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It started with *Little Boy*. And close to 100 000 people killed. The Atomic Age was inaugurated with a chilling and deadly bang. The nuclear bomb that caused all the deaths at Hiroshima was nicknamed *Little Boy* by the scientists who created the device. The bomb dropped over Nagasaki a few days later had a somewhat different design and was named *Fat Man*. But it was as deadly. The Nuclear Society truly had a devastating beginning.

The paradox is that the grim beginning at the same time evoked hope of a new and bright future for mankind. Nuclear power signaled the coming of a new age and a new society – the Atomic Age and the Nuclear Society. Energy would be very inexpensive and readily available, canals could be blasted like a new Panama Canal in the dreamy project Operation Plowshare, cancer would be cured and nuclear powered rockets would take man to Mars and Jupiter (Mahaffey 2009).

But at the same time and alongside all optimistic dreams, the atomic bombs kept on being larger and more effective. The number of heavily polluting above-ground nuclear tests was steadily growing from 20 in 1955, to 105 in 1958 and to 140 in 1961. In the fall that year Russia set off “The Tsar”, the largest man-made explosion ever. The explosive yield was 50 megatons – ten times the force of all explosives used in the second world war, including Little Boy and Fat Man dropped on Japan (Mahaffey 2009: 231f).

The very positive and joyfully optimistic hopes attached to nuclear power – the Age of Wild Experimentation to quote James Mahaffey – ended in 1963 when the Nuclear Test Ban Treaty was ratified. “...the sheer joy of blowing up things in the desert by atomic means was suddenly curtailed. It had a numbing effect on nuclear exuberance, similar to suddenly imposing liability insurance on hot-rodding...” (Mahaffey 2009: 227).

Civilian nuclear power was born in the midst of all the wild experimentation. The premier civilian nuclear power station was built in Russia at Obninsk about 110 kilometers southwest of Moscow. It was up-started in 1954. The Brits claim that they in 1956 commissioned the first commercial nuclear reactor. The Calder Hall reactor was connected to the electric grid in August 1956. USA was not long behind. The first commercial American reactor was built in California (Santa Susana) and commenced operations in the summer of 1957 (Mahaffey 2009: 205f).

Critical voices concerning the nuclear dream were around already in the 1940s especially related to its military use. These critical views turned into mass protests in the 1960s and spilled over onto the civilian use of nuclear power. To once again quote James Mahaffey: “..the anti-nuclear groups found the soft underbelly of the industry. It was the long-term disposal of all the radioactive byproducts of nuclear fission.” (Mahaffey 2009:304). Nuclear waste management and transportation issues became focal points for the emerging environmental movement. Anti-nuclear demonstrations became common in America as well as in some European nations in the early 1970s. The days of smooth and unanimously cheered on sailing were over for the nuclear industry. The Nuclear Society started to become politicized.

The accidents in Harrisburg at the TMI-2 reactor in 1979 and in the Chernobyl Unit 4 reactor in 1986 did not make things any easier for nuclear proponents. Anti-nuclear sentiments were strengthened all over the world. Expansion of nuclear power, which had already started to slow down in the late 1970s before the TMI incident, came to a grinding halt. In USA, the last reactors under construction were completed in the early 1980s. Many European countries decided to phase-out nuclear power. The previously growing nuclear endeavor lapsed into coma for about 25 years.

The anti-nuclear movement followed suite and No Nukes mass protests disappeared from the streets of Western democracies.

The dormant period for the nuclear industry ended in the mid 00s. A fifth reactor began to be built in Finland and the first US application in 30 years for a new nuclear plant was fielded in 2007. The nuclear dream was awakened again. Phase-out plans started to be phased-out in Europe. The nuclear rollercoaster was once more on its way up.

But what about the people? Have they actively taken part in the nuclear ride or have they merely been amazed onlookers or maybe only passive followers? The simple normative claim that ultimately the will of the people shall rule in a democracy is obviously of great interest when we study the development of nuclear power. So the question is, have peoples' views affected how the nuclear development has evolved? Yet, in representative democracies the people are not supposed to be the sole sovereign. Elected politicians are also intended to play an independent role as the representatives of the people.

The representative system is set up to work through an active interplay between voters/principals and representatives/agents/policies. Voter opinions should influence elected politicians and how policies are enacted at the same time as the views of the people are affected by what representatives say and do. A dynamic interplay between voters and representatives/policies is the driving engine in the representative system.

A new research area that has emerged during the last couple of decades is focused on this interplay between different actors/levels in a democracy (Page and Shapiro 1983). The field is usually called opinion-policy research. But it might as well be called research into dynamic representation (Holmberg 2011). The focal point is the across time relationship between the will of the people and the policies formulated by elected officials. The decisive question is who leads whom? We talk about a top-down representational system if elected representatives and policies dominate opinion formation on the mass level. People do as they are told and/or are influenced by what they see. If, on the other hand, elected politicians and enacted policies are affected by public opinion we talk about a bottom-up system. The will of the people rules.

Black and white either-or models are seductive, their simplicity makes them easy to digest and apply. Elite pull or mass push, representation from above or from below, elite- or mass-driven opinion change, are all good examples of such simplified dichotomous models. In empirical tests they all come out grey, not black or white. Representative democracy is never one hundred percent run from above or one hundred percent run from below. Elite pulls coexist with mass pushes (Stimson 2007, Holmberg 2011). Consequently, the interesting scientific question is one of degrees. Are policy changes more often elite or mass driven? To what extent is democratic decision making best characterized as representation from above or from below?

We will apply this theoretical framework and address the representational question using the development of nuclear power policies in Sweden as our empirical case. Sweden is an interesting case in the sense that nuclear power was politicized already in the early 1970s, and since then official nuclear policies have changed many times and rather dramatically. On the mass level we are fortunate to be able to trace public opinion very closely through all those years thanks to the data systematically collected by the Swedish National Election Studies (SNES) and by the SOM Institute, both located at the University of Gothenburg.¹

From In to Out and Back to In Again

Swedish nuclear power policy has not evolved much different from the general pattern discernable in many other Western democracies. Nuclear hopes were very elevated in the 1950s and 1960s. Sweden opted for an ambitious and supposedly "independent" program. A development company,

¹ The public opinion studies have been performed under the auspices of the research project *Energy Opinion in Sweden* and economically financed by *The Swedish Energy Agency*.

AB Atomenergi, was started already in 1947 with the State as owner. In 1954 the first research reactor (R1) was activated in downtown Stockholm. Four years later it was thoughtfully moved outside Stockholm. In the mid 1960s a Swedish uranium mine was operational, but was quickly shut-down in 1969 for lack of profitability. During these early gung-ho years for nuclear projects Sweden also seriously discussed the possibility to build an Atomic Bomb of its own. Those bomb ideas were not definitely shelved until 1968.

In the beginning of the 1970s all parties in the parliament supported a plan to build eleven nuclear reactors in Sweden. No debate, no conflict, everything calm. At the time energy policies were the topic for experts and a very limited number of politicians. Mass media were silent and the general public ignorant (Holmberg, Westerståhl and Branzén 1977, Holmberg and Asp 1984). In this atmosphere, the first Swedish reactor started operations in 1972.

The tranquillity was, however, about to be drastically changed. In 1973 the Center Party (formerly the Agrarian Party) suddenly ended the unity between the parties and came out against a build-up of nuclear power in Sweden. It was soon accompanied by the Left Party (previously the Communists). A politicization process started fueled by the international oil crises. Nuclear power became front page news and an opinion forming period commenced which in terms of scope and intensity is unmatched in modern Swedish history (Vedung 1979, Jasper 1990, Sahr 1985, Holmberg 1991B, Holmberg, Westerståhl and Branzén 1977).

This happened at the same time as nuclear power began to generate electricity and quickly reached 20 percent of total electricity production already in the 1970s. It reached its present-day level of at about 45-50 percent in the mid 1980s.²

The conflict pattern that emerged between the parties was very unusual for Swedish politics. Traditionally, most political issues in Sweden are structured by the dominant left-right dimension. That did not happen for the nuclear conflict, however. The Non-Socialist Center Party was joined by a Socialist party, the Left Party, and by the Christian Democrats (not represented in parliament at the time) in opposing a nuclear expansion. Favoring nuclear power were the Social Democrats, the Liberals and the Conservatives.

In 1979, the TMI-accident in USA prompted the Social Democrats to agree to an old request from anti-nuclear groups to arrange a referendum on the future of nuclear power in Sweden. The referendum was held in early 1980. The choice was between three alternatives. Alternatives I and II arguing for an expansion of nuclear power before an eventual phase-out won by a combined share of 58 percent of the vote. The anti-nuclear alternative (III) got 39 percent with 3 percent handing in a blank vote. Alternative III specified no nuclear build-up and a fast phase-out of existing reactors in ten years.

The victory for the pro-nuclear side had a serious catch, though. On the ballot paper of Alternative I (supported by the Conservatives) as well as on the ballot of Alternative II (backed by Social Democrats and Liberals) it was stated that nuclear power would be phased-out in Sweden sometime in the future. This made the referendum tricky to interpret. At the time Alternative I and II, most clearly Alternative I, were perceived as pro-nuclear. Yet, on the ballots there were talk of a phase-out. Sweden had a referendum where you could not vote but for phasing-out nuclear power. There was no alternative arguing in favor of the Nuclear Society.³

² Swedish nuclear plants are owned by a mixture of public and private companies. Stateowned Vattenfall has a majority owner share in the plants at Ringhals and Forsmark. The Oskarshamn plant has a group of private companies, including EON, as majority owners. Before it was shut down Barsebäck had Sydkraft, a private company, as majority owner. When the phase-out of Barsebäck was decided Vattenfall stepped in as a majority owner.

³ The reason behind the three alternatives was a tactical decision by the Social Democrats and the Conservatives. They did not want to be behind a joint alternative and thought it advantageous to have two "pro-nuclear" alternatives against only one "anti-nuclear" alternative. Two anti-nuclear parties – the Left Party and the Center Party – voted against the three alternative solution in parliament but were run over by a majority composed of Social Democrats, Liberals and Conservatives.

As a follow up to the referendum the Riksdag decided that all Swedish nuclear reactors should be shut down in the year 2010, by the latest. Sweden had opted for a nuclear phase-out policy. All parties except the Conservatives accepted 2010 as the terminal year for nuclear power in Sweden.

The official phase-out policy did not, however, preclude that Sweden kept on phasing-in new reactors. In the years immediately following the referendum in 1981-1985 five reactors were activated in Sweden. Then, the Chernobyl accident occurred. Resolve to really start the phase-out process hardened. In 1991 a coalition of Social Democrats, the Center Party and Liberals determined that the phase-out should start by the late 1990s and be finished in 2010. The Left Party did not agree, neither did the Greens. They wanted a faster phase-out, while the Conservatives thought the phase-out too quick and were against the terminal year 2010.

The Three Party coalition was not to last long, however. Already in 1997 the Liberals left. They had become skeptical of the phase-out policy and eventually joined the Conservatives and started to argue for building new reactors. Instead the Left Party joined the coalition and it was decided that the phase-out should start by shutting down Barsebäck I and II just outside Malmö, and close to Copenhagen. Less noticed at the time was that the decision also stated that the terminal year 2010 should be dropped. The end year for the phase-out process was left unspecified.

In 1999 Barsebäck I was definitely closed. Sweden had concretely started to phase-out nuclear power. In 2005 the process continued when Barsebäck II was also decommissioned. At the same time a research reactor at Studsvik was shut down as well. It seemed like Sweden was really going to phase-out nuclear power.

But then came the 2006 election. The four Non-Socialist parties formed an Alliance and made a nuclear compromise not to shut down any nuclear plants in the upcoming four years if they won the election. It meant that the Center Party left the nuclear phase-out coalition with the Social Democrats. The Alliance won the election and formed a new government replacing the Social Democrats. As a consequence, the phase-out policy was placed on hold and all former restrictions on nuclear research were abolished. Suddenly, only one year after the shut down of reactor II in Barsebäck, the phase-out process did not seem as inevitable anymore.

In 2009 it became evident that Swedish nuclear power policy was about to change very profoundly. The governing Alliance agreed to phase-out the phase-out plan. It was also agreed that it would be possible to build new reactors in Sweden, when the old ones are worn out. Ironically, in the previous terminal phase-out year of 2010, parliament decided in agreement with the Alliance policies to abolish the phase-out plan and make it possible to construct new nuclear power plants in Sweden. However, not more than a maximum of ten. The Red Green opposition composed of the Left Party, Social Democrats and the Greens voted against. They still supported the phase-out option.

