



NO SIMPLE FIX –

NUCLEAR POWER

IS IT A *'DINOSAUR TECHNOLOGY'* OR *'SECURE AND AFFORDABLE ENERGY SUPPLY'*?

Nuclear power production in Germany

The problem in brief

In order to supply large amounts of power and to effectively reduce carbon emissions, nuclear power is seen world wide as a proper solution. Contrary to world-wide trends, Germany decided to abandon nuclear power production by 2025. Currently, political leaders debate whether Germany should stop phasing out nuclear power plants and also build up new nuclear power capacities. This is a very controversial issue, as the German public is split into two equally large camps of proponents and opponents of nuclear power.

Germany in brief

Germany is located in central Europe. With a population of 80 million, it is the largest European Union member country. Officially, it is a federal republic and currently ruled by a coalition headed by the conservative Chancellor Angela Merkel combining the conservative Christian-Democrats and the somewhat more liberal Social-Democrats. Anticipating the results of the 2009 national election, political polls see the conservatives far ahead of the Social-Democrats who may still be able to forge a ruling coalition with the smaller Green and Socialist parties.

Economic-wise, Germany is a major trading country with few leading multi-national corporations but many leading small- and medium-sized enterprises. Engineering and renewable energies are important strengths of these businesses. Few natural resources, a declining population, decreasing innovation capabilities and talent pool give the country an overall stagnating or decreasing GDP-growth perspective for the next decades.

The recent history of nuclear power production

During the 1980s, an environmentalist people's movement greatly supported by external events—such as the Chernobyl disaster of 1986—started to re-shape the German society and values. Roughly eight years after the German unification, the Green party representing this social movement gained foothold in the federal government through a ruling coalition with the Social-Democratic Party. In 1999, this government decided to gradually phase out nuclear power plants until 2025.

Given the increased awareness of climate change and danger of carbon emissions in the German public, the right-wing liberal and conservative parts of the society consider a stop of the phasing out of nuclear plants. To them, it is not

only necessary to stop phasing out, but to invest in research and to possibly build new nuclear plants. In their eyes, the environmentalist should '*stop the crusade against nuclear power*'. It is a '*secure and affordable energy supply*', as the Chairman of the Christ-Democrats in the German parliament, Volker Kauder puts it.

Verbalizing the continuing skepticism of the social-environmentalists against nuclear power, the current head of the Green Party, Claudia Roth calls it a '*dinosaur technology*' which fails to address the needs of future generations. Instead of trying to '*cast out the demon of climate change by means of the master of all devils, nuclear power*', Germany should continue to pursue a leading role in the renewable energies sector. Nuclear power will certainly rank among the key issues of the upcoming national elections in 2009.

National and other actors

In Germany, the Christian-Democratic Party and the Liberal-Democrats largely represent the interest of German businesses and are principally in favor of nuclear power. Regarding nuclear power, both parties have their strongest supporters within the four big power producers in Germany. Three of these big four have their corporate HQ in Germany and yield immense market power and political influence as they produce more than 50% of Germany's power and control the country's grid.

Strongest opponents of nuclear power are located in the environmental movement, the Green Party and Socialist Party. The Social-Democrats are largely against nuclear power, but first signs of intra-party disagreement are obvious. Two important Social-Democrats' party elders already opted in favor of the technology, quietly supported by a younger and more pragmatic generation among the Social-Democrats. Non-national actors are very diverse and range from single countries to non-governmental organizations and international organizations. Apparently, Germany's current position is rare among other countries.

	Pro nuclear	Contra nuclear
German	Ministry of Industry, Christian-Democrats, Liberal-Democrats, some Social-Democrats, big power producers (Eon, RWE, ENBW)	Ministry for Environmental Affairs, most Social-Democrats, Green Party, Socialist Party, national environmental movement (e.g. BUND, NABU)
Other	majority of big EU countries and G8 countries, many developing countries	few small countries (e.g. Austria, Sweden, Ireland), transnational NGOs (e.g. Greenpeace, WWF)

Important Trade-offs

#1 Safety and liability issues

One advantage of nuclear power when compared with power production from renewable energies is that nuclear power plants do not cause voltage fluctuation as often. Especially in industry and commerce, voltage fluctuation causes widely underestimated break-downs of machines and dangers to employees. The costs are estimated to be about several billion € in the whole European Union per year. Possibly, greater supply of nuclear power can help to reduce the magnitude and dangerous effects of voltage fluctuation.

