Technological Forecasting & Social Change 79 (2012) 1513–1524

Contents lists available at SciVerse ScienceDirect

Technological Forecasting & Social Change

# The dynamics of public opinion on nuclear power. Interpreting an experiment in the Netherlands

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ARTICLE INFO

*Article history:*
Received 7 July 2010
Received in revised form 3 April 2012
Accepted 20 April 2012
Available online 11 May 2012

*Keywords:*
Nuclear power
Public opinion
Public acceptance
Participation
Decision making

ABSTRACT

This paper aims at clarifying factors that played a role in the formation of public attitudes towards nuclear power generation in the 1970s and 1980s in the Netherlands. The paper especially focuses on the effects of a government initiated societal discussion on energy policy between 1980 and 1985. It thereby intends to draw lessons from the controversies of the past for discussions that might return as several groups are arguing in favor of a "nuclear renaissance".

The concept of '*interpretive package*' is used as an intermediate concept to link the controversy on nuclear power to wider societal issues.

First, the paper briefly describes the nuclear power controversy in the Netherlands. It then reconstructs public opinion on the nuclear power issue between 1974 and 2006. Finally, it analyzes how the media linked the nuclear power issue to wider issues in society.

In its final analyses, the explanation of public opinion formation in terms of interpretive packages is compared to other explanatory models. The paper concludes that there is a strong indication that a main explanation for changes in the 'nuclear public opinion' in Western countries can be found in styles that governments apply in dealing with their citizens. The paper finally reflects upon possible consequences of these findings for future debates on nuclear power generation.



## 1. Introduction

Ever since its first conception by the end of the 1940s, nuclear power production has been the object of heated debates, that first focused on the interrelation of the proliferation of nuclear arms and the proliferation of nuclear power production. Later on nuclear waste, the risks of accidents and the general impact of this technology on the social structure of society became additional elements in the discussion. After the Chernobyl accident in April 1986, the controversy appeared to come to an end. In Western countries no new nuclear reactors were ordered, and several old ones were closed and dismantled. Germany, Austria, Belgium and Sweden adopted phase out schemes for nuclear power generation. However, nuclear power generation expanded in East Asia.

In the last decade, there seems to be a return of nuclear power generation in the public debates in Europe and North America. Several groups are arguing in favor of a "nuclear renaissance" [1]. The nuclear industry promotes nuclear power as "sustainable"[1] and the public tends to be somewhat more positive to nuclear power [2]. Although renewable energy technologies are rapidly gaining, many countries are unable to meet their $CO_2$ emission reduction obligations under the Kyoto protocol. Rising fossil fuel prices also stimulate politicians to reconsider their anti-nuclear position. In 2002, Finland was the first Western country that took the decision to build a new nuclear power station, Olkiluoto 3. The construction of the new reactors is being monitored closely outside Finland, especially since the initial phases of construction have suffered from delays and cost increases [3].

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[1] The Sustainable Nuclear Energy Technology Platform was officially launched on September 21, 2007, in the presence of EU Commissioners J. Potočnik (Science and Research) and A. Piebalgs (Energy). http://www.snetp.eu/ (6-10-2009).

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doi:10.1016/j.techfore.2012.04.018

The Finnish government decision fueled public debates on the nuclear power issue. However, it did not lead to more support of the Finnish population for nuclear power. In a 2008 survey, 53% of the Finnish population was opposed to building additional nuclear reactors [4].

Therefore, although the prospects of a cheap, and $CO_2$ free source of electricity were quite promising, and the Chernobyl disaster gradually faded away from our collective memory, politicians are quite reluctant to take firm pro-nuclear positions, as one fears the turmoil and endless political conflicts that could be caused by a fundamentally divided society and a re-enactment of the controversies of the past. But will the public really react to the issue like it did about 30 years ago?

Politicians often express fear for renewed controversy. This raises the question what has been driving the formation of 'the public opinion on nuclear power' before Chernobyl happened:

- To what degree was the 'public opinion' a product of characteristics/dangers of nuclear power technology, and the decisions that were taken on its application? or,
- Should we understand the 'public opinion' on nuclear power especially in the context of its time i.e. related to cultural and political changes?

Often contestants are inclined to call arguments that are directly related to the technology and its characteristics '*rational*' and all other arguments '*irrational*'. Such a divide between the scientific realm and the realm of politics and interests is a common feature of the scientific culture. It can easily be maintained under normal conditions. However, during a controversy like the one of the 1970s and 1980s on nuclear power, this divide became problematic. Nowotny [5] showed that Austrian physicists were deeply divided on the nuclear power issue and accused each other of being '*political*', or '*driven by industrial interests*'.

Seen from a political science perspective, the nuclear issue might be used as a tool to enact wider changes in society, which can be considered as another level of rational behavior. Undoubtedly, the nuclear power issue also played an important role in this respect. The controversy took shape by the circumstances of its time, and "*Nuclear, no thanks*" symbolized a culture that reached its zenith in the 1970s.

However, this did not only apply to protestors. "*Top down centralized planning*", embodied in long term government (and corporate) planning and investment schemes that were conceived in large bureaucracies, was often driving the introduction of nuclear power. It also reached its zenith then. Transparent government and participation of stakeholders in decision making have become more important and options for citizens and non-governmental organizations to legally influence, or stop government decisions have increased considerably. Moreover, the general level of education in the industrialized world rose considerably, which further contributed to the emancipation of the citizen [6].

## 2. Public opinion and interpretive packages

Resistance to new technologies is often described as 'technophobia', a general 'anti-technology' or even an 'anti-progress' attitude. Luddites and Amish are considered as the exemplars. However, on closer observation, these groups have more nuanced views of technology than is generally assumed [7]. Daamen et al. [8] showed that the relation between general attitudes towards technology and resistance towards specific new technologies was '*only moderate to negligible*'.

To understand the dynamics of public opinion formation, the concept of interpretive package was introduced by Gamson and Modigliani [9]. An interpretive package is a package of ideas and concepts that has a certain general prominence in the public debate. An interpretive package does not focus on items in the debate as such, but relates items in the debate to a wider storyline at the societal landscape level. *At the core of a package is a frame, an organizing idea that provides meaning to an unfolding strip of events, weaving a connection among them* [10, p. 143].

