

German Nuclear Policy*

Ernst Urich von Weizsäcker MP

Chairman, Bundestag Committee on Environment, Nature Protection and
Nuclear Safety

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Early history: emphasis on the peaceful use of nuclear fission

Nuclear fission was discovered here in Berlin, by Otto Hahn and Fritz Strassmann, in 1938, but the first applications were made in the US. Enrico Fermi's first nuclear reactor began producing (small amounts of) energy in Chicago as early as 1942, and the first atomic bomb exploded in the Alamogordo desert in 1945.

The Nazi period was the ultimate disaster for Germany (and others). The earlier scientific excellence – bringing more Nobel Prizes to Germany than to any other country during the first third of the 20th century, was badly eroded by the Nazi tyranny and criminal anti-Semitism. What the Nazis did not do, was done by the War. German industry had virtually ceased to exist in 1945, and almost all cities were destroyed.

The mindset after the war was characterized by guilt, peaceful reconstruction, pacifism (even under the threat of Soviet expansion), and an almost anti-national sentiment of “Europeanism”. The near absence of patriotism after 1945 was, of course, a consequence of its horrendous abuse by the Nazis but remains difficult for Americans to understand.

Concerning energy policy, two factors were dominant in post-war Europe: coal was the chief source of energy, and demand was steeply rising. The first significant move towards West European integration was the European Community of Coal and Steel (ECCS), founded in 1951. Its six countries,

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Germany, France, Italy, The Netherlands, Belgium and Luxembourg, were the nucleus of what six years later became the European Economic Community. The ECCS also became a symbol of *industrial democracy*, of co-determination, because for the heavy industries' supervisory boards a one to one parity between capital and labour became a mandatory rule, motivated perhaps by the fact that steel at the time was also the core of the arms industry that needed international control. Not too much later, nuclear energy entered the scene, with France – having almost no coal – taking the initiative. All ECCS countries were happy to agree on a common nuclear power policy for which EURATOM was founded, the European Community of Atomic Energy of 1957. Significantly, EURATOM was founded jointly with the European Economic Community and ranking with it at par!

Euratom had no military arm. This was particularly important for Germany. When the German Chancellor Konrad Adenauer intended to yield to American pressures to join NATO's nuclear weapons programme, an outcry of protest swept the country, with a group of eighteen atomic physicists including Otto Hahn, then President of the prestigious Max-Planck-Society, Werner Heisenberg and Carl Friedrich von Weizsäcker, directors of the Max-Planck-Institute for Physics leading the protest. They were later called the "Göttingen 18", although only six of them actually resided in Göttingen. The atomic physicists clearly saw the peaceful use of nuclear power as a great hope and were all the keener to keep nuclear energy out of the military odium. In the end, Adenauer had to give in.

Very soon, nuclear power became a technological routine no longer dependent on world class physicists. During the 1960s and 70s, nuclear power became a centrepiece of industrial renewal and was massively supported by all political parties. The "*Limits to Growth*" report to the Club of Rome (1972) with its gloomy pictures about resource depletion and environmental pollution and the energy shock of 1973 added to the feeling that nuclear power was perhaps

the solution to a whole range of pressing problems. Similar to the developments in Britain and France, some ten nuclear reactors were planned during the 1960s and another 15 during the 1970s. Also nuclear ships were planned. It all looked like an easy run promising formidable profits for the growing nuclear industry. The nuclear industry even suggested to do away with household metering because electricity was going to be so cheap that there would be no point in metering it.

From Wyhl to Chernobyl

Much to the surprise of the ruling elites, the tide turned against nuclear power during the mid 1970s. The turning point was *Wyhl*. This wine-growing village on the Upper Rhine facing France was spotted by the conservative provincial government of Baden-Württemberg as a site for a major nuclear reactor. But the government totally underestimated the local sentiments against the plan. Even the thoroughly conservative wine-growers stood up against it. They feared that the water vapour belching out of the cooling towers plus a warmed-up river could cloud the sky and take the sun from their vineyards. In addition, fears of radioactive radiation were spreading. Students from nearby Freiburg University initiated systematic protests and started street blockades against the heavy construction machines approaching the site. Moreover, they created the “*Volkshochschule Wyhler Wald*”, a popular, if demanding “school” of adult education teaching about the steam and clouds problem, radiation, disposal problems, vulnerability of nuclear installations to terrorism and war, solar energy and energy efficiency.