In the election of 2010 the Alliance once more proved victorious reaffirming their resolve not to phase-out nuclear power in Sweden. The Red Green Coalition with a phase-out policy on their platform lost. The loss was especially hard for the Social Democrats who did their worst election since Sweden became a democracy in 1921.

If it in 2005 seemed like Sweden was about to phase-out nuclear power, it now in the aftermath of the 2010 election seems like Sweden is not going to phase-out nuclear power. Instead, maybe Sweden will start to build new reactors if that is economically viable. At least it is a real possibility. Phasing-out is out, phasing-in is in.

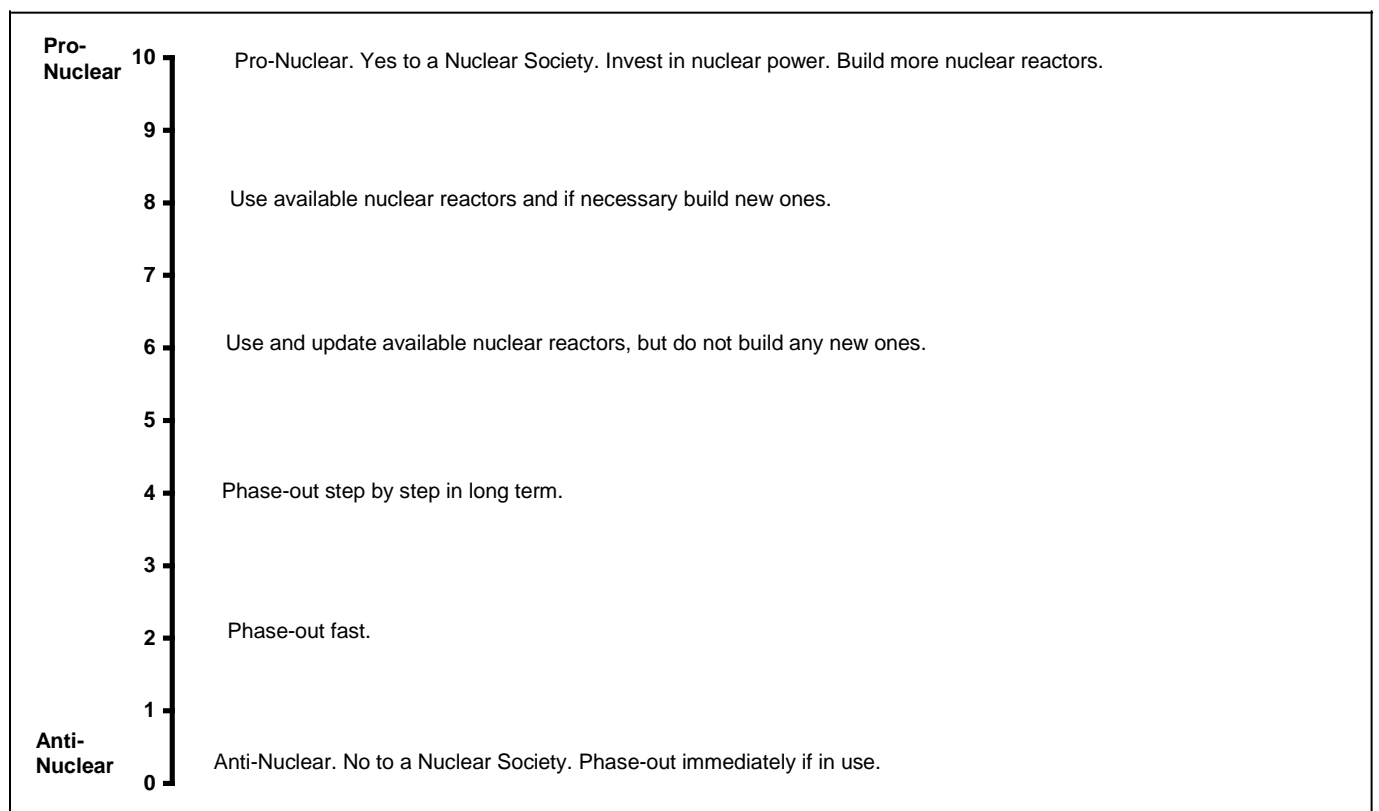
But then came the accident in Fukushima. When this is written in October 2011 no policy changes have been decided as a consequence of the Japanese accident. But Swedish public opinion was shaken by what happened. The immediate reaction was an increase in favor of phasing-out nuclear power by some 20 percentage points (Holmberg 2011). However, already in May 2011 two months after the accident the anti-nuclear chock wave had begun to recede. The opinion spike against nuclear power production was down to 5 percentage points (Novus 2011). In 1979, the immediate anti-nuclear effect on Swedish public opinion was about 5 – 10 percentage points and lasted about

half a year. The Chernobyl effect was more dramatic. Anti-nuclear sentiments quickly increased by some 10 – 20 points and the opinion effect stayed on for about two years (Holmberg 1991A).

Measuring Nuclear Power Policy on an Anti-Nuclear to Pro-Nuclear Scale

Telling the tale of how nuclear power policies have evolved over the last sixty years is hopefully informative as well as a good read. But it is less useful in an analytical sense if we want to systematically relate policy developments to other circumstances like how the policies of the political parties have changed or how public opinion have shaped up. If we want to study how nuclear power policies have interacted with other factors we have to measure policies more precisely and preferable on a unidimensional scale. That is not an easy undertaking and a task that demands a willingness to accept a rather crude measurement technique.

Figure 1: Grading Nuclear Power Policy on a Scale Between 0 (Anti-Nuclear) to 10 (Pro-Nuclear)



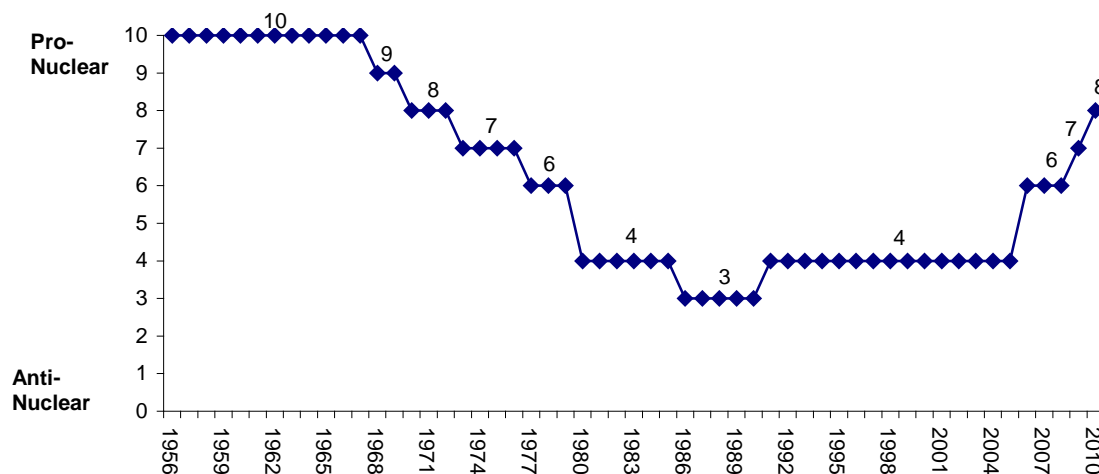
Comments: The scale is intended to measure official nuclear power policy. The grading is based on policies on the ground (implemented) as well as on goal-oriented policy decisions taken by the parliament. The scale has been constructed by Per Hedberg and Sören Holmberg.

In accepting this challenge we have opted for the use of an eleven point scale running from 0 (maximum anti-nuclear) to 10 (maximum pro-nuclear). The scale is intended to grade official nuclear power policies as well as the policies of the political parties. The scaling of official policies is based on what is happening on the ground (implemented policies) as well as on goal-oriented decisions taken by the Swedish parliament. The grading of party policies is in a similar fashion done based on statements in party programs and election platforms. The classification has been done by us, Per Hedberg and Sören Holmberg, and has also as of yet been validated by three other experts on Swedish energy policy.

The scale is presented in Figure 1. As can be seen value 5 on the scale is kind of a mid point. Higher values indicate different degrees of pro-nuclear policies while lower values signal anti-nuclear policies.

In Figure 2 the eleven point scale is used to classify Swedish nuclear power policy from 1956 through 2010. Under the Figure policies and policy changes are explicated and tied to a number on the scale.⁴

Figure 2: Swedish Nuclear Power Policy 1956 – 2010



Comments: Official Swedish policy on the development of nuclear power measured on a 0 – 10 scale based on parliament decisions and statements in public records. The classifications have been done by Per Hedberg and Sören Holmberg.

1945	10	An official investigative committee on nuclear issues is instituted.
1947	10	<i>AB Atomenergi</i> is constituted with the Swedish State as owner.
1954	10	Sweden's first research reactor (R1) is activated in downtown Stockholm. In 1958 moved to Studsvik outside of Stockholm.
1956	10	An ambitious, "independent" Swedish nuclear power program is enacted.
1957 – 1967	10	No major policy change decided in parliament.
1960	10	Sweden's second research reactor (R2) is activated in Studsvik.
1964	10	Sweden's third research reactor (R3) is activated in Ågesta. Construction of Sweden's fourth research reactor is started in Marviken. It will, however, never be activated.
1965	10	The start-up of a Swedish "Uranium" mine (Ranstad)
1966	10	Decision to build the first Swedish commercial nuclear reactor, Oskarshamn 1
1968	9	Sweden finally decides not to build any nuclear bombs
1969	9	Ranstad closed; not profitable
1970	8	Decision to limit the numbers of Swedish reactors to 11. Research reactor R1 decommissioned.
1971 – 1972	8	No major policy change decided in parliament.
1972	8	Sweden's first commercial reactor, Oskarshamn 1, in operation.
1973	7	The nuclear power issue is politized. A royal commission investigating spent nuclear fuel and radioactive waste is formed (December 1972).
1974 – 1976	7	No major policy change decided in parliament.
1974	7	Research reactor R3 decommissioned.
1975	7	Decision to increase the build-up program to 13 reactors. Barsebäck 1 and Ringhals 2 in commercial operation.

⁴ Most of the policy data has been collected and put together by Rebecka Åsbrink as research assistant in the project *Energy Opinion in Sweden*.

1976	7	Ringhals 1 and Oskarshamn 2 in commercial operation.
1977	6	A new law with tougher requirements for starting-up new reactors. Barsebäck 2 in commercial operation.
1978 – 1979	6	No major policy change decided in parliament.
1979	6	Decision to limit the number of Swedish reactors to 12. A new law forbidding the start of any new reactors until after the 1980 referendum on the future of Swedish nuclear power production.
1980	4	Referendum; parliament decision to gradually phase-out all nuclear power ending in 2010. In the meanwhile Sweden will keep the 6 already built reactors and start further 6 new reactors under construction. Forsmark 1 in commercial operation.
1981 – 1985	4	No major policy change decided in parliament.
1981	4	Ringhals 3 and Forsmark 2 in commercial operation.
1983	4	Ringhals 4 in commercial operation.
1985	4	Oskarshamn 3 and Forsmark 3 in commercial operation.
1986	3	Chernobyl accident. Restrictions on advanced nuclear research; decision to start phase-out in the late 1990s
1987	3	Decision to have the first reactor phased-out in 1993 – 1995, the second in 1994 - 1996
1988 – 1990	3	No major policy change decided in parliament.
1991	4	An agreement between Social Democrats, Center Party and the Liberals to phase-out nuclear power by 2010. Welfare and occupation should be considered and the phase-out process should not be started until renewable production of electricity has been secured at reasonable prices.
1992 – 2005	4	No major policy change decided in parliament.
1997	4	An agreement between Social Democrats, Center Party and the Left Party. The year 2010 as last phase-out year is abolished. Proposal to decommission Barsebäck 1 and 2
1998	4	Decision to phase-out reactor 1 in Barsebäck.
1999	4	Barsebäck 1 phased-out.
2004	4	Decision to phase-out reactor 2 in Barsebäck
2005	4	Barsebäck 2 phased-out. Research reactor R2 is decommissioned.
2006	6	Decision to <i>not</i> phase-out any reactors in 2006 – 2010; restrictions on nuclear research lifted
2007 – 2008	6	No major policy change decided in parliament.
2009	7	An agreement between the four governing parties: The law to phase-out nuclear power abolished; decision to make it possible to build a maximum of 10 new reactors in Sweden when the old ones are worn out. The choice of a site for the final repository of spent nuclear fuel was between Forsmark and Oskarshamn. Forsmark was selected by SKB in June. Ultimately it is the Swedish government that will decide where the final repository is to be built.
2010	8	Decision in the Swedish Riksdag: The law to phase-out nuclear power abolished; decision to make it possible to build a maximum of 10 new reactors in Sweden when the old ones are worn out

We start at the top of the scale and grade the optimistic and ambitious nuclear policies of the 1950s and 1960s as 10s, going down to 9 when Sweden in 1968 finally decided not to build any atom bombs. In 1970 all five parties unanimously decided to limit the Swedish build-up of reactors to eleven, causing us to drop down the nuclear power policy grading to 8.