A package does not directly prescribe a position in relation to a specific issue like nuclear power generation. However, an interpretive package that has gained a certain dominance in a debate, cannot be neglected by contestants. 'Economic growth' is for example such a package. It necessitates parties in the debate to defend positions such as:

- nuclear power fosters economic growth,
- nuclear power endangers economic growth,
- alternative sources of energy foster economic growth,
- society does not need economic growth.

Interpretive packages do not prescribe a position in the controversy. But they are not neutral either: Some positions in the public debate might receive more support if certain interpretive packages become more dominant. Specific interpretive packages can be used in an offensive way by one of the contestants, while pushing their opponents in a defensive position.

The prominence of interpretive packages is often related to external events, i.e. events that are not part of the controversy: the package 'economic growth' becomes more prominent if the economy is in a recession, and safety becomes especially prominent after a huge accident. External events that directly coincided with an interpretive package could suddenly bring that package to great prominence in the controversy. The announcement that a country was developing a nuclear weapon brought the interpretive package of the nuclear arms race to the forefront, just like accidents pointed to public safety.

But, interpretive packages do not need to be fully external to a debate. Contestants might be able to bring new interpretive packages to such a prominence that their opponents might feel necessitated to react to them. In the debate on nuclear power, the debate itself produced an interpretive package that could be labeled as 'legitimacy of decision making' (majority in parliament, majority among the population, rights of minorities/protestors, rights of local residents, ..).

Interpretive packages are not completely independent variables from a controversy that they structure. But to a certain degree they are, and for that reason, it is of interest to analyze the relation between them and the balance of opinions among the public.

By analyzing the link between nuclear power and interpretive packages, it can be well understood how sometimes information aimed at supporting one of the contestant's positions, actually supported their opponents. This is caused by the fact that information increases the prominence of an interpretive package, while the content of the information is not received: for example providing (incomprehensible) safety information to the public will not take away fears, but will make the safety issue more prominent.

In public debates, *framing*, i.e. the process of linking an issue to specific interpretive packages, is of crucial importance for the outcome of the debate. Especially the words by which an issue is described play a crucial role. '*Genetic manipulation*' or '*genetic modification*', '*plastics*' or '*polymeric materials*', '*subsidizing industry*' or '*preserving jobs*' all frame a debate. An overview of media framing research can be found in Ref. [11].

Interpretive packages come and go. They come, rise and disappear or fall back to a background level. Although unemployment has become again an important interpretive package in many debates, framing computers as 'job killers', as was done around 1980, is not very credible anymore (cf. [12]).

Analysis of interpretive packages is a powerful means to interpret the formation of public opinions regarding publicly contested technologies [cf. 13,14]. The importance of the analysis of interpretive packages instead of analyzing just the contested issues can be seen clearly from the role of works of art, like cartoons and films in the debate: in general they do not diffuse any new factual knowledge regarding specific issues. However, they emphasize and reinforce certain interpretive packages in the debate (cf. Fig. 1).

## 3. Relating public opinion to interpretive packages

In the following paragraph, it will be analyzed how the nuclear issue was linked to dominant interpretive packages in the Netherlands society. It does so by first briefly describing the controversy on nuclear power in the Netherlands, and then making an analysis of the dynamics of public opinion on the nuclear issue. Afterwards the paper analyzes the dominant interpretive packages that public television linked to the nuclear power issue.

In the Netherlands, there have been opinion polls on the nuclear issue between 1973 and 2006. This is of course a noticeable fact in itself: the occurrence of public opinion polls denotes that it is recognized that there is 'an issue' and there are interesting differences of opinion to be measured!

Naturally, it is important to acknowledge that media are not independent reporters of a controversy, but part of it. They play a key role in framing, i.e. connecting an issue to interpretive packages. They can promote certain interpretive packages and neglect others. This does not mean that they are necessarily supporting one of the contestants. However, their choice of news issues decides who is in an offensive position and who will have to defend himself.

## 4. Nuclear power in the Netherlands 1945–1970

The Netherlands has long been in the forefront of nuclear technology development. Already before World WarII (WW II), physicists had persuaded the government to purchase a large strategic stock of 'yellow cake' (concentrated uranium oxides). By a miracle, this stock was never discovered by the German occupants. Directly after WW II, the uranium stock was important for a


**Fig. 1.** ["Netherlands, stop cooperating with nuclear power station Kalkar"]. Poster for demonstration against the Kalkar fast breeder reactor. The link to an interpretive package is obvious.

strong investment into nuclear physics and nuclear reactor physics research. FOM, a national fundamental physics research organization, was created, Delft University of Technology was made the center of academic reactor research and education [15], and the Reactor Centrum Nederland was created to support industry to enter this new field.

The efforts led to the first national nuclear power station 'Doodewaard' in 1965. This power station produced only 50 MW, but was intended as a semi-experimental facility for the national industry and the utilities [16].

In 1967, Belgium, Germany and the Netherlands signed an agreement to build a joint fast breeder reactor in Kalkar, Germany. Design and construction began in 1972. In the Netherlands, the cost of construction had to be paid by all electricity consumers [17,18].

In 1971, a joint venture with the UK and Germany was formed, called Urenco. Urenco had to supply the fuel for the nuclear reactors that were to be built in these countries. Its production of enriched uranium started in 1976. The production plant of this company was set up in Almelo, in the East of the Netherlands and used the $UF_6$ ultra-centrifuge technology developed by Prof. Jacob Kistemaker at FOM.

In 1969, the first commercial nuclear power station was commissioned to Siemens in Germany (and so not to the national industry). It exemplified that the Netherlands was in fact too small to set up its own nuclear industry. In 1973, this "Borssele" 450 MW nuclear power station started production. This should be the start of the transition of the national electricity system: In 1972, the government announced that by 2000, the country should have thirty-five 1000 MW nuclear power stations [16].