The coal dominated state of North-Rhine-Westphalia seized the opportunity of commissioning the Freiburg based *Ökoinstitut* to write a report on a nuclear-free future for Germany. The Federal Government under Chancellor Helmut Schmidt, however, maintained its full support of nuclear energy, but the popularity of this position was visibly dwindling as the Wyhl protesters gained sympathies throughout the country.

The popular science writer Robert Jungk published a book, *Der Atomstaat* (1977), in which he elaborated on the authoritarian political structures nuclear power would imply. This catapulted the atomic controversy to the level of fundamental questions of freedom and democracy, thus further eroding the support for nuclear power, however peacefully intended. The nuclear controversies were positively instrumental to the emergence of a new political party, the Greens. (The so-called 5%-hurdle that parties must take to enter parliament was meant to and has worked to strongly discourage the creation of new parties.) The Greens were quite radical in many regards but their unifying theme was the opposition to nuclear power in all its forms. They therefore were particularly at odds with the ruling Social Democrats (SPD) under Chancellor Helmut Schmidt – from which party many of the early Greens originated. The SPD came into rough times anyway because of the widespread phenomenon of “stagflation” that demoralized Keynesian “liberals” all over the place. Helmut Schmidt’s junior coalition partner, the Free Democrats (FDP) changed sides and spearheaded neoliberal thinking in the country, helping the conservative Christian Democrats (CDU) under Helmut Kohl to assume power. Thus the Greens inadvertently found themselves in an alliance of opposition with the SPD against the new conservative government; and gradually their views infested the larger partner. Helmut Schmidt retreated from party politics while the party moved to the left.

Around 1983, the combined issues of NATO’s nuclear rearmament with cruise missiles and the new “Waldsterben” (forest dieback) brought hundreds of thousands of protesters to the streets and created an atmosphere in which the Kohl government lost the popular majority in opinion polls. Fortunately for him, he had three years to go for the next elections, but he felt it was time to act against the steady rise of the Greens. One factor in particular alarmed Kohl and his US-American friends under President Reagan: the Greens wanted Germany

to step out of NATO, thus making a potential majority of the Greens and the SPD a true spectre for Atlantic defence policy.

Looking at the high popularity of ecological issues, Kohl decided to confront the Greens by putting himself at the top of the environmental movement. This is how Germany under a conservative government became known as an environmental champion and a rather stubborn fighter in the EU for stricter environmental standards.

It all happened before the reactor disaster of Chernobyl in April 1986, although some developments were influenced by the Three Mile Island accident. Chernobyl definitively put an end to any plans of expansion of nuclear energy. In the SPD, it shifted majorities and triggered a decision at their party convention at Nuremberg a few months later to completely phase out nuclear power within ten years. Polls suggested that this decision gave the party a strong and additional popularity push and that it might take just another three years to regain power, together with the Greens, – in the federal elections scheduled for 1990.

This prospect, however, made it all the more urgent for Kohl's to step up his environmental profile. Immediately after the Chernobyl disaster, Kohl created the new federal Ministry of the Environment; (environmental policies were thus far handled by the Ministry of the Interior.) A year later, in 1987, he was lucky appointing a top class man for the portfolio, professor Klaus Töpfer who had served as state environment minister in Rhineland Palatinate before. Töpfer introduced the green dot system for packaging waste and initiated very proactive German and European climate policies. In this, he was backed by an all-party Bundestag commission on climate policy, that boldly demanded a 25-30% reduction against 1990 of CO₂ by 2005

From German unification to the SPD-Green coalition of 1998

Then came the German unification, in a way Kohl's masterpiece. At the 1990 elections he was generously rewarded by an impressive victory. The SPD contender, Oskar Lafontaine, and the Greens had made lots of mistakes in the context of the unification, notably by not showing the necessary enthusiasm. (On one important issue, Lafontaine was probably right, namely his strong warning against the 1:1 exchange rate of the East German against the West German D-Mark because this rate implied rapid bankruptcies essentially for all East German firms selling their goods to East European clients paying their dues in Roubles at an agreed exchange rate with the East German Mark. Some analysts see this as the real cause for the non-ending tragedy of the German economy after unification!).