The consensus was about to end, however. In 1973 - a year after Sweden had started its first reactor in Oskarshamn - nuclear power became politicized in Sweden when the Center and Left parties decided to oppose the building of reactors. How to dispose of radioactive waste was the number one issue. A royal commission was formed to investigate the matter. For the first time the future of nuclear power in Sweden was seriously put in question. Consequently we put down the predominated pro-nuclear grading to 7. In 1977 a new law was enacted making it tougher to start-up new reactors prompting us to set down the grading further to 6.

Then in 1980 came the referendum followed by a Riksdag decision to phase-out nuclear power in Sweden. The previous pro-nuclear policies were changed into a predominantly anti-nuclear policy. Yet, the phase-out was not to be immediate. It was to take place over a thirty year period. The grade

on our nuclear power policy scale is adjusted to 4, below the midpoint of 5. After the Chernobyl accident in 1986 Sweden put on extra restrictions on nuclear research and it was decided to start the phase-out by the late 1990s. The grade is once more lowered to 3.

Grade number 3 characterizing the nuclear policies in the years immediately following the nuclear catastrophe in the Ukraine, is as low as we will get on the anti-nuclear side of the scale. Already in the beginning of the 1990s nuclear policies started to become a bit less negative to the use of nuclear power. The agreement between the Social Democrats, the Liberals and the Center Party in 1991 to stick to the old commitment to phase-out all reactors by 2010 did not mention anything about when to start the close down. Instead it was emphasized that welfare and jobs must be considered and that the phase-out process would not be commenced until renewable production of electricity has been achieved at reasonable prices. The phase-out had become less immanent. The grade is put up to 4 again.

In 2006 the Non-Socialist Alliance won the elections and formed a new government replacing the Social Democrats who had run Sweden since 1994. The change of government meant that no reactors were to be shut in the foreseeable future and that the restrictions on nuclear research were lifted. Swedish nuclear power policy had once more become more positive than negative to using nuclear power. The grading is lifted above the midpoint 5 to a perhaps weak 6.

However, in 2009 there is no doubt anymore that Swedish nuclear power policy has changed rather profoundly. The governing four Alliance parties agreed to abolish the phase-out plan. Furthermore, they proposed to make it possible to build new nuclear reactors in Sweden when the old ones are worn out. Nuclear policies are now clearly on a pro-nuclear path. The grade is increased to 7. In 2010, ahead of the elections, the parliament – with the Red Green opposition voting no - formally determined to phase-out the phase-out plan and to make it possible to construct new nuclear plants in Sweden, although not more than ten. In the fall of 2010 the new more positive nuclear power policy was solidified since the Alliance won the election and was reelected as the governing coalition.

The grade on the nuclear power policy scale is elevated to 8. A nuclear future is once more a real possibility for Sweden. After forty years the country's nuclear policy is back where it was before nuclear power became a contentious issue in the early 1970s. The decision in 1970 was to build eleven reactors. Now the decision is to make it possible to replace those with ten new ones. The intervening thirty years with an official phase-out policy is history.

Party Influence on Nuclear Policy

In a representative democracy, one of the tasks of political parties is to represent the will of the people by formulating policies, gather support for those policies at the polls and then try to get the policies enacted in parliament. Obviously, parties are not equally successful in performing these functions. Supposedly, larger parties and parties in government get more done than smaller parties and parties in opposition.

The extent to which different parties manage to get their preferred policies transformed into practical policy is an important question. It says something about how the democratic system works. All party politics can not be rhetoric and only expressive. Somewhere down the line there has to be some instrumental results.

When it comes to Swedish nuclear power policy, this problematique can be boiled down to a simple empirical question: Across the last forty years, to what extent is there any relationship between the nuclear power policies of the different parties and official enacted Swedish nuclear power policy? Have some parties been more successful in getting their policies implemented than other parties?

Methodologically, we will utilize the nuclear power policy scale and compare the grades across time for the different parties with the grades for the official Swedish policy. When grading the policies of the parties we have used statements in party programs and election platforms. The score

results for seven Swedish parties represented in the Riksdag during the last forty years are presented in Table 1. How the nuclear policies of the seven parties has changed is detailed in Appendix A.

Table 1 Swedish Nuclear Power Policy and Party Positioning on Nuclear Power 1970 - 2010

year	Official Swedish Policy	Party Position						
		V	S	MP	C	FP	KD	M
1970	8	8	8	-	8	8	-	8
71	8	8	8	-	8	8	-	8
72	8	8	8	-	8	8	-	8
73	7	0	7	-	0	8	-	8
74	7	0	7	-	0	8	-	8
75	7	0	7	-	0	7	-	8
76	7	0	7	-	0	7	-	8
77	6	0	7	-	2	7	-	8
78	6	0	7	-	2	7	-	8
79	6	0	7	-	1	7	-	8
1980	4	1	4	-	1	4	1	5
81	4	1	4	0	1	4	1	5
82	4	1	4	0	1	4	1	5
83	4	1	4	0	1	4	1	5
84	4	1	4	0	1	4	1	5
85	4	1	4	0	1	4	1	6
86	3	1	3	0	1	4	1	6
87	3	1	3	0	1	4	1	6
88	3	1	3	0	1	4	1	6
89	3	1	3	0	1	4	1	6
1990	3	1	3	0	2	4	1	6
91	4	1	4	0	2	4	1	7
92	4	1	4	0	2	4	1	7
93	4	1	4	0	2	4	1	7
94	4	1	4	1	2	4	1	7
95	4	1	4	1	2	4	1	7
96	4	1	4	1	3	4	1	7
97	4	2	4	1	3	7	1	7
98	4	2	4	1	3	7	3	7
99	4	2	4	1	3	7	3	7
2000	4	2	4	1	3	7	3	7
01	4	2	4	1	3	8	3	7
02	4	2	4	1	3	8	3	7
03	4	2	4	1	3	8	3	7
04	4	2	4	1	3	8	3	7
05	4	2	4	1	3	8	3	7
06	6	2	4	1	4	8	4	7
07	6	2	4	1	4	8	4	7
08	6	2	4	1	4	8	4	7
09	7	2	4	1	6	8	6	8
2010	8	3	4	2	6	8	7	8

Comments: The Nuclear Policy Scale runs between 0 (anti-nuclear) to 10 (pro-nuclear), see Figure 1 for more details. The party positions are taken from party programs, election platforms and party web sites. V=Left Party, S= Social Democrats, MP=Greens, C=Center Party, FP=Liberals, KD=Christian Democrats and M=Conservatives. The Green party was founded 1981. Christian Democrats were founded in 1964. However, no information on Christian Democrats' nuclear power policies is available previous to 1980.

If we systematically, year by year, compare the party grades with the grades of the official nuclear power policy it is obvious that there are clear differences between the outcomes for the different parties. Some parties' policies are very much closer to official policies than other parties'. If we assume that degrees of policy closeness can be interpreted as degrees of potential influence - e.g. that the relevant party's policies have had or not have had an impact on official policy – then our data

can be used to analyse the extent to which the political parties influenced official Swedish nuclear power policy.

In Table 2 we have facilitated such an analysis by computing a difference measure indicating the yearly distance between how official nuclear power policy is graded relative to the policies of the seven political parties. A negative difference (-) shows that the relevant party's nuclear power policy is more anti-nuclear than official policy, while a positive difference (+) indicates a more pro-nuclear party position than official policy. Theoretically the difference measure can vary between -10 to +10 with 0 indicating a perfect match between party policy and official enacted policy. In Table 2, an average of the difference measure results across all relevant years is also provided for every party.

Table 2 The Fit Between Official Nuclear Power Policy and Seven Swedish Parties' Nuclear Policies

Left Party (V)		Social Democrats (S)		Greens (MP)	
Years	Difference	Years	Difference	Years	Difference
1970 – 1972	0	1970 – 1976	0	1981 – 2005	-3/-4
1973 – 1979	-6/-7	1977 – 1979	+1	2005 – 2010	-5/-6
1980 – 2005	-2/-3	1980 – 2005	0		
2006 - 2010	-4/-5	2006 - 2010	-2/-4		
Average over 41 years -3,2		Average over 41 years -0,2		Average over 30 years -3,7	

Center Party (C)		Liberals (FP)		Christian Democrats (KD)	
Years	Difference	Years	Difference	Years	Difference
1970 – 1972	0	1970 – 1996	0/+1	1980 – 1997	-2/-3
1973 – 1976	-7	1997 – 2005	+2/+4	1998 – 2010	-1/-2
1977 – 1985	-3/-5	2006 – 2009	+1/+2		
1986 – 1996	-2	2010	0		
1997 – 2005	-1				
2006 – 2010	-1/-2				
Average over 41 years -2,4		Average over 41 years +1,2		Average over 31 years -2,1	

Conservatives (M)	
Years	Difference
1970 – 1976	0/+1
1977 – 1985	+1/+2
1986 – 2005	+3
2006 – 2010	0/+1
Average over 41 years +2,0	

Comments: This analysis is based on the data presented in Table 1. The Difference measure indicate the yearly difference between how official nuclear power policy is graded relative to the policies of the seven parties. A negative difference (-) shows that the relevant party's nuclear power policy is more anti-nuclear than official policy. A positive difference (+), on then contrary, indicates a more pro-nuclear party position than official policy.

Too little surprise, on average the difference measure between party policy and official policy is by far the smallest for the Social Democratic Party. The average is -0,2 across the relevant 41 years starting in 1970 and ending in 2010. Thus, on average, Social Democratic nuclear power policy has over the years been very much the same as official Swedish nuclear power policy. On the one hand this result is expected. Social Democrats have been the governing party in Sweden during 30 of the 41 relevant years (1970-76, 1982-1991, 1994-2006). On the other hand, it is not self-evident that parties are successful in using the government position to implement their own policies. However, in the Swedish case at least, it is obvious that the Social Democrats have been quite successful in carrying their nuclear power policy through. The only years when the difference measure reveal that Social Democratic nuclear policy has been somewhat off compared to official policy are the years 1977-79 (average +1) and the most recent years 2006-2010 (average -2/-4). Those years have in common that the Social Democrats were in opposition and not in government. But being in

opposition does not necessarily mean that you can not have a nuclear policy close to the official one. For the Social Democrats that was the case in the years 1991-1994 when Sweden had a Non-Socialist government which upheld the "Social Democratic" policy of phasing-out nuclear power.

That a government position is not that all-important is also proved by the difference results for the Liberals. Their average difference between party policy and official policy on the nuclear issue is +1,2 across the forty-one years, the second smallest among the parties. Thus, the Liberals have been comparatively successful in implementing their nuclear policies over time. And that despite the fact that the party has only been represented in government coalitions during 11 of the relevant 41 years. The main reason for this outcome is that the Liberals for many years in the 1980s as an opposition party stuck to the phase-out policy and thus supported the Social Democratic government policy. The Liberals did not become a true opposition party on the nuclear issue until 1997 when they began to argue for an abolishment of the phase-out process. This change of hearts among Liberals is very noticeable in the difference results for the years 1997-2005, when they rose to +3/+4 compared to 0/+1 in the preceding years. Then came the election victory of 2006 and the Liberal entry into the Alliance government resulting in a return of a closer fit between Liberal nuclear policy and official nuclear policy with a difference of +1/+2 and 0, respectively for the years 2006-10.