However, nuclear power production is not entirely a safe thing. There always is a residual risk of smaller or bigger radioactive accident. Additionally, the financial liability of plant owners covers cost up to 2.5 billion € only. Since anything beyond this amount is financially not insurable and not to be paid by the plant owners, costs of a bigger accident would be largely on the tax payers. While statistically unlikely, the short- and long-term costs of a bigger accident are estimated to be about 5,400 billion €. In view of the residual risks of accidents and liability issues, nuclear power may seem a little unsafe.

#2 Reliability and security issues

When compared to oil and gas, a second advantage of nuclear power is that access to its energy source—uranium—appears reliable. Reliability of access is based on the origins, availability and price of uranium. Most of Germany's uranium originates from mines in Canada and Australia. Both are countries who maintain stable and friendly relations with Germany. Moreover, it is estimated that uranium will certainly be available for the next two to eight decades. Hence future supply of uranium should be rather secure. Additionally, power plant producers claim that future price increases of uranium due to increasing worldwide demand will not lead to unbearable price increases of nuclear power. It is said that a 50% price increase of uranium will cause a price increase below 10% of nuclear power.

As with safety, nuclear power is not totally secure. To start with, uranium as a fuel rod or waste can be used to build weapons of mass destruction. While Germany is unlikely to produce such weapons itself, relying on radioactive material also increases the chance that such material proliferates to irresponsible individuals inside and outside of Germany. In addition to proliferation risks, a nuclear power plant itself may be target of an attack. Given current global trends and the surge in transnational terrorism, this chance appears to be higher than before. Although proliferation and terrorist attacks cannot be quantified, the risk of such events discounts the security of nuclear power.

#3 Emission and waste issues

As stated above, nuclear power is seen as a proper solution to provide power and to reduce carbon emissions. Directly and indirectly, nuclear power indeed causes less carbon emissions than solar, gas, and coal plants with

estimated CO₂ emission of 16 to 32 g/kWh.¹ In this respect, nuclear power has a strong advantage in regard of carbon emission over most other energy sources.

Unfortunately, nuclear power plants cause radioactive waste which has a half-life of several million years. Meanwhile the German repositories for nuclear waste can only ensure to seal off the waste for the next fifty to a few hundred years. As scientists have developed no clear working strategy to effectively deal with this problem, the resulting cost from nuclear waste will be on future generations.

#4 Subsidy and cost issues

A final advantage of nuclear power plants is the economic aspect. In order to run a nuclear power plant profitably and to supply inexpensive power, nuclear power plants do not need as much government subsidies as other energy sources. The current subsidies for nuclear power are only about 2.2 €cts/kWh², which are the lowest among all other energy sources except for imported coal. Even building new power plants can be profitable without higher subsidies as long as the plants are able to run 60 and more years.

This cost competitiveness of nuclear power plants, however, has adverse effects on the competitiveness of power production from renewable energies. And even if subsidies for nuclear power are excluded and all quantifiable external costs are included in the price of nuclear power, it still has a cost advantage of estimated 2.6 €cts/kWh over power from renewable energies. As a consequence of relying on nuclear power, power production from renewable energies may continue to be small or even decreasing.

Possible policy options

There are several approaches to address the trade-offs either individually or with a 'one size fits all' solution. Policy options may include a wide range of actions, from funding additional research, to national regulations and even international or global actions. Whichever way might be the best in your eyes, policy makers in the European Union have a powerful tool to fight climate change—the carbon emission certificate trading system.

In 2005, the first phase of the carbon emission certificate trading system started in fifteen European countries. As of now, it mainly targets the power production sector. The certificates are first distributed to the power producers by the European Union and then traded on exchanges. While the European Union distributes fewer carbon certificates than carbon is emitted, the certificates' price is still rather low. However, this may change during the next decade.

¹ g/kWh = gram of CO₂ emissions per kilo Watt hour

² €cts/kWh = Euro cents per kilo Watt hour