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RESPONSES AFTER CHERNOBYL AND FUKUSHIMA COMPARATIVE ANALYSIS OF GERMANY AND THE NETHERLANDS AS AMPLIFIED EXAMPLES.

The worldwide reactions on the nuclear disaster at Chernobyl (Ukraine, 26 April 1986) were quite different in different countries. So were the worldwide reactions on the nuclear disaster at Fukushima (Japan, 11 March 2011). On both governmental level as well as on a public level. This article is a comparative overview of the worldwide responses to both disasters, with (West-) Germany and the Netherlands as amplified examples.

It is clear it will take some time to analyze the precise consequences of the Fukushima nuclear disaster on a political level, as well as for the future of nuclear power in general. Nevertheless, this is a first attempt, focusing on the differences compared to Chernobyl in two neighboring countries. But first a brief overview of the worldwide responses.

Reactions after Chernobyl

After *Chernobyl* many countries decided to cancel the (planned) construction of (new) nuclear power plants. Italy was the only country which decided to close their nuclear power plants after a 1987 referendum. The shutdowns of the East-German nuclear power plants during the German reunification (1990) and Lithuania's only nuclear power plant Ignalina (2009) – a Chernobyl-type reactor - in accordance with Lithuania's accession agreement to the European Union could be considered as a delayed impact of the accident in Chernobyl.

Chernobyl caused much fear among the public and has seriously limited the worldwide expansion of nuclear capacity for a long time. After Chernobyl until now, only China, Iran, Mexico and Romania have completed construction of their first nuclear reactors and thereby entering the select group of countries with nuclear power reactors. Particularly in the United States the partial melt-down in one of the reactors of the Three Mile Island (TMI) nuclear power plant in Harrisburg (29 March 1979) had grave consequences. The support for nuclear power dropped substantially in the United States and elsewhere in the world, which was again amplified after *Chernobyl*.

However, there were and there are also many other factors involved in influencing the state of the nuclear capacity. On the one hand the oil shocks in the 1970s led to renewed concerns about energy security. For example as a consequence of the oil crisis of 1973-4 France started to launch a large nuclear energy program to diversify its economy away from oil. On the other hand, skyrocketing oil prices led to global inflation and high interest rates making nuclear power much less competitive. High inflation led to sagging economies and falling demand for electric power making earlier assessments of electric power supply/demand projections obsolete. Such periods of economical crises happened in the 1970s, in the early 1980s, the years after *Harrisburg*, and again with the nuclear disasters at Fukushima in 2011.

Only many years after *Chernobyl*, from the end of the 1990s, the (worldwide) support for nuclear power started to grow, because nuclear energy was presented as a carbon neutral energy source that would be of great importance to reduce the carbon dioxide emissions. More and more people began to believe in nuclear power as an option to reduce these emissions, although worldwide support for nuclear power has always been limited. In a whole range of non-nuclear nations – in February 2012 according to the World Nuclear Association nearly 45 countries - a nuclear power program is "under serious consideration". A remarkable (and highly unrealistic) number when you keep in mind that only 10 countries started to generate nuclear energy for the first time since the end of the 1970s; after the accident at Three Mile Island. (see Table 1)

That means that not a single country started a nuclear power program (the construction of its first nuclear power reactor) since Chernobyl; in fact, only two (China and Romania) after the 1979 accident at TMI.

Table 1: Emerging nuclear countries

Country	Start construction first NPP	First power of first reactor	Number of reactors (as of January 2012)
Slovenia ¹	3-1975	10-1981	1
Brazil	5-1971	4-1982	2
Hungary	8-1974	12-1982	4
Lithuania ²	5-1977	12-1983	-
South Africa	7-1976	4-1984	2
Czech Republic ³	1-1979	2-1985	6
Mexico	10-1976	4-1989	2
China	3-1985	12-1991	16
Romania	7-1982	7-1996	2
Iran	5-1975	11-2011	1

¹ By then part of Yugoslavia; ² By then part of the Soviet Union; ³ By then part of Czechoslovakia

Even in the past decade – long before *Fukushima* - it was already clear that nuclear energy can't be a panacea for carbon reductions in the future. This cheap PR trick of the nuclear industry is aimed to generate a nuclear renaissance. But unsuccessfully: there was no nuclear renaissance (see Table 2). As of march 1, 2012, there were 436 nuclear reactors operating in the world - eight fewer than in 2002. The International Atomic Energy Agency currently lists 63 reactors as “under construction” in 14 countries. By comparison, at the peak of the industry's growth phase in 1979, there were 233 reactors being built concurrently. In 1987, 137 reactors were listed under construction. In 2008, for the first time since the beginning of the nuclear age, no new unit was started up, while two were added in 2009, five in 2010, and seven in 2011. In the European Union, as of March 1, 2012, there were 143 reactors officially operational, down from a historical maximum of 177 units in 1989.