Concerning nuclear policy, the unification allowed Kohl conveniently to satisfy anti-nuclear sentiments by closing down all *East* German reactors, and the planned disposal facility at Morsleben.

In the meantime, the climate policy agenda was moved to the forefront of international environmental policies. The adoption at the 1992 Rio de Janeiro Earth Summit of the Framework Convention on Climate Change (FCCC) had an important side effect on nuclear power. It helped keep the nuclear option alive, despite continuing public mistrust. In Germany, the German Physical Society (DPG), significantly, was in the forefront of educating the public about the urgency of climate policy, and not few critics felt that this was a manoeuvre for a revival of nuclear energy.

Another period of four years of Kohl followed from 1994-1998. German industry had urged Kohl to rid himself of Klaus Töpfer who was seen as a liability to industry in the new post-cold-war era of globalization and of relentless cost competition. Kohl did as suggested and gave Töpfer a minor and less controversial portfolio, replacing him by Angela Merkel from East Germany who at the time had no credits of experience in the field. She actually

managed her new field much better than expected and was instrumental in getting the Kyoto Protocol of the FCCC agreed in 1997.

Concerning nuclear policy, the South German states of Bavaria and Baden-Württemberg, both governed since ages by Christian Democrats (Bavaria by the CSU sister party), felt that the Chernobyl shock was now over and one should return to “reason”, i.e. to a further expansion of nuclear energy. But industry placed no new orders of nuclear power plants, and opinion polls showed no signs of new sympathies with the nuclear option. Anyway, the power industry was considerably more hesitant than conservative politicians were as regards the continuation, let alone expansion of nuclear energy

The “Ausstieg”, perhaps the most distinguishing decision of SPD and Greens

The federal elections of 1998 brought Kohl’s government to an end after 16 years. The SPD campaign included a commitment for a phase-out of nuclear power. The new chancellor, Gerhard Schröder, former premier of Lower Saxony, entered a coalition with the Greens, who had an even stronger view on the phase-out of nuclear energy. Very soon, Schröder, together with the Green Minister for the Environment, Jürgen Trittin and the Economics Minister, Werner Müller, entered talks with the nuclear industry and finally found an agreement for a stepwise exit from nuclear power. The talks had been well prepared by Schröder’s attempts during his time as premier of Lower Saxony to arrive at an energy consensus with industry. These talks actually annoyed Lafontaine who wanted the thing done by governmental oktroi.

What is the substance of the phase-out, or the “Ausstieg”, as it is called in German? In essence, the German Government made an agreement with the electric utilities on a phase-out, with a total amount of 2.623 Terawatthours –of nuclear electricity remaining to be supplied. The utilities are invited to trade the permits allocated to them so as to optimize the economic output. Old reactors needing more maintenance would be retired sooner, while some of the newer

ones would continue to operate until the total amount permitted was exhausted. That could be at 2025 or perhaps as late as 2030.

Other parts of the deal were a prohibition to build new reactors, an end to the reprocessing of nuclear materials, and a ten years moratorium on the exploration of the planned final disposal facility for highly radioactive waste in the salt domes below the Lower Saxony village of Gorleben.

The postponement to a later date of the vexing question of the final disposal of radioactive waste was done at a price. It became necessary to build *intermediary* storage facilities for radioactive waste at each reactor site. The nuclear industry actually welcomed this condition because it helped terminate for the time being the highly controversial and increasingly expensive shipments of radioactive waste on roads or railways. Also, the intermediate storage served to reduce radioactivity and heat production from nuclear waste to some thirty percent of the original intensities, thus dramatically easing the physical specifications for final disposal.