Another interesting case is the Center Party. The difference measure between the party's policies and official policy reveals very dramatic swings. From no difference at all in the early 1970s when all parties embraced a pro-nuclear policy, over a long period of strong opposition to the start-up of new reactors (1973-1985, occasionally with the Center Party as part of a governing coalition!) and a period of continued support for the phase-out process (1986-2005) followed by a last phase (2006-2010) in which the Center Party changed its nuclear policy in support of the new more nuclear positive policy of the Alliance government of which the Center Party is a part. Over the years the average difference measure for the Center Party is -2,4, indicating an only semi-successful implementation of the party's nuclear power policies.

The only parties with clearly worse average difference measures are the most anti-nuclear parties, the Left Party and the Greens, with average differences of -3,2 and -3,7 respectively. The comparative results for the Christian Democrats and the Conservatives are -2,1 and +2,0. The result for the Conservatives indicate that they through the years on average have been most positive to nuclear power among Swedish parties, however under some competition from the Liberals since the early 2000s. And since the government shift in 2006, the Conservative and the Liberal pro-nuclear policies are the law of the land. They have been successful in stopping the phase-out policy and opened up for a renewed investment in nuclear power in Sweden. The difference between their nuclear policy and the official policy is 0 in 2010.

A systematical test of the importance of belonging to the government in order to be able to implement your nuclear policy reveals a positive relationship. When in power parties tend to have a smaller difference between their nuclear power policy and official policy compared to when they are in opposition. But the impact of government possession is not dramatic. On average, it is limited to a lowering of the difference measure with about one unit for the Social Democrats, Liberals and the Conservatives.

For the Center Party and for the Christian Democrats no impact can be detected. On the contrary, on average, a smaller average policy difference is revealed when the two parties are in opposition compared to when they participate in a governing coalition. In the case of the Center Party the main reason is that the party was very much more anti-nuclear than official policy in the years 1976-1982 when the Center Party was part of a series of Non-Socialist governments. Apparently, the Center Party was not successful in implementing its more drastic anti-nuclear policy during those years.

The Left Party and the Greens have so far not formally participated in any Swedish government, but during those years when they in parliament backed Social Democratic governments their difference scores were about two units lower than when they belonged to the opposition. A possible

conclusion is that it paid off for the Left and the Greens to support the Social Democrats in parliament.

An alternative way to study the importance of government possession for getting your policies implemented is to perform a dynamic analysis investigating the extent to which changes in party policies is related to changes in official policy. Practically, we singled out the cases – with a one year time-lag – when either a party’s policy or official policy changed or both changed and studied if the change pattern is compatible with a potential influence from party policy on official policy.⁵ When that was done we cross-tabulated the outcome with information on whether the parties at the relevant times were or were not part of the government.

The result of the dynamic analysis confirms our previous finding. Government possession matters, but it is not a prerequisite for potential influence. There are examples of potential influence when parties are in opposition. Overall, the result reveal that in a majority of cases with nuclear policy changes involving government parties the change patterns indicate the possibility of a potential influence of party policy on official policy. This occurred in 57 percent of the relevant cases. When policy changes happens involving opposition parties the change patterns more seldom reveal a potential influence of party policy on official policy. It is the outcome in only 21 percent of the examined cases.

The conclusion is fairly straight forward. In the Swedish case, nuclear policies of the parties have had a clearly visible impact on official policy. This is especially true for governing parties and par preference for the Social Democratic Party. Party policies matter as does having government power. And that is positive. That is the way a representative democracy based on political parties should work.

Public Opinion on Nuclear Power

The first Swedish opinion polls on the issue of nuclear power were done in the beginning of the politicization period in the years 1973/74. They revealed large proportions of don’t know answers and a majority favoring expanding nuclear power in Sweden. However, already in late 1974 or early 1975 public opinion shifted drastically under the influence of an intensive debate and a majority came to support a no to a nuclear buildup (Holmberg and Hedberg 2009). The anti-nuclear majority among voters was to prevail until after the elections of 1976, and would help unseat the Social Democratic government.

Going into the election of 1979 and the 1980 referendum public opinion turned more positive toward nuclear power, interrupted only by a short negative spike immediately after the TMI-accident in USA in the spring of 1979. In the referendum the two alternatives that at the time were perceived as pro-nuclear won by 58 percent to 39 percent for the anti-nuclear alternative. But since all alternatives talked about eventually phasing-out nuclear power, the Swedish parliament decided on a long-term phase-out policy in 1980.

After the referendum, nuclear power quickly lost its number one position on the public agenda. In the lead up to the elections of 1976 and 1979 nuclear power was singled out as the most important issue by 21 and 26 percent of the voters, and ranked on top on both occasions. Since then, however, the comparable proportions of voters mentioning nuclear or energy issues as important has been substantially smaller – between 1-5 percent in the elections in 1982-2010 (see Appendix B). Nuclear power was not depoliticized on the mass level, but it became less politicized.

After the referendum and the return-to-normalcy process that followed, public opinion did not change much for a number of years. If there was a trend in those years it was a weak one favoring nuclear power. The stillness was to change dramatically by the Chernobyl accident in 1986. Like in many other European countries support for nuclear power plummeted. In the short term attitudes to

⁵ Potential party influence is present when official policy is shifted in the direction of policy policy. In the analysis we study all together 45 cases where either party or official policy change between consecutive years.

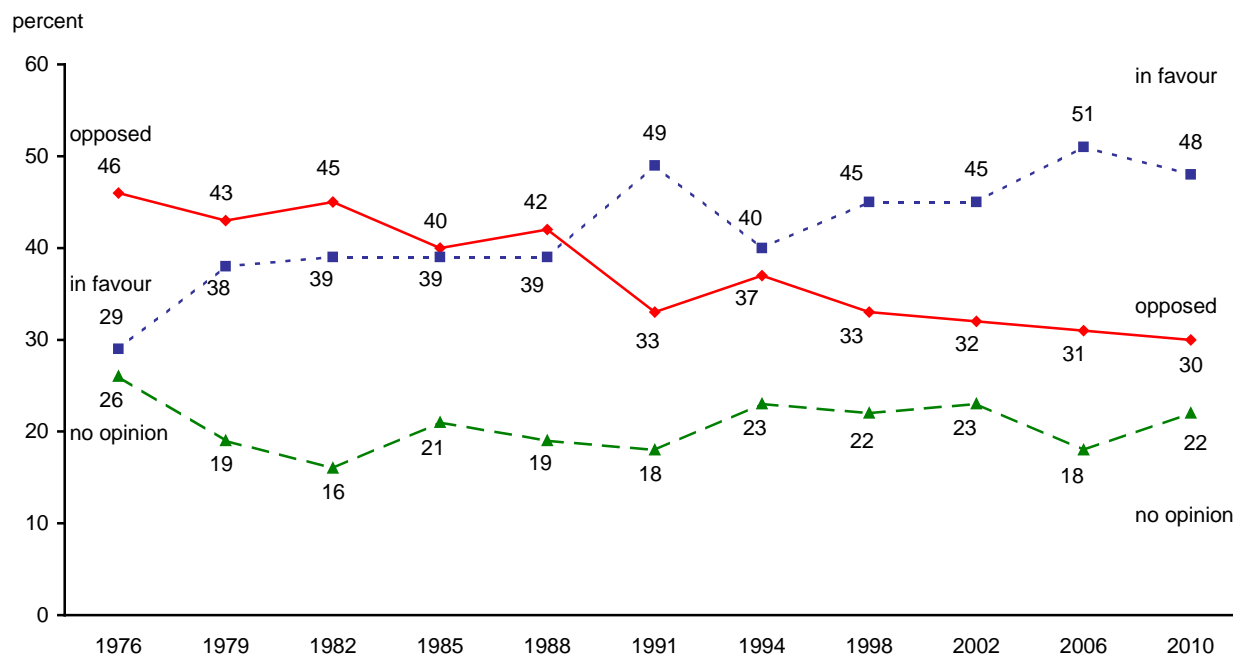
nuclear power became 10-20 percentage points more negative depending on what measure we entertain. Yet, the effect was only temporary. In some measurements the upturn in anti-nuclear sentiments was still present two years after the accident. But in most surveys, the impact was gone within a year after the catastrophe.

The last years of the 1980s and especially the elections of 1991 which brought a Non-Socialist government to power meant a strong upsurge in pro-nuclear views in Sweden. The decidedly anti-nuclear years of the late 1970s were definitely gone.

In the following we will be less narrative. Instead we will be more precise and look more closely at what results from a couple of surveys reveal about how Swedish public opinion has evolved across the forty years between the mid 1970s and the first decade of the 2000s. The data come from the Swedish National Election Studies and from the SOM Institute, both located at the University of Gothenburg.

The curves in Figures 3 and 4 show how mass attitudes to nuclear power have developed since the issue was politicized in the mid 1970s. In Figure 3, nuclear opinion is measured using a subjective self-classification question with three explicit response alternatives – in favor, against or no opinion. The advantage as well as drawback of a simple self-classifying question is that it lacks any specific policy content. The advantage is that the question can be used across time even though the debate over nuclear issues might shift in focus. The drawback is equally evident. Since the question lacks a policy content the meaning of an in favor- or an against- answer could change across time.

Figure 3 Swedish Opinion on Nuclear Power 1976 – 2010 (percent)

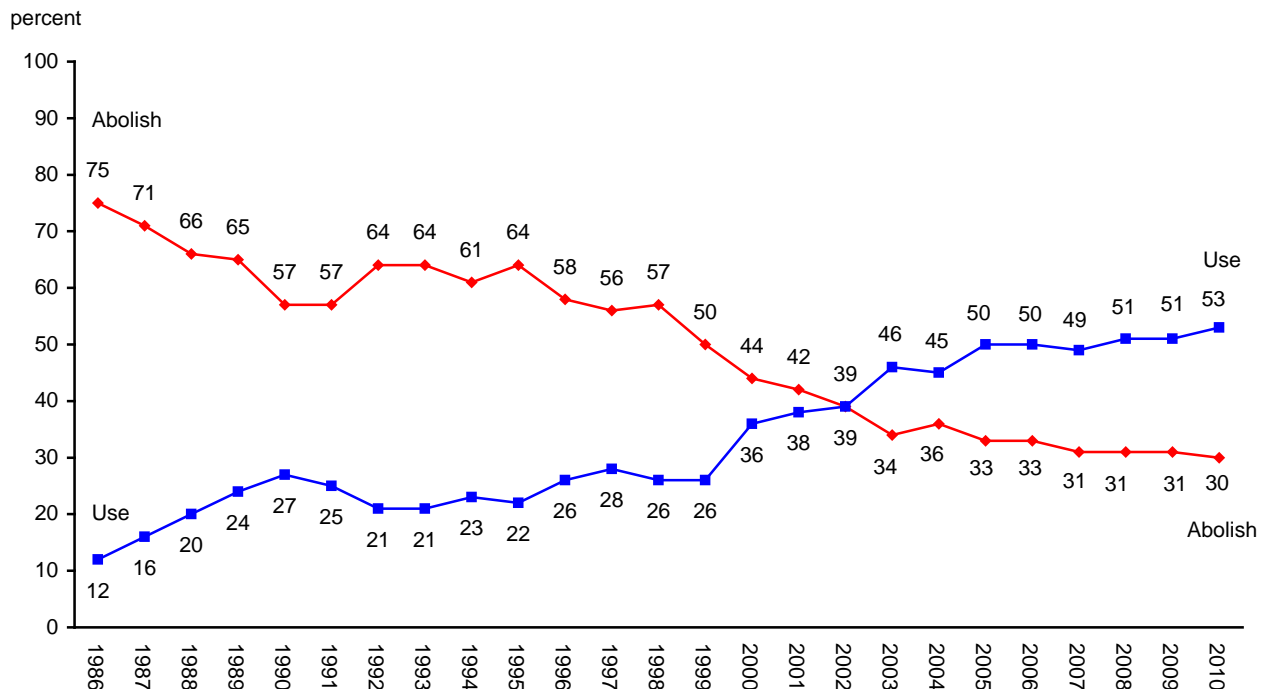


Comments: The results for 1976 come from Holmberg et al *Väljarna och kärnkraften* (1977). The results in 1979 – 2010 come from The Swedish National Election Studies (SNES). Percentages are computed among all respondents. **Question:** "There are different opinions on nuclear power as an energy source. What is your view? Are you mainly in favour or mainly opposed to nuclear power or don't you have any decided opinion?"