Table 2: Number of reactors 1979, 1987, 2012

Nuclear Power Status	31-12-1979	31-12-1986	31-12-2011
Units in Operation	234	396	435
Total net MWe	120,427	272,315	368,000
Units Under Construction	226	137	63
Total net MWe	205,700	121,645	61,000

Source: IAEA / ENS

Reactions after Fukushima

Just like with *Chernobyl*, the worldwide political reactions on the nuclear disaster at Fukushima (Japan, 11 March 2011) were quite different too. A group of countries with a large share of nuclear power, such as China, France, Russia, the United States and the United Kingdom don't have any intentions to end

their nuclear programs. Other countries with a large share of nuclear power have shut down older nuclear reactors (Germany, Japan) and have announced to finish their nuclear programs. Germany says that all nuclear power stations will be closed in 2022 and Switzerland in 2034. Japan hasn't fixed a date, but declared to stop building new nuclear power reactors. The French *Parti Socialiste* (Social Democrats) and the French Greens have agreed upon a joint position on the future of France's nuclear power. The Greens will support the PS candidate François Hollande in the next spring's presidential elections in return for his promise to shutdown 24 nuclear reactors by 2025, lowering France's dependence on atomic power to 50 percent, and the immediate halt of the oldest plant at Fessenheim. Italy has declared again by referendum to remain a non-nuclear nation. There are also non-nuclear nations and nations with little share of nuclear power which declare to go on as usual with their nuclear ambitions, such as Czech Republic, Turkey, Lithuania and the Netherlands. They argue that earthquakes like in Japan don't exist in their areas and that the new generation of nuclear power reactors is much safer than the 1971 built nuclear power station at Fukushima Daiichi.

Also the worldwide reactions from the public were quite different in different countries, with the exception of Germany which always has had a large anti-nuclear movement. In India, Italy, Spain, Switzerland, Taiwan and the U.S. the resistance against nuclear power has clearly increased. In other countries the group of skeptical people has clearly increased. Such as in France: 40 percent of the French are 'hesitant' about nuclear energy while a third are in favor and 17 percent are against, according to a survey by pollster Ifop published 13 November 2011.

Comparison of (West-)Germany and the Netherlands

At first sight (West-) Germany and the Netherlands - two neighboring countries - very much look like the same. At least on cultural and economic area. However, there are clearly visible differences (sometimes even opposite to each other) in the way they dealt with the nuclear disasters at Chernobyl and Fukushima. On governmental level as well as on public level. The reactions on Chernobyl and Fukushima are first described and the differences then analyzed.

West-Germany after 'Chernobyl'

Due to weather patterns, and distance to Chernobyl, (West-) Germany was more contaminated than the Netherlands. Although the German authorities took some measurements and precautions to protect citizens from radiation (closure of schools, kindergartens, etc.) a considerable part of the public viewed those precautions with suspicion, convinced that it was not enough and only meant to defend the vested interest of the nuclear sector.

That feeling was further fed by the fact that the federal government - a center right wing coalition of Christian Democrats (CDU/CSU) and Free Democrats (Liberals, FDP) - didn't falter about their position on nuclear power. The FDP remained the party of the status quo: cancel nothing, construct nothing further. It was left to the Christian Democrats, the largest single party, with 40% of the votes, to decide how the country should react to this unexpected threat from a foreign disaster. Meanwhile the political parties were in the position of having to fight a number of state elections, the first only a few weeks after the disaster, and a federal election in January 1987. In July 1986, the death sentence for the fast breeder reactor Kalkar was pronounced by Reimut Jochimsen, Social Democratic Economics Minister in Northrhine-Westphalia. He said he spoke not as a politician but as a licensing authority according to the German Atomic Energy Act. According to Jochimsen Kalkar has dangerous similarities to Chernobyl. The Social Democrats (SPD), once the nuclear industry's supporters, opted in August for closure of all nuclear stations in ten years, starting in 1988, and an end to federal subsidies for nuclear power, except for research related to spent fuel disposal and safety. The Greens stayed even more resolutely anti-nuclear. The first Green politician to be appointed as a minister in a state government (Hessen, 1985), Joschka Fischer, was taking action against a plutonium fuel plant at Hanau for non-compliance with the letter of regulatory procedures. For all that, yet all existing nuclear projects in West-Germany went on as usual. And remarkably, even several reactors were connected to the grid in the following year. The controversial Brokdorf reactor was put into operation a few months after Chernobyl and connected to the grid in October 1986. In 1987 the nuclear power plant in Mühlheim-Kärlich (first criticality 6 weeks

before Chernobyl) was connected to the grid and the THTR reactor in Hamm-Uentrop went into commercial operation. This thorium reactor was synchronized to the grid in 1985 and started full power operation in February 1987 and it was shut down definitely in autumn 1989. Despite the large opposition to nuclear power the Christian Democrats won the 1986 elections in most states and the federal elections in January 1987.