Many Greens and Social Democrats felt the deal was much too generous towards the nuclear industry, while some industry representatives thought it was too ambitious. My own assessment is that it has been a fair deal. It meant that each reactor would be allowed to run for 32 years. Assuming that it takes some sixteen years for a nuclear plant to be written off, the owner has another sixteen years to make fat profits on it. Moreover, the liberalized electricity markets offered plenty of options to import electricity from abroad. When Edmund Stoiber, the Bavarian Premier, and the conservative candidate for the Chancellery in 2002, announced during his campaign that in case of victory he would initiate a revival of nuclear power, it was industry to remind him that the deal was agreed with Schröder and that there was no intention of ordering new nuclear reactors. For the Coalition and other ecologically minded people, the deal was ambitious enough to make it politically feasible to adopt a highly proactive renewable energies law (which would have been unrealistic without

the time pressure given by the “Ausstieg”). Moreover, the fact that a highly industrialized country felt it could afford phasing out atomic energy altogether has been an extremely strong signal to the international community.

In retrospect, after six years of the “Red-Green” government it can be said that the phase-out of nuclear power stands as the move that distinguishes the government most visibly from the positions of the conservative opposition. (With regard to social and tax policies as well as defence and foreign policies, the reality of the SPD and Greens governance has come very close to what the conservative camp has done and proposed during the past ten or twenty years!)

Perspectives

The big question is, of course, whether the Schröder government is right to assume the country can afford the Ausstieg. The time will come undoubtedly, when the replacement problem for nuclear power becomes highly pressing. The surplus capacities of electricity that characterize the European power industry in our days, are certain to disappear within the next ten years. Rising prices of natural gas have surprised earlier optimists. Wind energy is still on the rise but as yet very far from making good for nuclear power. So far, all German wind power taken together is worth a mere three nuclear reactors (although the *capacity* may be worth ten or more reactors, but then the wind is not always blowing at optimum speed.).

It is hard to believe, therefore, that renewables will be sufficient to close the gap will be left when nuclear electricity disappears from the market. A more realistic popular option has been the construction of combined cycle fossil power plants using coal and natural gas as fuels. But with the dramatic rise of the gas prices, that option is no longer very attractive, and people from all political camps become more accustomed to supporting renewable sources of energy as the core of the answer to challenge. As a matter of fact, the conservative CDU has recently begun to say that they would like to extend the

running time for nuclear reactors in order to leave more time for the build-up of renewable sources of energy.

I am reading with interest that in the USA a new discussion is on about a revival for nuclear energy, with an aggressive build-up of new nuclear reactors. Although some groups in Germany may hope for a similar debate in this country, I see it as a marginal minority position. What finds far more support, is the more conventional idea of extending the permitted life time for nuclear reactors. Many people from industry are demanding exactly that. But the motive tends to be only that an extended life time would simply take some steam out of the energy debate.

If the nuclear phase-out appears as an irreversible decision, if renewable sources of energy are simply too expensive to be a serious candidate for replacing all of today's nuclear plants, what could then be the solution? Leaving out coal, the major cause for the greenhouse effect, I am inclined to think of a systematic worldwide strategy of opening an entirely different option, which tends to be left out and forgotten by mainstream energy planners. It is a systematic approach to increase energy efficiency.

What is that? Essentially energy efficiency or rather energy productivity mean to extract more well-being from one kilowatt-hour or from one barrel of oil. Surprisingly, the physics of energy do invite for speculations of a dramatic improvement of energy productivity. One kilowatt-hour, after all, is enough, to lift a ten kilograms bucket of water three times from the sea level to the top of Mount Everest. What we do with one kilowatt hour, is extremely poor by comparison, chiefly because energy is so fabulously cheap.

With my friend Amory Lovins, I dared to put it on paper what kind of technological improvements are available. In our book "Factor Four" we feature twenty examples of how to quadruple energy productivity, and some of them actually go much beyond a factor of four.

The main challenge politically will be to make it profitable to go in the direction of aggressively increasing energy productivity. You would not be prepared to carry a ten litres bucket three times up to Mount Everest for anything like the price we pay for one kilowatt hour.

Emissions trading, a revenue neutral ecological tax reform, and de-subsidizing energy consuming industrial and transportation activities can lead us a long way of making energy productivity more profitable.

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