In contrast, our other measurement series depicted in Figure 4 is based on a question specifying a number of concrete policy options related to the long term use of nuclear power in Sweden. The question wording has been identical across time although the exact formulation and number of response alternatives have changed somewhat over time. In the most recent surveys the response alternatives have been five: "Abolish nuclear power very soon; Abolish nuclear power, but not until

our present reactors are worn out; Use nuclear power and renew/modernize the reactors, but do not build any more reactors; Use nuclear power and build additional reactors in the future; No definite opinion”.

Figure 4 Swedes on the Use of Nuclear Power as an Energy Source (percent)



Comments: The data come from the SOM Institute, based on annual nationwide surveys in Sweden; Sample size 3 000 persons 16-85 years old; Mail questionnaires with an average response rate of 65 percent. *Question:* “What is your view on the long term use of nuclear power as an energy source in Sweden?” Five response alternatives; “abolish nuclear power very soon; abolish nuclear power, but not until our present reactors are worn out; use nuclear power and renew/modernize the reactors, but do not build any more reactors; use nuclear power and build additional reactors in the future; no definite opinion.” In 1986 the “Don’t know” response was left out; therefore the results for this year have been adjusted. The actual results were 84 percent “abolish”, 13 percent “use” and 3 percent no answer. All respondents are included in the percent calculation. In 1980, the support for the Use-alternative was 30 percent and for the Abolish-alternative 66 percent, och Holmberg and Asp 1984.

The longest time series portrayed in Figure 3 and based on self-classifications reveal that opposition to nuclear power was most pronounced in 1976. It also shows that anti-nuclear identifications were more common than pro-nuclear identifications up until the election of 1988. After that, beginning in 1991, Swedes have more often classified themselves as in favor of nuclear power than as against – most decidedly so in the two last elections in 2006 and 2010. The long term trend has been in favor of the use of nuclear power. In 1976, only 29 percent identified themselves as in favor of nuclear power. The comparable figure had risen to 51 percent in 2006 and to 48 percent in 2010.

Our other time series starting in 1986 and footed on a more policy-specified survey question show the same trend (Figure 4). Support for the long term use of nuclear power in Sweden has gone up from 30 percent at the time of the referendum in 1980 - and from a low of 12 percent a couple of months after the Chernobyl accident – to 53 percent in 2010. During the same period, support for a phase-out of nuclear power diminished from 66 percent in 1980 and a high of 75 percent in 1986, after the Chernobyl disaster, down to 30 percent in 2010.⁶ The relative majority of Swedes has

⁶ The fading out of the opinion effect of the Chernobyl accident is clearly visible in figure 4. Support for phasing-out nuclear power goes down from 75 percent in 1986 to 66 percent in 1988 and to 57 percent in 1990 (see Holmberg 1991A and Holmberg 1991B).

changed from being in favor of a phase-out of nuclear power up until 2001 to supporting a continued use of nuclear power from the year 2003 and onwards.

Ironically, most of the opinion shift happened when Sweden finally started to phase-out nuclear power in the years 1999-2005, when the two reactors at Barsebäck outside Malmö were shut down. In 1998 before the closing of reactor I at Barsebäck, 57 percent supported the phase-out plan. Six years later in 2005 after Barsebäck II was closed down only 33 percent still supported the phase-out process. Neither of the shut downs had a majority support among Swedes (Holmberg and Hedberg 2009). On the contrary, at the time a majority opposed the closing of the reactors, including most followers of the Social Democratic Party – the governing party who together with the Center Party and the Left Party made the decision to shut down the reactors.

In terms of self-identification a relative majority of Swedes declared themselves in favor of nuclear power already in the early 1990s. In more concrete policy terms, however, the same relative majority did not materialize until ten years later in the early 2000s – after the phase-out process had started and people started to have second thoughts. Today, a very clear relative majority of Swedes identify themselves as in favor of nuclear power and want Sweden to use nuclear power, not phase it out.

In a comparative perspective, Swedish public opinion is one of the most pro-nuclear in Europe. A Eurobarometer survey in 2008 showed Sweden ranked 5th among 27 member states in terms of support for nuclear power among its citizens. Lithuania, Czech Republic, Bulgaria and Hungary were ranked slightly ahead. But among West European nations Sweden was number 1, ahead of other nuclear-using countries like Finland, France, United Kingdom, and Germany.

It is obvious that Swedes are not nuke averse anymore. On the contrary, present day Swedes are nuke accepting. In opinion polls in 2010 and even in 2011 after the Fukushima accident, there is a relative majority supporting the possibility to build new nuclear reactors in Sweden. Public opinion has come a long way from the anti-nuclear and phase-out days of the 1970s and 1980s.

How this drastic change came about on the level of the different party supporters is highlighted in multi-colored graphs in Figures 5 and 6. Sympathizers with all parties have become more supportive of nuclear power over the years, but clearly more so for some parties than for others.

Looking at Figure 5, the line up of the parties at the time of the referendum is very evident among their voters. Supporters of the anti-nuclear parties (Alternative 3-parties in 1980) – the Center Party, Communists, Christian Democrats, and the Greens – are decidedly more negative to nuclear power than supporters of the more nuclear-positive parties, especially compared to followers of the Conservatives (an Alternative 1-party in the referendum), but also in comparison to supporters of the Social Democrats and Liberals (Alternative 2-parties in 1980).

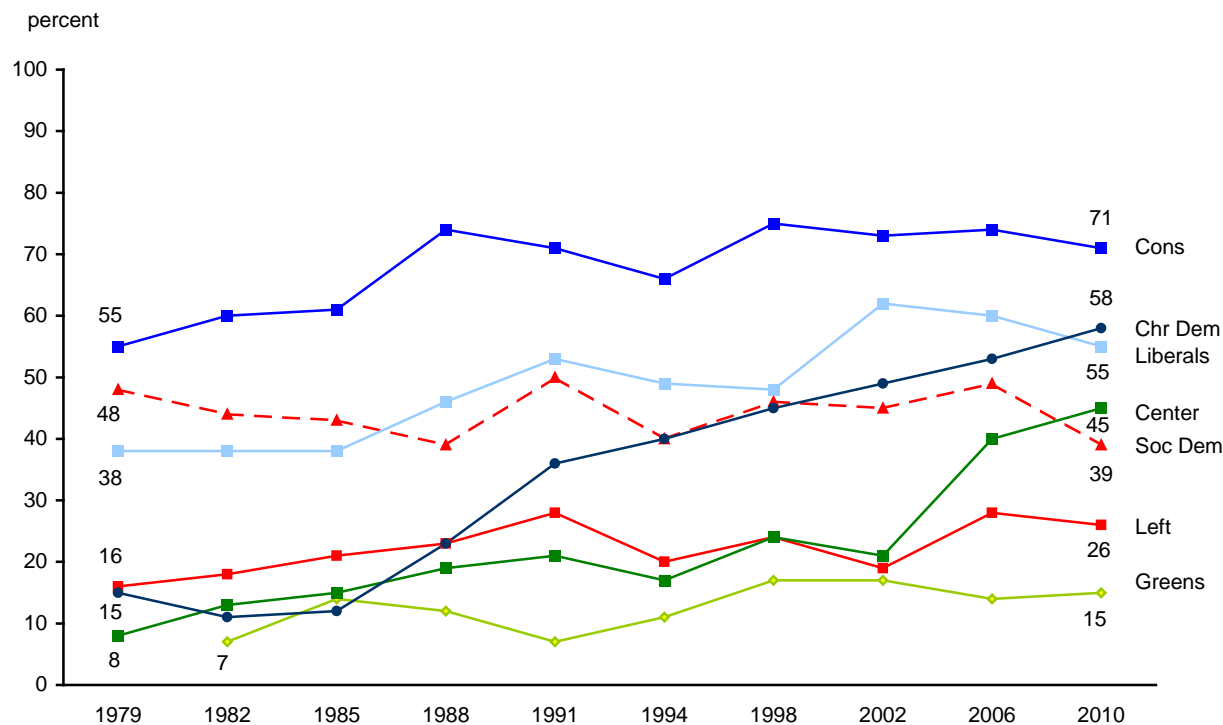
With one exception, the increase in support for nuclear power has occurred across all parties but at a very different pace. If we compare the situation at the elections in 1979/82 with opinions in 2010, support for the nuclear option has increased most clearly among voters for the Christian Democrats (+43 percentage points) and the Center Party (+37 points). The comparable upturn is smaller among voters for the Liberals (+17 points) and the Conservatives (+16 points). The change is considerably less visible among voters for the Red Green parties, +10 points among Left Party supporters and +8 points among Green voters, while among Social Democratic voters support for nuclear power has decreased by –9 points.

Looking at relative majorities across time for different party sympathizers it is interesting to note that most party groups have not shifted their majority position. More supporters of the Conservatives and the Social Democratic Party have always identified themselves as in favor of nuclear power rather than against; more so among Conservatives, however, than among Social Democrats. In a similar fashion, most followers of the Greens and the Left Party have always classified themselves as against nuclear power. Center Party sympathizers were close to switching side in the election of 2006, but not quite. But in 2010 they did.

Three party groups have changed side, though. In 1988 most Liberal supporters began to identify themselves as in favor of nuclear power. Previously most Liberals saw themselves as anti-nuclear.

Christian Democratic voters made the same journey a few years later. Since the election of 1994 most Christian Democrats have identified their nuclear position as in favor. Before that a relative majority of Christian Democrats were describing themselves as anti-nuclear. And, finally, in 2010 more Center Party voters identified themselves as in favor nuclear power rather than against.

Figure 5 Percent In Favour of Nuclear Power Among Voters for Different Swedish Parties 1979-2010 (percent)



Comments: See Figure 4 for the question wording. The data come from SNES. The result for New Democrats in 1991 is 66 percent in favour. For Sweden Democrats the percent in favour is 46 percent in 2006 and 68 percent in 2010.

Now, focusing on how the more policy-based nuclear attitudes have changed among different party groups, it is apparent that most developments basically are the same as for the measurement based on the self-classification question. As is shown in Figure 6, support for using, not phasing-out nuclear power has increased among sympathizers of all parties compared to the situation in 1986; most noticeable among Liberal (+61 points) and Center Party supporters (+51 points).⁷ The shift among Social Democrats, Christian Democrats, Conservatives and Left Party sympathizers has been more modest and close to the average for the whole population (+39 points). Least attitude change in the direction of using nuclear power is found among supporters of the Greens (+14 points).

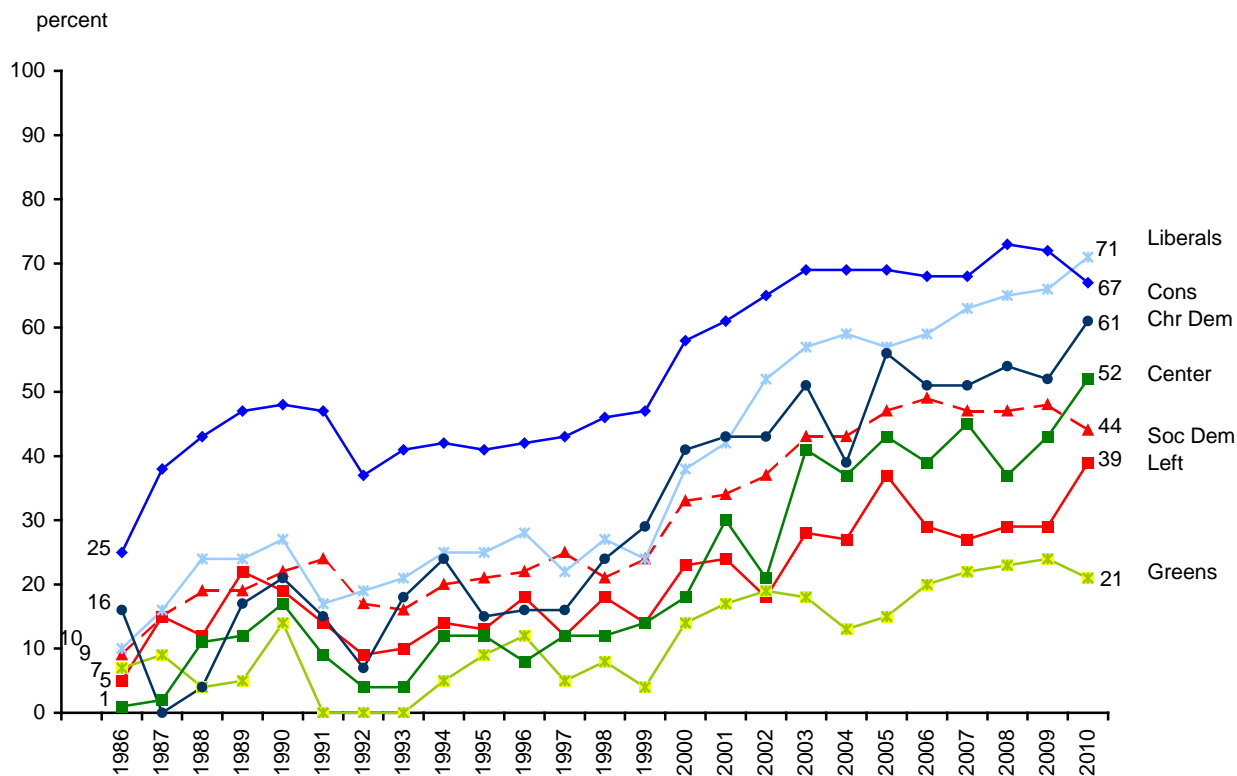
The result for the Social Democrats is worth noting especially. The change in direction of a more positive attitude to nuclear power among Social Democrats is most apparent when we talk about the phase-out policy and not at all when we look at how Social Democrats identify themselves as pro or con nuclear power. In terms of self-identification, Social Democrats of today are actually less pro-nuclear than in the late 1970s. However, the relative majority of Social Democratic sympathizers have all along been identifying as pro-nuclear and that has not changed. But when it comes to

⁷ Most of the opinion change in favour of nuclear power among liberal and Center Party supporters have occurred in the 2000s when the policies of the two parties have become markedly more pro-nuclear (see figure A4 and A5 in Appendix A). A potential top down opinion formation process from party to followers is one possible explanation for what has happened, more clearly so for the Liberal than for the Center Party supporters (Holmberg and Hedberg 2009)

concrete policies present-day Social Democrats are much less in favor of a nuclear phase-out than was the case in the 1980s.