The West-German anti-nuclear movement was already a big social movement before and continued to be that after the Chernobyl accident. The movement was mainly focusing on Gorleben and Wackerdorf. Several very large demonstrations during 1985 and 1986 have been staged to protest the planned commercial reprocessing plant at the Bavarian village, 100 km north of Munich. In the Pentecost weekend (7 & 8 June, 1986) about 100,000 people marched to the Wackersdorf construction site. At the same time, in Northern-Germany, some 70,000 gathered to protest the completed but not yet started Brokdorf reactor outside Hamburg. Police arrested 800 demonstrators and 60 policemen were injured, despite very strong efforts by the opponents to keep the demonstration peaceful. The police have been accused of provoking the violence.

The Netherlands after 'Chernobyl'

The Dutch government was in the process of licensing the construction of two or three nuclear power plants, when Chernobyl happened. As soon as the consequences of the nuclear accident became clear, the government – a center right coalition of Christian Democrats (CDA) and Liberals (VVD) - was taking action. The Dutch government took measurements and precautions in case of radioactive contaminations: cows were ordered inside (to avoid eating contaminated grass) and the consumption of certain vegetables (esp. spinach) was discouraged. But the most important decision was to postpone an important decision for the construction of the new nuclear power stations that was scheduled a few days later. Because of the nuclear disaster - and with elections ahead a few weeks later - these plans were postponed and later mothballed. Due to this swift reaction there was not much criticism or suspicion towards measurements and precautions in society (quite different from Germany).

The Dutch public was concerned, but the number of demonstrators – at most a few hundred people - was not a glimpse of the masses in West-Germany or even of the recent past of the Dutch movement. At the end of the 1970s and the beginning of the 1980s there was a big anti-nuclear movement, probably the biggest social movement the Netherlands ever had. After 'Chernobyl' there was no revival. A few large environmental organizations had started a 'vote-against-nuclear' campaign for the coming national elections on 21 May. The attitude of the center right wing government, however, took the wind out of their sails. The Christian Democrats won the elections (54 seats as opposed to 52 seats for the Social Democrats, out of the 150 seats in parliament) and led to second CDA/VVD cabinet. But plans for more nuclear reactors were off the table for many years.

Germany after 'Fukushima'

Just like after the Chernobyl accident, Germany has a center right wing government with Christian Democrats and Free Democrats. Nonetheless the situation is totally different. In autumn 2010 Chancellor Angela Merkel pushed through an extension of nuclear reactor lifetimes. After the accidents in Fukushima she retract this decision: the German government announced that all the country's nuclear power plants will be phased out by 2022. This is a return to the decision taken by the previous red-green government in 2001.

Further, it is important to note here that the decision for lifetime extension of the older reactors was taken together with the *Energiewende* (energy transition) decision, which means a phase-out of fossil and nuclear power. So, Germany had decided to follow a new avenue, a roadmap to a renewable energy future. And Germany was losing speed to this future by this lifetime extension decision. Just because of this decision the resistance had grown tremendously. Perhaps, therefore the (alternative) energy movement as well as companies and famous research institutes are politicized and against nuclear

power. The involved companies see clearly that they have a direct interest for their trade sector to quit nuclear energy quickly.

By tradition the German anti-nuclear movement remains a big social movement, not resting before all nuclear facilities have been closed today.

The Netherlands after 'Fukushima'

At the time of the Fukushima accident, the Netherlands was, again, in the process to license the construction of new nuclear power reactors. In the decade before 'Fukushima', a growing part of the Dutch public became used to the idea that growth of the nuclear capacity was necessary to counter global warming. The right-wing government of Christian Democrats and Liberals (VVD), supported by the ultra-right wing Party of Freedom (PVV), was and still is - also after the nuclear accidents in Fukushima - of the opinion, that nuclear power is a necessary source of energy in the current energy mix.

From opinion polls it is shown that a majority of the Dutch doesn't support nuclear energy, although there is a decline in opposition compared to the early 1980's or after Chernobyl. The reaction of the anti-nuclear movement after Fukushima was diametric compared to the reaction after Chernobyl. Though the Dutch anti-nuclear movement was at death's door since the mid-1980s, there was a strong revival. A large anti-nuclear coalition was built and several actions were held, resulting in a 10,000 strong demonstration in Amsterdam on April 16. One could definitely say that the movement was gaining power again. Especially in the province Zeeland where the municipality Borsele – the location of the only nuclear power reactor and proposed site for new reactors - is situated.