## 5. Public opinion on nuclear power, before opinion polls

In the 1950s and 1960s public opinion on nuclear power was never studied systematically. Naturally there were worries about nuclear arms, but framing the civil nuclear power production (Atoms for Peace) as turning a potential danger into a bright prospect for the future swept away most criticism. The media were cheering on nuclear power as an infinite source of clean power that would lead to great progress. Even the small Pacifist Socialist Party, an anti-militarist left wing party that was strongly rooted in the anti-nuclear arms protest movement did not oppose civil nuclear power production. Remarkably, the only resistance against nuclear power came from the Communist Party of the Netherlands (CPN). It tried to frame the debate by an argument that was rather specific for that time: by close nuclear research cooperation with Germany, the Netherlands would help 'the German nazi-revengists' to obtain nuclear arms, and this would be a threat to world peace. In 1960, the CPN blocked the FOM laboratories in Amsterdam, to protest against the physicists that 'helped to rearm the Nazis' [19]. However, the CPN did not get much support for this framing of nuclear research. In the aftermath of the Soviet intervention in Hungary, playing the card of sentiments against the former German enemy did not work. The CPN was such a scapegoat, that their protests of 1960 were completely neglected by public TV. Although later on, it turned out that there had been secret plans for a German nuclear bomb by the end of the 1950s, and the German government resistance to the non-proliferation treaty in the 1960s was mainly based on its wish to keep the nuclear arms option open [17,20], the anti (-German) nuclear rallies of the CPN did not affect the positive view of the public on nuclear power. There was neither criticism in the media, nor were there other members of parliament sharing the CPN's anti-nuclear power viewpoint.

This changed a bit in the early 1970s. Concerned citizens mainly in the vicinity of the main sites designated for nuclear activities started organizing themselves [16]. However, until 1973, they did not reach any media coverage.

## 6. Nuclear power: a large controversy

In 1973, the Dutch government decided that the national contribution to the construction of the Kalkar fast breeder reactor should be paid by the electricity consumers [18]. Each household had to a pay a monthly surcharge on its electricity bill. Some of the concerned citizens refused to pay this small amount. Consequently, a bailiff confiscated some of their property, and sold it in public. Public disobedience was very uncommon at the time and therefore, these events attracted wide media coverage. All over the country, dozens of groups started to promote this disobedience. Although the cabinet very rapidly terminated billing Kalkar's construction to individual consumers, the anti-nuclear movement was born. In 1974, the first anti-nuclear demonstration took place in Kalkar. In that same year, a new coalition government published a national energy strategy, in which it announced to abandon this surcharge in 1977. In the meantime, if requested, the surcharge of a citizen could be deposited in a special fund to enhance energy efficiency [17,21].

The anti-nuclear movement was born. In the following years, various demonstrations took place that targeted not only Kalkar's reactor but virtually all nuclear facilities in the country. The largest demonstration, in whom 40,000 people participated, took place in 1978 near the Urenco uranium enrichment facilities in Almelo.

In 1976, a working group of prominent scientists, trade union- and church leaders called for a reconsideration of the government's nuclear power policies. The national government was more or less indecisive, as the issue split the country, as well as the parties in parliament. Some political parties were even internally divided.

The March 28th, 1979 accident with the Three Mile Island-2 nuclear reactor (TMI-2) near Harrisburg, USA, made clear that the risk of nuclear accidents was not completely negligible, and fueled the anti-nuclear movement. In this movement, more radical groups gained power. They organized a peaceful blockade of the small Doodewaard nuclear power station in 1980. In 1981, this action was repeated but ended in a large fight between police and demonstrators.

This marked the end of the large protest events. In 1980, the government had postponed all decisions by giving in to requests for a "wide public debate on energy policy" (which became known as BMD). A politically representative committee was

appointed to organize this national debate. In the subsequent years, 3000 discussion sessions took place in all neighborhoods and villages (see e.g. [22] for a critical evaluation of this debate). In 1984, the committee presented a final report of this national debate [23].

In the meantime, the violence of the 1981 protests and the truce that was created by this national debate that was in progress, swept away the perspectives for political protest (cf. 'political opportunity structures', [24]). Moreover, two new political issues, the deployment of intermediate range nuclear missiles in Western Europe and the fast rising unemployment, were competing for the attention of the opponents of nuclear power stations. The anti-nuclear movement in the Netherlands strongly declined between 1981 and 1986.

## 7. Opinion

In reconstructing public opinion, there is an important methodological constraint. The response to questions in a survey is both influenced by the context of the survey as well as by the other issues in a survey. These context effects are unavoidable in survey studies [25]. However, they are less present if the involvement of respondents in the subject is higher.

For my purpose, I have gathered opinion polls and survey reports from literature, websites and from the media archive of the LAKA documentation and research center on nuclear energy, Amsterdam. In total, 30 different opinion polls were retrieved.

In order to create a longitudinal profile, I have been searching for similar questions in all available surveys. The first opinion polls on nuclear power in the Netherlands were organized in 1973 and 1974. As these two polls used a rather different set up than the later ones, they could not be used to construct a trend in public opinion formation. Moreover, as the general involvement of the public in the subject 'Nuclear Power" was lower at that time, they could potentially lead to stronger context effects.

The remaining surveys were in general not very different in character and generally asked rather straightforward for the respondents' opinion on nuclear power. One question that appeared in almost every survey was: '*Are you in favor of expanding the number of nuclear power stations in the Netherlands?*'

In most surveys, there were 3 alternatives:

1. Expand number of nuclear power stations (NPS)
2. Keep current NPS open, but no expansion
3. No NPS at all

and of course the 'don't know' answer. However, these three alternatives did not always occur. A few times, the question that was posed just happened to be whether or not the respondent agreed to the expansion of nuclear power in the Netherlands (so options 2 and 3 combined). Sometimes options (1) and (2) were combined by asking whether or not the respondent was in favor of nuclear power production in the Netherlands.

The 'don't know' answer means that the respondents do not know what to prefer (or do not wish to express their preference). This might be caused by being not knowledgeable. However, from some of the more extended polls, which contained questions regarding knowledgeability [e.g. 23,26] it is clear that from the end of the 1970s ignorance regarding the options was a negligible factor. Therefore, although there is significant uncertainty in the data, from the mid-1970s "don't know" probably rather indicates being "undecided" than being ignorant.

