; Slingerland, Stephan & Olivier Bello, Marc Davidson, Kirsten van Loo, Frans Rooijers & Maartje Sevenster; Den Haag, Rathenau Instituut, 2004. Workingdocument 94.

5 us Department of energy (<http://nuclear.energy.gov>).

6 Het nucleaire landschap; Slingerland, Stephan & Olivier Bello, Marc Davidson, Kirsten van Loo, Frans Rooijers & Maartje Sevenster; Den Haag, Rathenau Instituut, 2004. Workingdocument 94

7 Comparing Greenhouse-Gas Emissions and Abatement Costs of Nuclear and Alternative Energy Options from a Life-Cycle Perspective; Öko-Institute, 1997 and Het nucleaire landschap; Slingerland, Stephan & Olivier Bello, Marc Davidson, Kirsten van Loo, Frans Rooijers & Maartje Sevenster; Den Haag: Rathenau Instituut, 2004. Workingdocument 94.

8 2004 data; EU Commission staff working document Sec(2007)12

9 See note 4: Rathenau Instituut, 2004.

2050, when the 'fourth generation' plants become commercially viable.

#### TERRORIST PURPOSES

There is the concern that the expertise required to produce nuclear power for civil purposes can easily be applied for military objectives. Uranium from decommissioned nuclear weapons is also used in nuclear power plants and nuclear waste can be used by the military or terrorist organisations. The spread of nuclear technology to countries with an undemocratic, repressive regime or a military dictatorship could present a major threat to the international community. Moreover, the potential threat of terrorists targeting nuclear plants, or the use of nuclear waste as a 'radiological dispersion device' - or 'dirty bomb' - has become a valid concern. Defence experts from the United States consider this 'dirty bomb' to be an expedient weapon, as radioactive waste material is often not as well guarded as nuclear weapons.<sup>10</sup> The risk that nuclear material is used for military or terrorist purposes, underlines the urgent need for non-proliferation. In the hands of countries that are not reliable, democratic partners of the international community, nuclear techniques become a serious threat to the world.

#### CONCLUSION

Nuclear power has reappeared on the agenda as part of the climate change debate because of its relatively low CO<sub>2</sub> emission and its potential to lower the energy dependency of rogue- or failed states and regions. Although exact figures are subject to ongoing debate, it is clear that emissions from nuclear power plants are lower than those of coal or gas fired plants.

On the other hand current generation of nuclear power plants are not considered to be inherently safe and potential accidents could have major, and irreversible consequences. In addition, the question of disposing of nuclear waste is unresolved, creating an

environmental burden for generations to come and a continuing threat to ecosystems. Finally, there is the risk of proliferation, as rogue- or failed states pursue access to nuclear technology. The threat of terrorists using dirty bombs remains an unwelcome threat.

From a sustainability perspective, there is a need for an integral approach to lower the emissions of all types of energy used, to reduce energy consumption, to increase energy efficiency and to shift to renewable energies. Renewable energy already is the third largest contributor to global electricity production accounting for almost 18%, compared to the 16% of nuclear power<sup>11</sup>. Data on the growth potential of renewable energy indicates that renewable energy in the long run will become a feasible alternative, replacing fossil fuels and nuclear power<sup>12</sup>. However, for the near future, there is an enormous gap between a 'business-as-usual' - with continuous rising energy consumption and increasing CO<sub>2</sub> emissions - and ambitious sustainability scenarios needed to control global CO<sub>2</sub> emissions. The main challenge as we approach 2020 is to make meaningful changes towards a situation where renewable technologies meet our energy needs. Triodos Bank will actively contribute to this positive change, instead of financing nuclear power.

To face difficult choices about future energy supply and considering the current safety and environmental risks related to nuclear power, Triodos Bank chooses to invest in sustainable solutions, such as energy efficiency and renewable energy sources such as wind power, biomass, solar power, and geothermal energy.

As a result, the bank does not invest in companies that have involvement in the nuclear industry, including uranium mines, companies that are involved in constructing nuclear power plants, companies that transport nuclear material, retailers of nuclear energy and companies involved in the treatment or storage of nuclear waste.

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<sup>10</sup> A 'dirty bomb' consists of waste by-products from nuclear reactors wrapped in conventional explosives, which upon detonation would spew deadly radioactive particles into the environment ([www.cdi.org](http://www.cdi.org)).

<sup>11</sup> 2004 data, from 'Renewables in Global Energy Supply' International Energy Agency, 2007.

<sup>12</sup> The Vision Scenario for the European Union, Öko-Institut e.V./International Consulting on Energy (ICE), 2006; Presentation by E. Lysen, Conference on Energy Policy and Climate Change, Greenaccord, Rome, 12 March 2007.