How to explain?

It is striking that both countries had a center right government during both nuclear disasters and that both countries (have) reacted almost opposite at both nuclear disasters, and - after Fukushima - opposite to the reaction of their predecessors.

Despite a large and militant antinuclear opposition in Germany no apparent changes were made in government policies after Chernobyl, while after Fukushima the government totally reversed its policy. Why did Merkel retract her decision to prolong the operational-life of the nuclear reactors after Fukushima and demand the closure of seven of the oldest reactors immediately? One reason could be that Fukushima was a welcome occasion for her to prevent a collision with the *Bundesrat*, dominated by the Social Democrats and the Greens, on the Bill about the lifetime extension of the older nuclear reactors. An elegant way to get rid of it and to take the wind out of the sails of the Greens - which became the largest political party in the polls - with important elections ahead.

In the Netherlands in 1986 as well as in 2011 firm plans for the construction of new reactors existed. After Chernobyl the government was swift to cancel construction plans - although there was no longer a vibrant antinuclear movement - with general elections three weeks later (and staying in power). After Fukushima, despite growing opposition the government did not move an inch, claimed Fukushima had no safety related consequences for the Netherlands, and it was a matter for the private sector to decide about newbuild anyway.

It is clear the Dutch government is leaving the energy sector to the private sector market and does not want to interfere much. It has not developed a vision on future energy production and refuses to make fundamental choices towards a sustainable energy policy. The reason why the Dutch government is standing by nuclear power is partly because of feelings of *revanchismus* (revanchism) against the environmental movement. Nuclear power is being seen by the government (especially VVD and PVV) as being blocked by the environmental movement for decades and just because of that a good way to get back at the movement. Another reason for the pro-nuclear position of the government is because nuclear power has been considered and advocated as the winner in a liberalized market (and neoliberalism reigns).

Nevertheless, it is not plausible that a new nuclear power plant will appear in the Netherlands in the coming years. Utility Delta postponed the construction of a new nuclear power plant in January 2012, blaming the financial crisis and low energy prices. Overt subsidizing the construction of a nuclear reactor is not realistic for this government, while especially those political parties were very audible the last decade in claiming nuclear power was the only source of electricity without needing subsidies.

How to explain all this? Although in both societies the political debate was much polarized we observe an important difference concerning the political situation in the mid-1980's. The Netherlands came from an (what we will call) 'open' society. In the 1970s the Netherlands went through a radical upheaval. In virtually all sectors of the society mature and critical citizens took control of their own fate. As a result the Dutch government was forced and thus willing to listen more to civil society and encouraged participation. Germany of the 1980s, however, was in the end-phase of a 'closed' society. The historical legacy of Nazism drove a wedge between the generations and increased suspicion of authoritarian structures in society in the 1970's. Because of this legacy, which became imminent in the late 1960's and 1970 through to the early 1980's the German society was therefore stronger polarized (and with less participation of civil society in institutionalized structures) in this era than the Dutch society.

Though the German antinuclear movement was very big in the 1970's and 1980s, it was also more isolated and much less institutionalized than the Dutch movement in the same era or the German movement in 2011. The Greens were just coming in and (still) quite marginal, but the big difference with Germany of 2011 was the absence of a civil society against nuclear energy, like the current alternative energy movement, the energy movement after Fukushima. There was virtually not yet a movement dealing with energy in general. The then antinuclear movement was much more a political movement, left-wing, autonomous and anti-establishment. In short, a movement on the street, not in the center of the power, or even in the periphery of the power.

In Germany after Fukushima this situation was totally different: there is a reasonable consensus on the direction to go. Only the pace was / is different. In the Netherlands, however, there was in the era after Chernobyl an (alternative) energy movement. This could well have been an (unplanned) consequence of the so-called Brede Maatschappelijke Discussie (BMD, broad social debate) on nuclear energy. This BMD was intended by the government to ease the antinuclear sentiment in Dutch society, and was to discuss - in the aftermath of the second oil crisis, in 1981-83 - Dutch energy policy in general. After (and before for that matter) Fukushima that energy movement was completely de-politicized, and not interfering in - or part of - the nuclear energy debate.

To summarize: while the Netherlands is heading towards a more 'closed' society (in which not civil society but market forces dominate the debate and decision making), in which 'renewable energy' has a negative connotation, the vast majority of Germans is convinced of the need for a 100 per cent power supply with renewable energy sources as soon as possible.

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