What we see is remnants of the old Alternative 2-policy from the referendum. It proposed to first build up and use nuclear power and then slowly phase-out all reactors as they got worn out. Two messages were deliberately sent. Social Democrats and Alternative 2 were in favor of nuclear power in the short and intermediate term, but against in the long run. And that is still today the mind-set of many Social Democrats – postpone the phase-out as long as possible, but eventually nuclear power has to be abolished.

Figure 6 Percent in Favour of Using Nuclear Power Among Swedes With Different Party Sympathies (percent)



Comments: See Figure 4 for the question wording. For Sweden Democrats the percent in favour is 65 percent in 2009 and 56 percent in 2010. Among All the percent in favour is 51 percent in 2009 and 53 percent in 2010.

Supporters of the other party behind Alternative 2 in the referendum, the Liberals, have taken a different and more decisive route. They have abandoned not only the phase-out plan. They have also stopped identifying themselves as against nuclear power. Most of them are now whole-heartedly in favor of a nuclear future.

Examining the results from the latest survey in 2010, it is noticeable that the phase-out plan is only still supported by relative majorities among followers of two parties – the Greens and the Left Party. Most supporters of the other parties, including the Center Party are in favor of using nuclear power, and also including the new party, the Sweden Democrats, whose sympathizers are very much in favor of using nuclear power. Most Swedes in 2010 and most sympathizers with a majority of the parties, including the two big ones, are in favor of using nuclear power – not phasing it out.

Public Opinion Effects on Official Nuclear Policy

The ultimate question of whether there across time has been any relationship between Swedish nuclear power policy and what people wants can be given a straight forward answer. Yes, there has been a very evident relationship. In the early 1970s when Sweden started the nuclear build up, most Swedes with an opinion were or became positive. Then in the late 1970s and the 1980s, in a parallel fashion, official policy as well as public opinion became more negative and in favor of phasing out nuclear power. Later, in the 1990s, official policy was stable and still in support of a phase-out and so was public opinion. When around the millennium shift mass opinions on nuclear power started to decidedly turn more positive, official policy followed suite a couple of years later. In 2010, the Riksdag in concord with a majority of the people determined to phase-out the phase-out plan. Sweden was to use nuclear power, not phasing it out.

This bird's eye view of how official nuclear policy and public opinion have travelled together gives a superficial but on the whole accurate picture of what went down. But, naturally, it needs to be refined and fleshed out in more detail. Not least to be able to address the question whether policies have affected opinions more often than opinions have affected policies.

With the data at hand, one possibility is to systematically study the extent to which public opinion and official policy has changed in the same direction across the ten mandate periods covered by our investigation, starting with the period 1976-79 and ending with 2006-10. When opinion and policy shift in tandem and turn more negative to nuclear power like between the years 1979-82, we classify the change as being in the same direction. If opinion or policy stays the same while the other moves, we classify the case as indecisive. Mandate periods where nuclear policy and public opinion have changed in opposite directions, one becoming more positive at the same time as the other has become more negative, are classified as changes in different directions. It happened, for example, between the years 1976-79.

Across our ten mandate periods half witnessed parallel changes in the same direction for official nuclear policy and public opinion (50 percent). Policy and opinion became more positive or more negative in tandem. Only one case (10 percent) reveals a change pattern with a shift in different directions. In the period 1976-79, the people became more positive to nuclear power while official policy turned somewhat more negative. The remaining three periods show indecisive change patterns, with in all cases policy being stable while opinion moved (30 percent). Thus, official Swedish nuclear power policy has most often changed together and in a parallel fashion with Swedish nuclear opinion across the thirty five years between 1976 and 2010. Rarely has policy moved one way and the will of the people the other way. That is positive news for representative democracy in Sweden. The system works as intended (see Table A1 in Appendix A).

If we in a similar manner inspect the change patterns between party policies and the opinions of party supporters across the ten mandate periods we can base the conclusions on many more cases (7 parties across 10 mandate periods). And reassuringly enough, the mean outcome for seven parties over the thirty five year period is much the same as when we studied the relationship between the general public and official policy. Parallel changes are more common (30 percent) than changes in different directions (1 percent) even for the relationship between party policy and the opinions of party sympathizers. Party policies and the views of its voters tend to go together much more often than the other way around, when they move in different directions. Apparently and for the nuclear power issue, Swedish representative democracy in most cases also works as intended on the party level.

So far, what the analysis has shown is that change patterns between Swedish nuclear policies and opinions more often tend to move together across time than in opposite directions. What we, however, have not said anything about is who follows whom? Or to express the question somewhat sharper – do policy changes tend to be driven by opinion and /or opinion changes? Or is it more often the other way around that changes in public opinion tend to be driven by policy and/or policy changes?

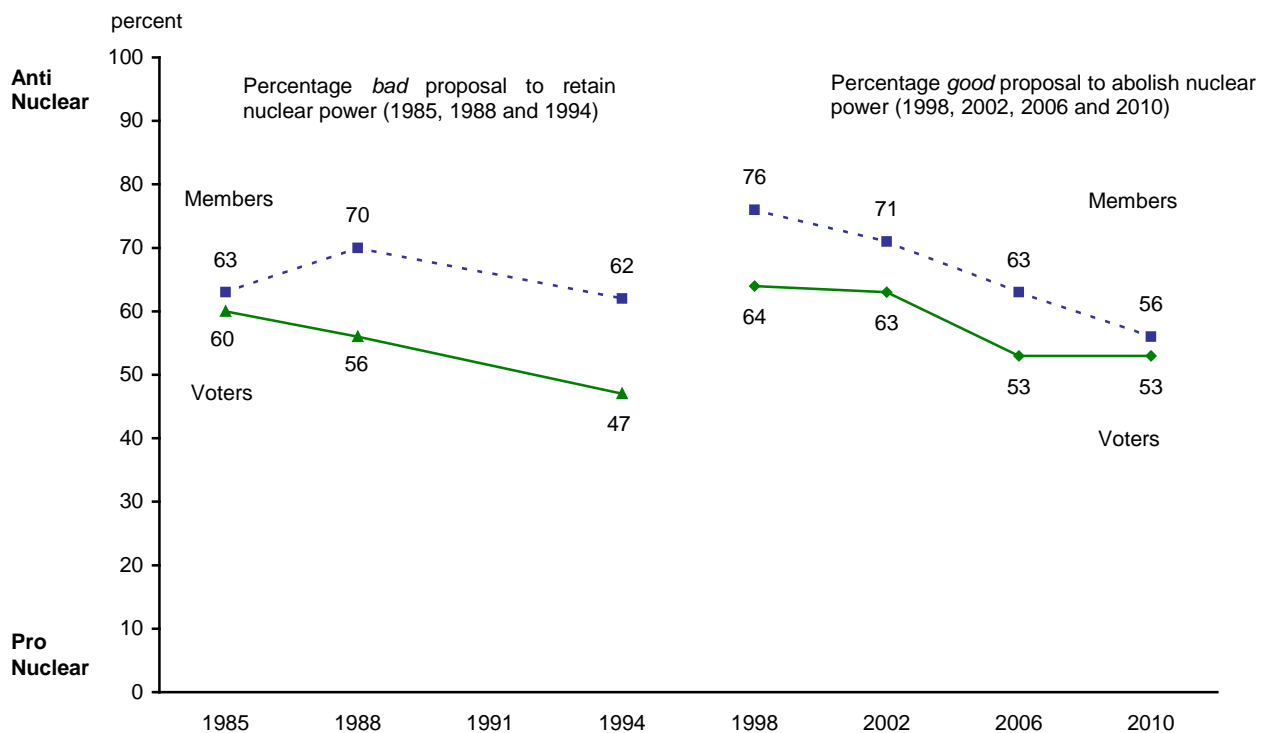
One way to empirically address these questions is to apply time-lagged time series analysis. We study the relationship between policy or opinion change in a previous period with policy or opinion change in a later period. And we do that separately with first opinion and then policy time-lagged as “causal” factors. It is important to emphasize that the analysis can not in any sense prove causal relationships. What the results can indicate are degrees of *potential* effects of opinion on policy or *potential* effects of policy on opinion.

Results in Table A2 in Appendix A show the time-lagged change patterns between nuclear opinion (t-1) and policy (t) and between policy (t-1) and opinion (t). Unfortunately, the outcomes are not very conclusive. Most changes are of the indecisive kind, meaning, in most cases, that opinion changed while policy stayed stable. Furthermore, in the minority of cases where we could see dual time-lagged changes, it is about as common to find potential effects of opinion on policy as it is to find potential effects of policy on opinion.

Consequently, the conclusion must be that given our data we can not determine who - opinion or policy - follows whom most frequently on the nuclear issue. Yet, what we more firmly can conclude is that nuclear opinion and policy to a large extent move together in Sweden. But on the question of who leads whom, the jury is still out.

An interesting bit of evidence that can strengthen the case for potential opinion effects can be picked up from a series of Swedish studies of political representation (see Figure 7). Beginning in 1985, Swedish members of parliament have been asked some of the same survey questions on nuclear power as the voters. Across the last twenty years we can systematically follow the development of nuclear attitudes in the Riksdag as well as among the electorate.

Figure 7 Policy Representation in Sweden – Attitudes on Nuclear Power Among Members of Parliament and Eligible Voters in 1985 – 2006 (percent)



Comment: The results come from the Swedish National Election Studies (Oscarsson and Holmberg 2008) and the Swedish Riksdag Studies (Brothén and Holmberg 2010). Members stand for members of the Swedish parliament and voters for eligible voters. Percentages have been calculated among respondents with explicit opinions, excluding don't know and middle of the road-answers (“neither good nor bad”). See Holmberg 2011.

In a dynamic fashion we can study whether the opinions of members have tended to lead the way and voters followed suite, or if the process has been the opposite with politicians' opinions following voter opinion over time. In the first case we talk of representation from above, in the second case we have representation from below. In Sweden, most issues tend to be of the representation from above kind (Holmberg 2010). Issue opinions are more elite-driven than mass-driven.

The nuclear issue, however, is an exception. Opinion formation on the nuclear issue has not been potentially elite-driven. Ever since our first study in 1985, members of the Swedish Riksdag have on average been more negative to the use of nuclear power than the general public. But like the voters, the politicians have across time become more positive to nuclear power; yet, never becoming more positive - or as positive - as the electorate.

The nuclear views of the politicians have followed public opinion in slowly accepting the long term use of nuclear power and not to phase it out. Thus, since the mid-1980s we have a clear case of representation from below on the nuclear issue. Potentially, members' nuclear attitudes have been influenced by what the voters think. Mass opinions affected elite opinions.