No surveys were directly linked to one of the contestants in the nuclear controversy. Opinion polls were generally carried out by the specialized firms like NSS, NIPO, Intomart, and Peil and were commissioned by TV stations, newspapers, journals and by the University of Leiden.

Based on these data a trend could be constructed on the issue whether or not the respondent agreed to expansion of nuclear power production in the Netherlands. So the dividing line was between options 1 and 2. Option 3 was therefore considered as a stronger form of 2.

The two polls of May 1973 and October 1974, both by NSS, that were not taken into account as they had a different structure, more or less confirmed the trend that was found, i.e. they showed large levels of '*don't know*'.

What is clearly shown in the graph is that nuclear power became highly controversial between 1973 and 1980. Clearly the number of 'don't know' decreased from around 50% in 1975 to about 10% in 1980. It appears that this "*don't know*" group turned against more nuclear power stations, thereby leading to the situation that a vast majority of the population was opposed to the expansion of the number of nuclear power stations in the midst of 1981.

However, a remarkable change occurred after 1981: the segment of the population that opposed nuclear power expansion continually dropped until 1986, when it was no longer the absolute majority. Meanwhile, the number of proponents of nuclear power expansion, but especially the "don't know" expanded.

The Chernobyl catastrophe in 1986 swept away all support for nuclear power expansion until quite recently when some shift could be seen. Noticeable is that the number of opinion polls dropped after Chernobyl, as the issue was far less debated.

## 8. The nuclear issue on television

Until 1989, there were no commercial television stations in the Netherlands. Starting from that year various commercial stations were introduced. These were not included in this study.

Public television was controlled by a number of public broadcasting organizations that represented various cultural–political groups in Dutch society. There was one broadcasting organization (NOS) that was jointly controlled by the other public

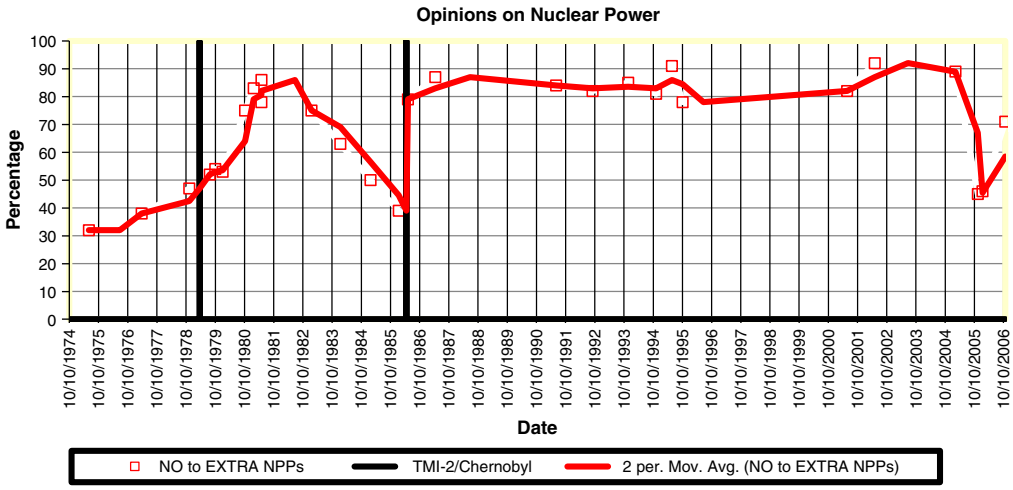


**Fig. 2.** Opinions on expanding the number of nuclear power plants (2 period moving average).

broadcasting organizations and the national government. The NOS mainly broadcasted the news (Journaal) and larger sports events.

Public television grew strongly between 1955 and 1989: in 1955, one station broadcasted only a few hours in the evening. This was gradually increased and in 1964, a second station started broadcasting. In 1988, a third public station was introduced. During the whole period, the hours of television broadcasting increased continuously.

Historic data on television coverage of nuclear power were acquired from the archives of the Netherlands media museum (http://experience.beeldengeluid.nl/).

Fig. 3 shows the number of programs which dealt with the nuclear issue per half year (repetition of a news clip on one evening is counted only once).

Given the growth of television broadcasting over the years and the start of a controversy between 1973 and 1977 it appears remarkable that these years had only rather limited television reporting on the issue. What is even more remarkable is that the TV news almost completely disregarded the issue (Fig. 4).

After collection of data on programs that dealt with nuclear power, the content of the programs/news clippings was related to 'interpretive packages'. The following were recognized:

- *Progress*. Scientific–technological–economic progress was the dominant 'mood' of society in the 1950s and 1960s: science and technology brought economic growth. Various news items cheered events like nuclear science meetings or the opening of a research laboratory as a sign of progress.

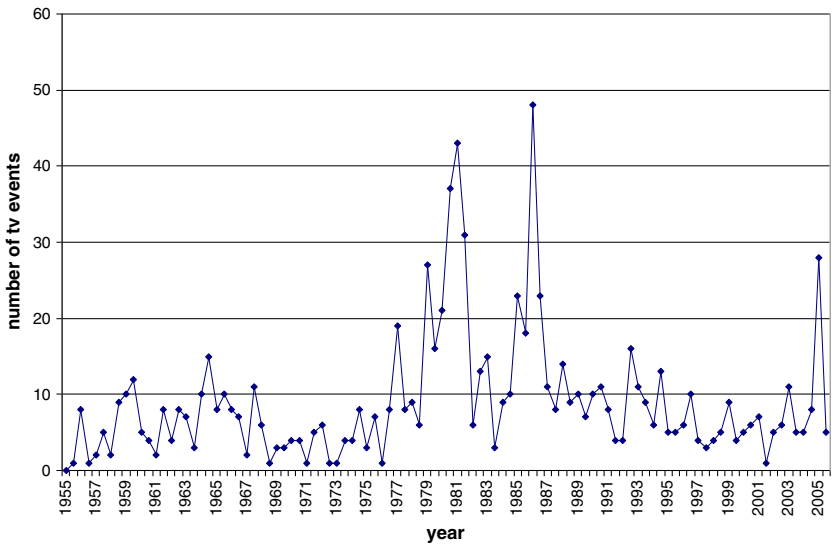


**Fig. 3.** Netherlands' public TV coverage of nuclear power issue.

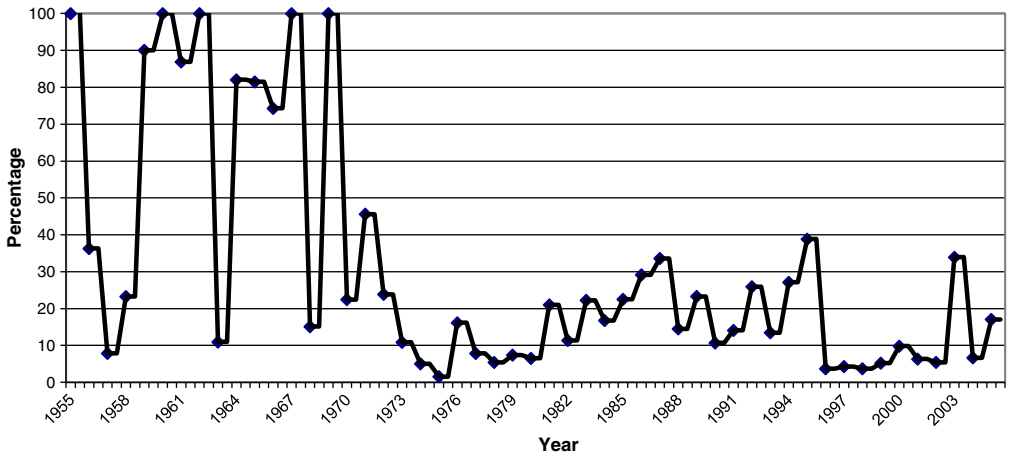


**Fig. 4.** Percentage of "Nuclear Power" TV time that came from news clippings.

- *The risks of modern technology*: grave accidents and health risks. This interpretive package was present during the whole period. It rose to high prominence by the Chernobyl catastrophe.
- *Decision making*. How should society deal with this issue and how to involve citizens in decision making? How could citizens achieve influence? Protest occurred in the whole period. However, at the end of the 1970s, TV almost disregarded the content of the anti-nuclear protests: the main issue that was often reported regarding demonstrations was the fact as such that there was a protest.
- *Nuclear arms race*. The threat of large scale nuclear conflict and deployment of nuclear arms was a recurring issue. Especially uranium enrichment facilities were important in relating nuclear arms to fuel for nuclear power stations.
- *Intergenerational responsibility*. The 'environment' had become an important interpretive package. However, it actually consisted of several discourses. In respect to the nuclear issue, 'responsibility to take care for the planet on behalf of future generations' was an important interpretive package. Nuclear waste was the main issue here.
- *Sites*. Decisions on sites of nuclear power stations triggered various regional interpretive packages. Some regions considered themselves as not the favorites of government, while others emphasized the economic opportunities for the region.

What is rather clear from Fig. 5 is that the years 1973–1975 were the turning point. Just in these years, there are very few television clips/programs on the issue (Figs. 3 and 4). From 1976 onward, "decision making" became the dominant interpretive package in television reporting. Moreover, references to "progress" almost disappeared. In 1972, there were two small news clippings cheering the future option to implant artificial hearts that were nuclear powered, an option that might have horrified people only a few years later.

Even very soon after the Chernobyl catastrophe, there were more links to "decision making", and the role of citizens in it, than to anything else.

Comparing the dynamics of the nuclear power public opinion in the Netherlands to the dominance of interpretive packages, there is a remarkable phenomenon: from 1981 until the Chernobyl catastrophe, resistance against nuclear power generation dropped considerably. The dominant interpretive package over these years remained "decision making" and especially the role of citizens in it. This appears to denote that the BMD (Wide Societal Discussion on Energy), that took place from 1981 to 1984, and could be seen as the government answer to this issue, actually played a role in this change of public opinion. Although many people, both nuclear proponents and nuclear adversaries, were skeptical about the BMD, the organizing commission emphatically tried to make the BMD successful: it tried to inform citizens with information from all relevant stakeholders and actively tried to get citizens' opinions. More than 3000 local meetings took place. Perhaps it is not so much the content of what was discussed at these meetings, but the fact that so much effort was put into them. Citizens therefore might have regained some trust in the government, and as this was the main interpretive package, they were more positive regarding nuclear power.

The growth in support for nuclear power resembles the tendency that Kepplinger [27, p. 374] found for Germany, although the change in the Dutch public opinion is far more pronounced. In this period the US approval rate for nuclear power generation dropped from about 50% in 1979/1980 to 35% before the Chernobyl catastrophe [28,29]. In international comparison, it appears that the Dutch population changed its opinion more in favor of nuclear power than the German population, and far more than the US population, which even became more opposed to nuclear power during the same years. This is an indication that postponing decisions and organizing the BMD as a new way of dealing with the nuclear issue, affected public opinion.

The results of BMD, published in 1984, were quite negative for further attempts of the government to embark on a pro-nuclear course. The BMD steering committee concluded that there was insufficient support among the population for constructing additional nuclear power stations [23]. In 1985–1986, these BMD results were played down by government officials. In the beginning of 1986, government submitted a proposal to parliament to build additional nuclear power stations. How this