Together Hand in Hand

Swedish official nuclear power policy, party policies and public opinion have to a remarkable extent followed each other over the last forty years since the nuclear issue was politicized in the mid-1970s. Yet, we can not conclusively determine who lead whom. What we can conclude, however, is that most changes have been parallel. Official policy shifts have in a majority of cases been done in tandem with changes in relevant party policies – mostly in concord with changes among parties in government – and also most often in the same direction as swings in the public opinion.

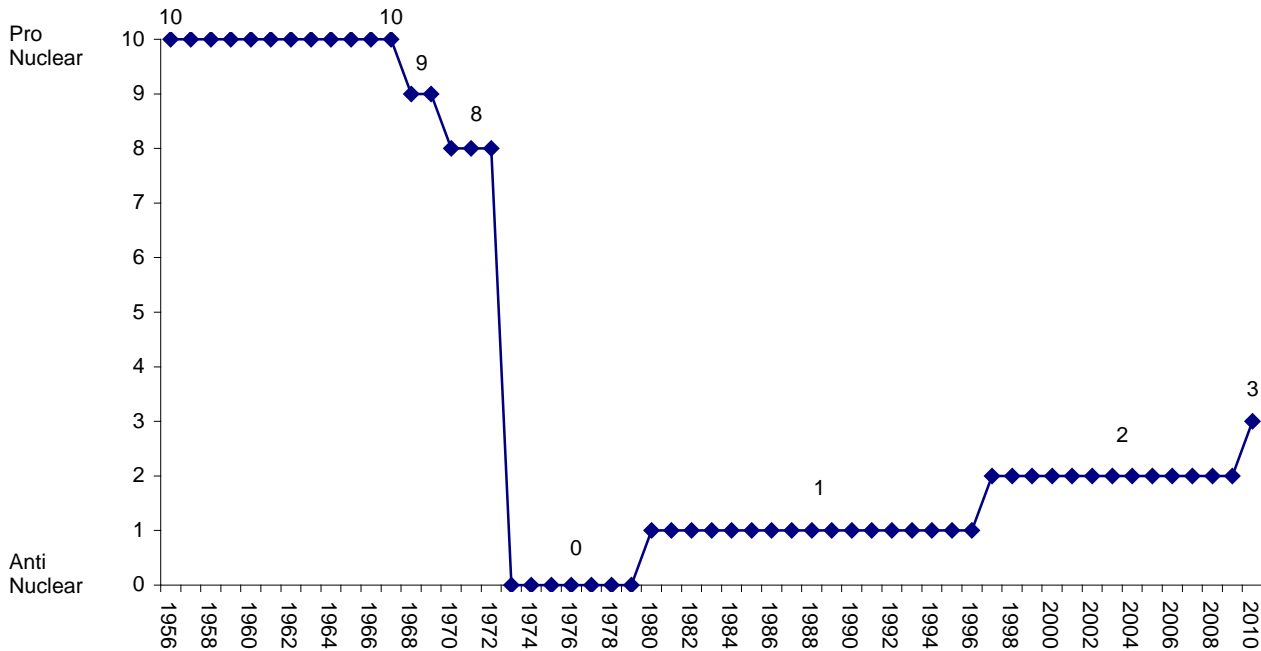
In the early 1970s, all parties and the majority of the Swedish people agreed with official policy. Sweden was to go nuclear. Then in the late 1970s and in the 1980s, all parties' policies as well as public opinion became decidedly more anti-nuclear, as did official policy. After a referendum, Sweden was now to phase-out nuclear power (after a period of first finishing the build-up). Somewhat later, in the 1990s, official policy was still to phase-out all nuclear reactors and the policy had a strong backing by public opinion as well as by the policy of the governing Social Democratic Party. When public opinion began to turn more pro-nuclear in the years around 2000 – ironically at the same time as Sweden started the phase-out process by closing down two reactors – with some delay, official policy as well changed and became more positive to the use of nuclear power. Most parties' nuclear policies followed suite and adjusted to a more pro-nuclear stance; noticeably not the Social Democrats, however. In 2010, a Non-Socialist government elected in 2006 and reelected in 2010 decided – with support of a majority of the electorate - to phase-out the phase-out plan and to open up the possibility to build new reactors in Sweden. Once more, official policy was to go nuclear. And once more, the decision was taken in accordance with the will of the people.

Together and hand in hand Swedish politicians and people walked into the Nuclear Society in the early 1970s. A nuclear build-up was decided and became the official policy of the land. Then second thoughts appeared, resulting in a referendum and a phase-out policy supported among parties and people as well as manifested in official policy. The phase-out era was to last about thirty years. In the early 2000s, however, afterthoughts followed the second thoughts. Sweden once more changed its nuclear course. Together and hand in hand the majority of the people and - this time not all politicians - but the governing Non-Socialist politicians determined to go back to the policies of the early 1970s and once more walk Sweden into the Nuclear Society.

When it comes to the functioning of representative democracy, our normative conclusion must be positive. On the whole, Swedish representative democracy and nuclear power policy have worked well together. Hand in hand most of the time - parties, politicians, and the public have formed and changed policies. It may look like a fairy tale, but apparently representative democracy sometimes works as intended.

APPENDIX A

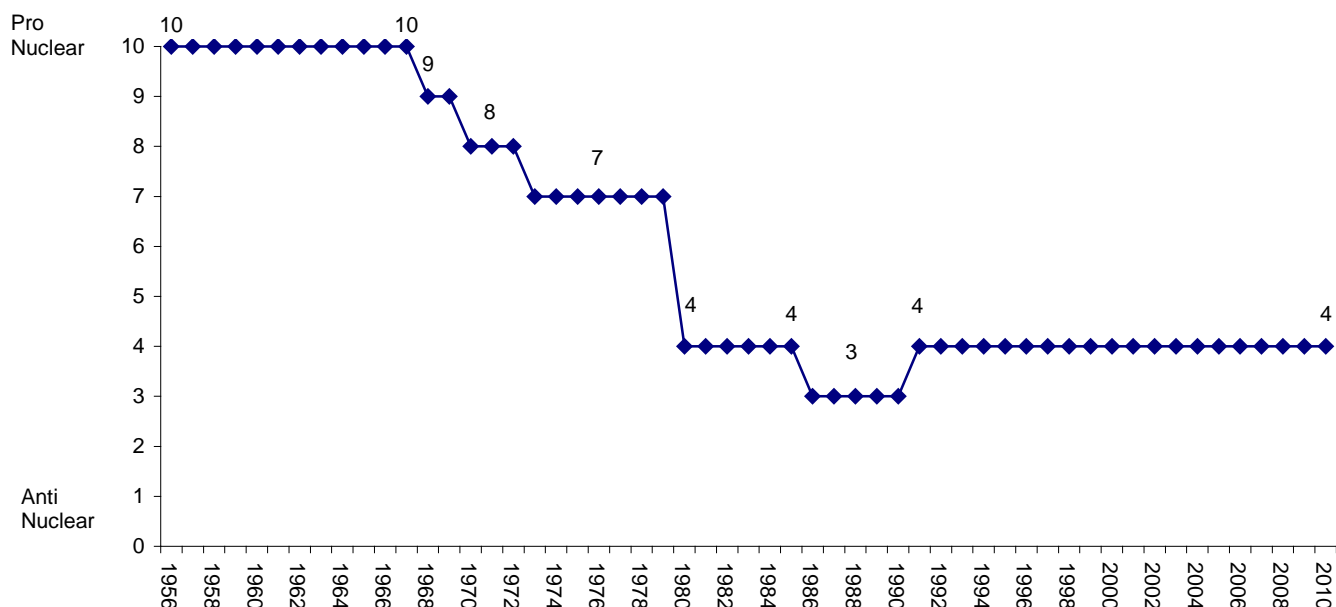
Figure A1 Left Party Positioning on Nuclear Power



Source: The Left Party programs. Classification of nuclear power policy on a 0 – 10 scale done by Per Hedberg and Sören Holmberg. The Left Party was previously the Swedish Communist Party.

- 1956 - 1967 10 Supports the independent Swedish nuclear program; visions of a nuclear society.
- 1968 9 No to a Swedish atom bomb
- 1969 9 No major change
- 1970 - 1972 8 Agrees with the other *Riksdag* parties to construct 11 reactors in Sweden
- 1973 0 Decides to go against construction of nuclear reactors in Sweden; a complete turn-around.
- 1974 - 1979 0 No major change
- 1980 1 Supports Alternative 3 in the referendum; no to construction of new reactors; phase-out existing ones in 10 years.
- 1981 - 1996 1 No major change
- 1997 2 Energy policy agreement between Left Party, Social Democrats and Center Party; Decision to shut down the reactors at Barsebäck; 2010 no more the last year for nuclear operations in Sweden; a slower phase-out opted for
- 1998 - 2009 2 No major change
- 2010 3 Agreement with Social Democrats and Greens. Continue phase-out, but take employment and welfare in consideration and wait for cost effective renewable energy; a slower phase-out pace yet.

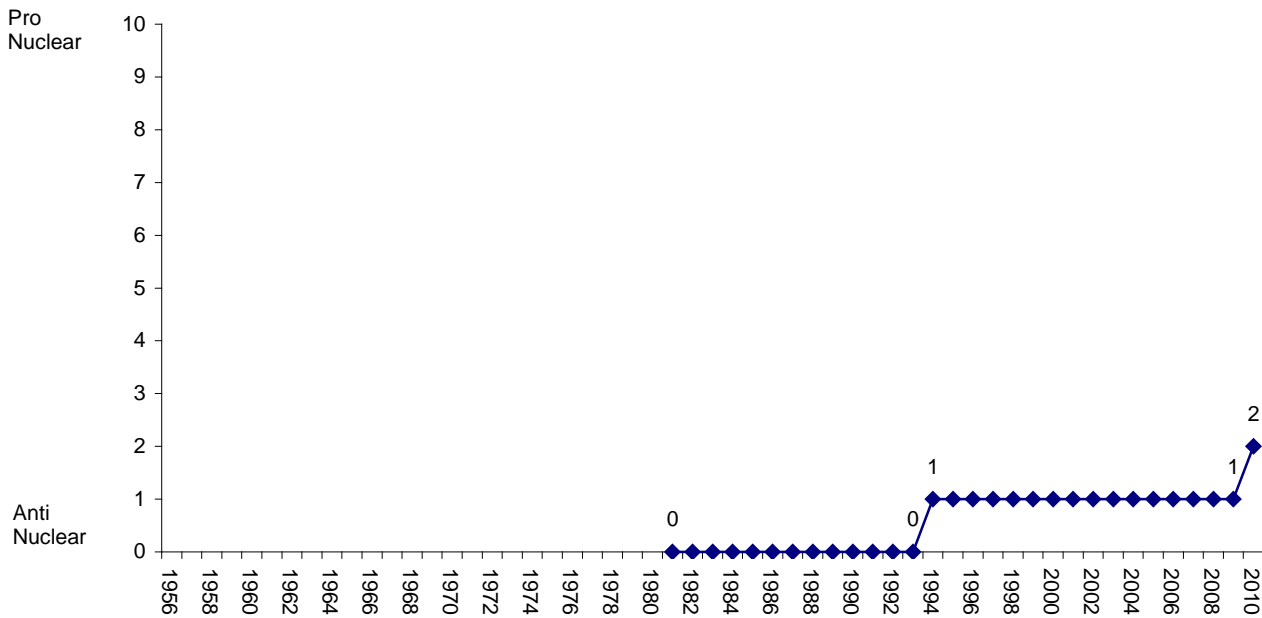
Figure A2 Social Democratic Positioning on Nuclear Power



Source: The Social Democratic programs. Classification of nuclear power policy on a 0 – 10 scale done by Per Hedberg and Sören Holmberg.