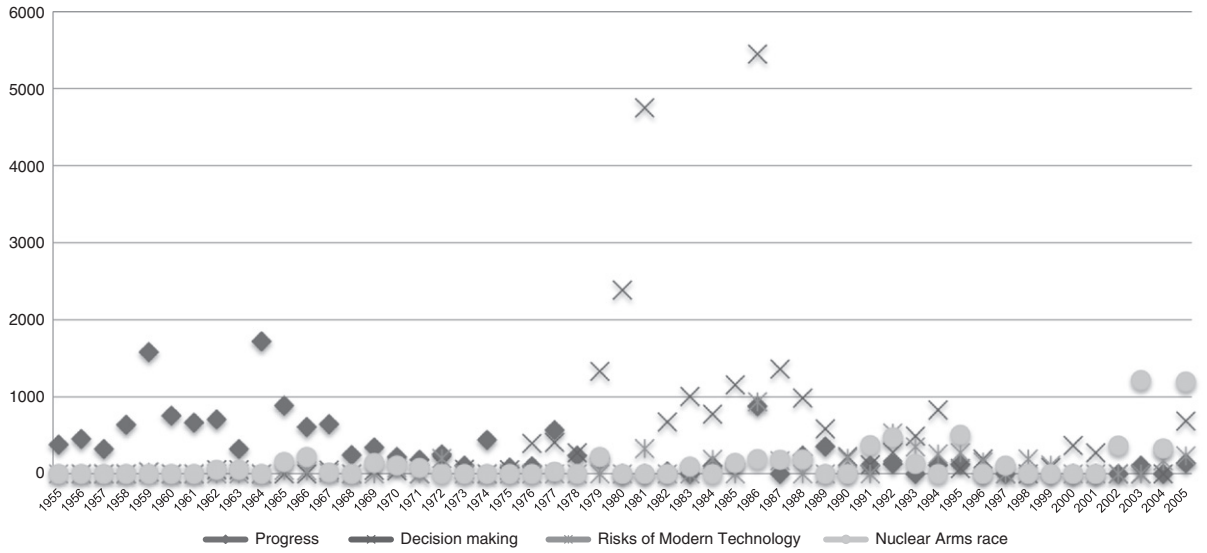


**Fig. 5.** Interpretive packages of 'nuclear issue' used in public television (minutes on television). For reasons of clarity, the interpretive packages "sites" and "intergenerational responsibility" have been left out (all values below 200).

influenced public opinion cannot be established as the parliamentary debate on the proposal took place just before the Chernobyl catastrophe.

After Chernobyl all nuclear expansion plans were on halt. Public opinion turned against nuclear power and hardly recovered over time [30]. For almost two decades the public was quite solidly opposed to the expansion of nuclear power generation. Midden and Verplanken [31] showed that underneath, there was more instability of preferences at the individual level: supporters of constructing new nuclear power plants were rather ambivalent in their judgments, while opponents showed very little ambivalence.

## 9. Alternative explanations

An attempt to reconstruct the historic dynamics of public opinion is never able to grasp all motives of participants in the public discourse. The array of motives is probably just far too wide. For current debates, divergent stakeholder perspectives can be retrieved by the Q-methodology (cf. e.g. [32] for stakeholder perspectives regarding biomass as a source of energy). The divergent

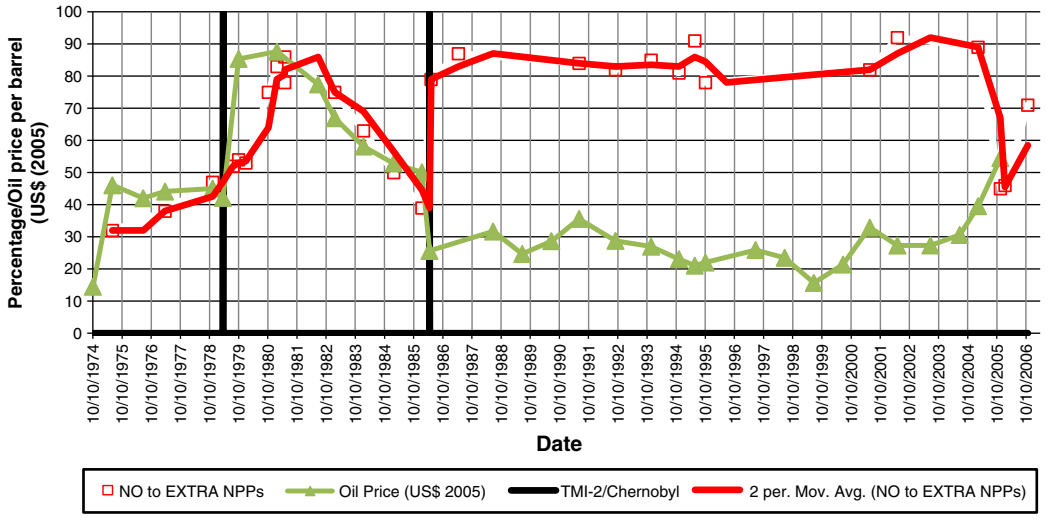


**Fig. 6.** Oil price level (per barrel, US$ 2005) and opinion on nuclear power (2 period moving average).

range of stakeholder perspectives cannot be retrieved in the same way with hindsight. Some alternative explanations for the observed changes in support for nuclear power are interesting to discuss here:

*Cost/benefit*. People might evaluate the nuclear issue by balancing the risks of nuclear power stations and the lower prices of nuclear electricity production: This would lead to two effects: if the risks became more striking (for example by an accident) the resistance to nuclear power would go up, if competing sources of energy became more expensive, the low costs of nuclear power would become more important. Clearly Fig. 6 shows no such effects: on the contrary. The rise of resistance against nuclear power coincided with a rise of crude oil prices.[2] The 1979 Three Mile Island accident, in Harrisburg, USA, had no direct effect on public opinion in the Netherlands (which was at that particular moment already very negative to nuclear power), but the Chernobyl accident had a lasting influence (see Fig. 2 and cf. [30]).

*Competing issues in the public debate*. On 12 December 1979, NATO decided to deploy intermediate range nuclear missiles in Europe, if the Soviet Bloc continued its deployment of new SS 20 missiles. This decision caused the rise of an unprecedented anti-nuclear weapons movement. Under the leadership of church related peace organizations the country's two largest demonstrations ever took place in Amsterdam (1981) and The Hague (1983). Except for the churches, the main organizers of the peace protest had also been involved in anti-nuclear protest.

The economic recession of 1981–1982 may also have played a role. One might argue that the trend of an increasingly negative public opinion towards nuclear power turned when unemployment peaked. However, there is no indication that unemployment figures were decisive in other periods (see Fig. 7).

Finally, it is interesting to note that recently, opinion surveys denoted some change regarding the nuclear issue (Table 1). This seems rather strongly related to the growing number of media reports that relate nuclear power production to a new issue in society: "climate change" (see Fig. 8). The interpretive package "climate change" is in this regard often used to claim that nuclear power is an on the shelf solution.

## 10. Reflections on a future debate

What happened in the Netherlands is in many respects not unique (cf. e.g. an analysis for Belgium, [33]).

A main issue behind the nuclear debates is the issue of trust: trust in institutions that should safeguard the public, trust in politicians to act in the public interest, trust in the designers of technologies not to create unacceptable risks. A recent study confirmed for the US case that trust in the nuclear industry and regulatory agencies is the key element to understand the public's perception [34]. This probably also played an important role in the Netherlands.

What made the Netherlands unique in the early 1980s were:

- its large societal experiment regarding public involvement in long term energy strategy discussions
- a clear cut change in public opinion between 1983 and the Chernobyl catastrophe

It is likely that these two specifics were related. Given the dominance of the interpretive package "decision making", the changing trend (1983–1986) in public opinion is probably related to the only specific event regarding this interpretive package, the large scale societal experiment.

Limited resources of fossil fuels and a rapidly increasing demand for electricity have been mentioned as the main driving force for the introduction of nuclear power in the 1960s. However, we should also acknowledge that there was an important cultural underpinning: "progress" through a high tech and unlimited source of cheap power. The driving for nuclear power, but also the resistance against it, was a product of its time. But the world has changed. An interpretive package that emerged in the 1970s, democratic decision making, has made a change. The prerogative of being an elected official is often not considered sufficient anymore to decide on controversial issues. Transparency and the possibility for stakeholders to be involved in decision making processes, is now taken for granted in many Western countries.[3]

The implication of this change in society is that any strategy that aims at enforcing nuclear power generation decisions by firm leadership, is bound to fail. New conflicts will probably emerge which will raise costs, and will prohibit the creation of an effective policy to combat climate change and provide sufficient energy. The nuclear proponents will only succeed if they are able to rebuild trust in the nuclear industry and in the regulatory agencies.

If nuclear power is to be seriously reconsidered, it should be done by an approach that is not driven by any hidden political agenda. Only then new arguments like climate change or technological progress in reactor design can play a serious role in a debate. This implies that nuclear power could be part of a range of options, and by no way pushed as the only/preferred option.

If this can ever be carried out is questionable: the way in which the Dutch energy sector and leading politicians involved in energy policy that dealt with the results of the BMD procedure is illustrative: they just aimed at disregarding this unprecedented nationwide public participation procedure. This points towards an interesting cultural phenomenon: favoring bottom up procedures appears to coincide culturally with a more critical position towards nuclear power, while the pro-nuclear contestants often favor strong leadership. The implication is that there is no easy way to reach widely accepted decisions.

[2] Crude Oil and natural gas are the main sources of energy. Prices of natural gas are derived from crude oil prices.

[3] Various countries in Asia have built new nuclear power stations in the last 20 years. The values that are mentioned here are often considered to be less important in the cultures of these countries.

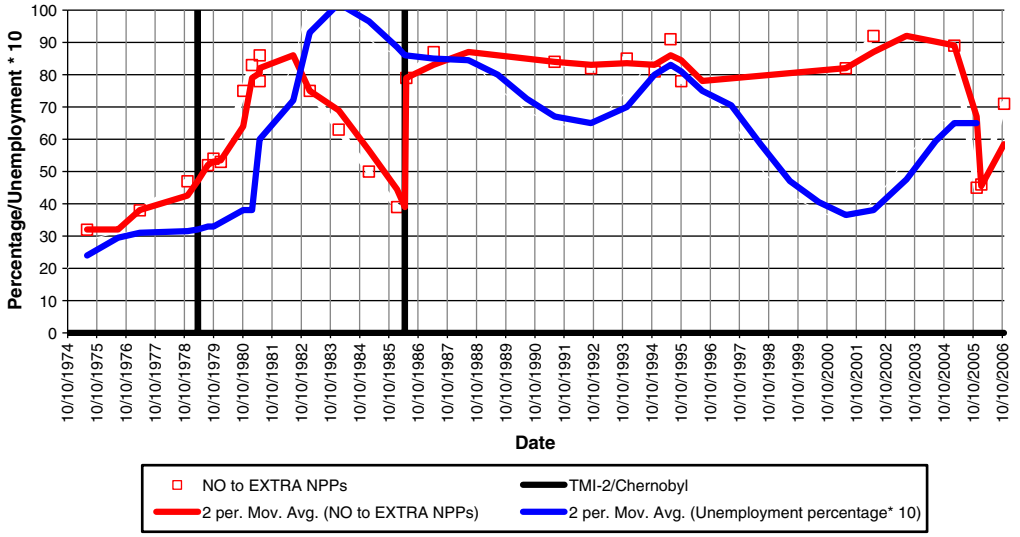


**Fig. 7.** Unemployment level and opinions on nuclear power (2 period moving average).

The words and phrases by which we describe reality are never neutral: they construct a reality that favors certain actions. Neutral wording and phrasing is certainly impossible in the nuclear issue. That also applies to this paper. It has not been my intention to argue in favor or against nuclear power, but that still does not make the paper neutral.

**Table 1**
Opinion surveys on expansion of number of nuclear power plants (%).

| Organizer of survey | Figures obtained from | Publication date | 3. No nuclear | 2. No to more nuclear | Sum No + no more | 1 Yes more | Don't know |
|---|---|---|---|---|---|---|---|
| NSS | Peilpunten | 1-5-1973 | | | | | |
| NSS | Trouw | 10-10-1974 | | | | | |
| NIPO | NRC | 11-6-1975 | 19 | 13 | 32 | 23 | 45 |
| NOS | NOS | 1-4-1977 | | | 38 | 27 | 35 |
| NIPO | Elsevier | 18-11-1978 | | 47 | 47 | 34 | 19 |
| NOS | NOS | 1-8-1979 | | | 52 | 24 | 23 |
| NIPO | NOS-panoramiek | 9-10-1979 | | | 54 | 19 | 27 |
| Intomart | KRO-brandpunt | 9-1-1980 | | 53 | 53 | 26 | 21 |
| NIPO | Bericht 2070 | 16-10-1980 | 41 | 34 | 75 | 14 | 11 |
| Bonaventura | Blikopener | 1-2-1981 | 29 | 54 | 83 | | |
| NSS | Haagse Courant | 8-5-1981 | 38 | 40 | 78 | 15 | 7 |
| | KRO-brandpunt | 9-5-1981 | 34 | 52 | 86 | 9 | 5 |
| BMD | BMD | 25-1-1983 | 25 | 50 | 75 | 7 | 18 |
| | Folia | 21-1-1984 | 40 | 23 | 63 | | |
| TROS | TROS | 2-2-1985 | 30 | 20 | 50 | 35 | 15 |
| TROS-NSS | De Volkskrant | 21-1-1986 | 31 | 8 | 39 | 36 | 26 |
| NIPO | NRC | 16-5-1986 | | 79 | 79 | | |
| Univ. Leiden | Reformatorisch Dagblad | 23-4-1987 | 53 | 34 | 87 | 9 | 4 |
| Univ. Leiden | persbericht UL | 13-6-1991 | 45 | 39 | 84 | 9 | 7 |
| Univ. Leiden | [26] | 1-12-1993 | 45 | 40 | 85 | 11 | 5 |
| NIPO/Univ. Leiden | Provinciale Zeeuwse Courant | 11-9-1992 | 50 | 32 | 82 | 12 | 6 |
| | De Volkskrant | 15-11-1994 | 43 | 38 | 81 | | |
| Univ. Leiden | [26] | 1-6-1995 | 52 | 39 | 91 | 6 | 4 |
| Univ. Leiden | Nl-opiniepeil | 13-10-1995 | 53 | 25 | 78 | 6 | 16 |
| CMA | Energie Nederland | 1-6-2001 | | | 82 | 7 | 11 |
| SBS | SBS6 | 13-5-2002 | 37 | 55 | 92 | 3 | 5 |
| Peil | www.Peil.nl | 16-2-2005 | 23 | 66 | 89 | | |
| | Noord Hollands Dagblad | 23-11-2005 | 30 | 15 | 45 | 27 | 28 |
| NSS | NOS: nova | 20-1-2006 | | 46 | 46 | 29 | 25 |
| Eurobarometer | http://ec.europa.eu/public_opinion/archives/ebs/ebs_271_en.pdf | 1-11-2006 | 37 | 34 | 71 | 23 | 6 |

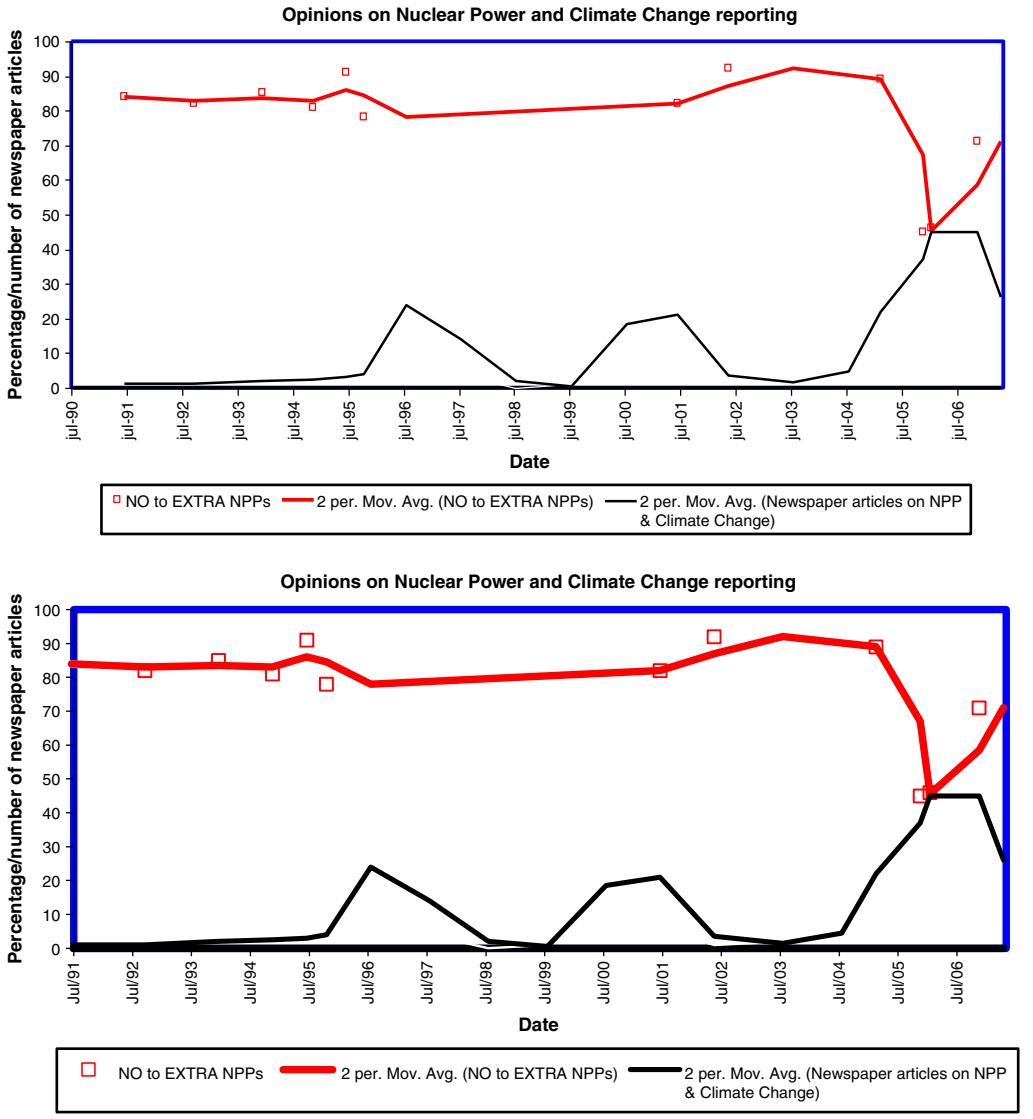


**Fig. 8.** Opinions on nuclear power and climate change reporting in nationwide newspapers mentioning nuclear power as option (2 period moving average) (data source: http://www.lexisnexis.nl/dutch/).

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