- 1956 - 1967 10 Supports the independent Swedish nuclear program; visions of a nuclear society.
- 1968 9 No to a Swedish atom bomb
- 1969 9 No major change
- 1970 - 1972 8 Agrees with the other *Riksdag* parties to construct 11 reactors in Sweden
- 1973 7 Nuclear power politicized; in Government starts a royal commission dealing with nuclear waste and fuel
- 1974 – 1979 7 No major change; but in 1975 opts for 13 reactors; agrees to a referendum after the Harrisburg accident 1979.
- 1980 4 Supports Alternative 2 in the referendum; a slow phase-out to 2010; finish the construction of 12 reactors.
- 1981 - 1985 4 No major change
- 1986 3 Ban on nuclear research; phase-out shall start in the late 1990s.
- 1987 - 1990 3 No major change
- 1991 4 Agreement with Liberals and Center Party; phase-out completed 2010, but done with employment and welfare taken into consideration and also the availability of cost effective renewable energy.
- 1992 – 1996 4 No major change
- 1997 4 Energy policy agreement between Left Party, Social Democrats and Center Party; Decision to shut down the reactors at Barsebäck; 2010 no more the last year for nuclear operations in Sweden; a slower phase-out opted for
- 1998 – 2009 4 No major change
- 2010 4 Agreement with Left Party and Greens; continue phase-out but with a slower pace

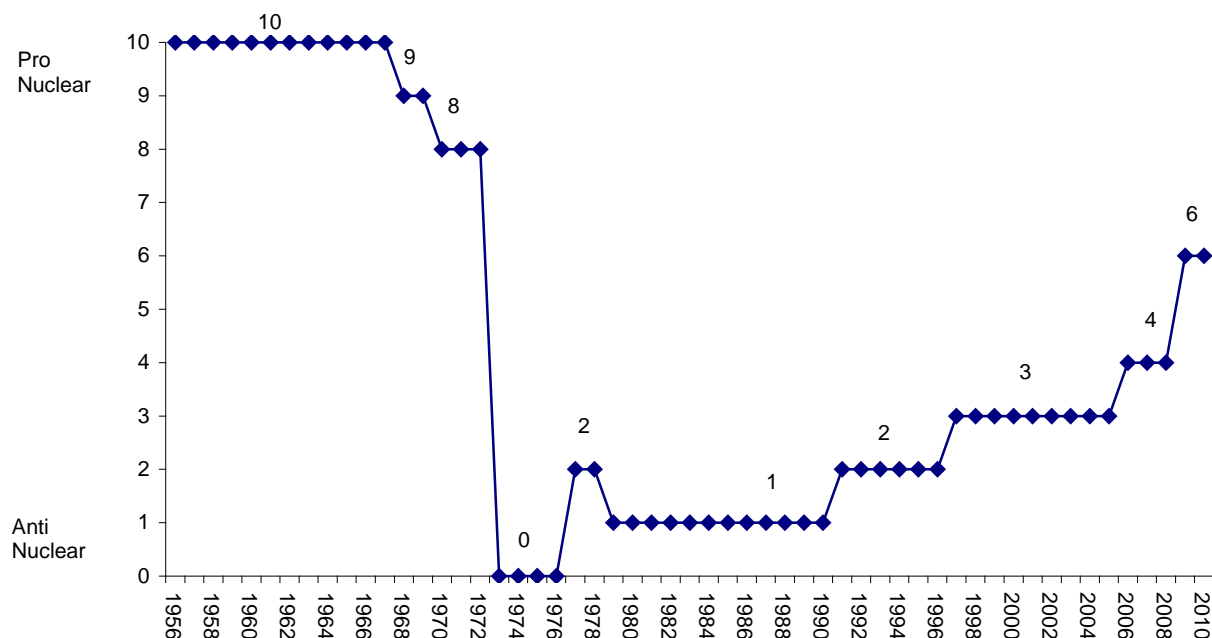
Figure A3 Green Party Positioning on Nuclear Power



Source: The Green Party programs. Classification of nuclear power policy on a 0 – 10 scale done by Per Hedberg and Sören Holmberg. The Green Party was founded in 1981.

- 1956 – 1980 No Green Party
- 1981 – 1987 0 The Green Party is founded 1981. Strongly anti-nuclear from the start.
- 1988 – 1993 0 Start phase-out now; finish within 3 years.
- 1994 1 Shut down 4 reactors within 4 years; specify a concrete plan for the phase-out of the remaining 8 reactors.
- 1995 – 2009 1 No major change
- 2010 2 Agreement with Social Democrats and Left Party. Continue phase-out, but take employment and welfare in consideration and wait for cost effective renewable energy; a slower phase-out pace.

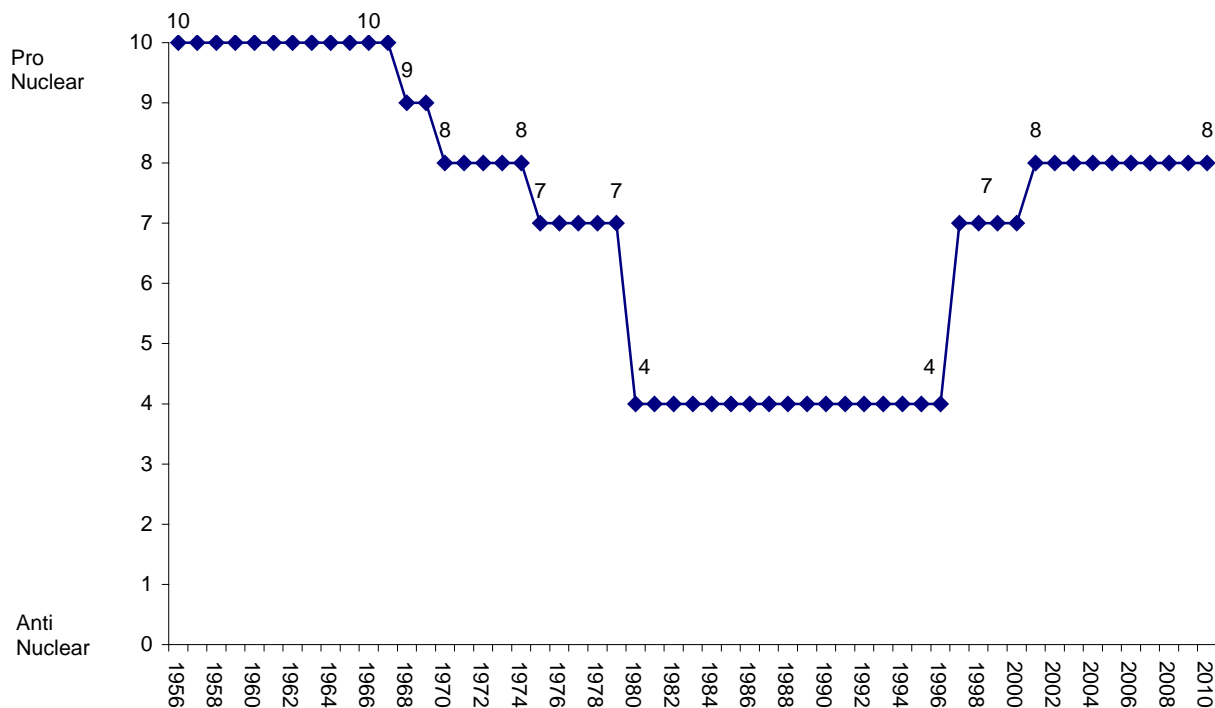
Figure A4 Center Party Positioning on Nuclear Power



Source: The Center Party programs. Classification of nuclear power policy on a 0 – 10 scale done by Per Hedberg and Sören Holmberg. The Center Party was before the mid 1950s named the Agrarian

- 1956 - 1967 10 Supports the independent Swedish nuclear program; visions of a nuclear society.
- 1968 9 No to a Swedish atom bomb
- 1969 9 No major change
- 1970 - 1972 8 Agrees with the other *Riksdag* parties to construct 11 reactors in Sweden
- 1973 0 The turn-around; decides to oppose building any reactors in Sweden; firmly anti-nuclear.
- 1974 - 1976 0 No major change. prime minister Fälldin (C) “forced” to agree to the start-up one ready-build reactor in the fall of 1976.
- 1977 - 1978 2 Party compromises with the Conservatives and Liberals in Government; nuclear build-up continues but restrained by the new Law of Conditionality; in the fall of 1978 the party leaves Government after a conflict over the nuclear build-up.
- 1979 1 The party resumes a more anti-nuclear stance after having left the Non Socialist Government in late 1978.
- 1980 1 Supports Alternative 3 in the referendum; no to construction of new reactors; phase-out existing ones in 10 years.
- 1981 - 1990 1 No major change
- 1991 2 Agreement with Social Democrats and Liberals; phase-out completed 2010, but done with employment and welfare taken into consideration and also the availability of cost effective renewable energy.
- 1992 – 1996 2 No major change
- 1997 3 Energy policy agreement between Social Democrats and Left Party; Decision to shut the two reactors at Barsebäck; 2010 no more the last year for nuclear operations in Sweden; a slower phase-out opted for
- 1998 – 2005 3 No major policy change
- 2006 4 Agrees with Alliance program; no phase-out during the next 4 years.
- 2007 – 2008 4 No major policy change
- 2009 6 Agreement among the four Alliance parties; no phase-out until renewable energy is available at a cost effective price; however in the long run nuclear power must be phased-out, claims the party on its home page, ”but with minimal disturbance to the production of electricity” and with “least possible costs to society”; opening for the possibility of building a maximum of 10 new reactors in Sweden.
- 2010 6 Votes in the *Riksdag* in favor of the possibility of building a maximum of 10 new reactors in Sweden, replacing the present ones.

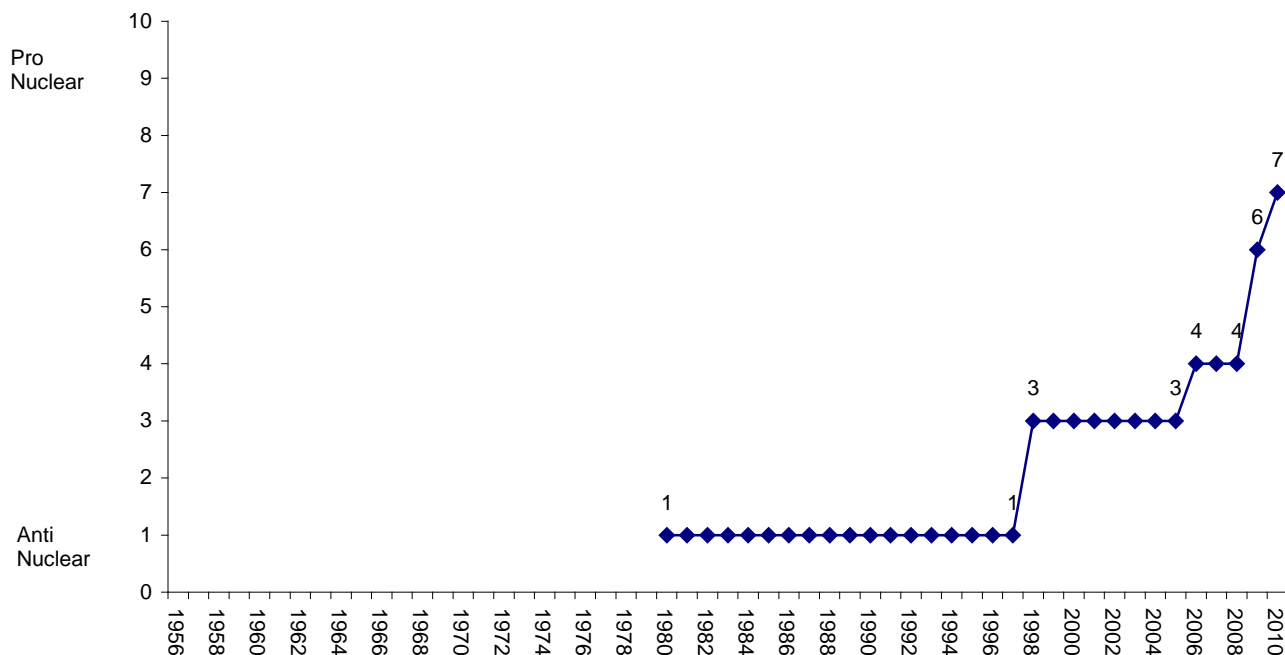
Figure A5 Liberal Party Positioning on Nuclear Power



Source: The Liberal Party programs. Classification of nuclear power policy on a 0 – 10 scale done by Per Hedberg and Sören Holmberg.

- 1956 – 1967 10 Supports the independent Swedish nuclear program; visions of a nuclear society.
- 1968 9 No to a Swedish atom bomb
- 1969 9 No major change
- 1970 – 1974 8 Agrees with the other *Riksdag* parties to construct 11 reactors in Sweden
- 1975 7 The party sticks to build 11 reactors; Social Democrats and Conservatives opt for 13 reactors.
- 1976 – 1979 7 No major change
- 1980 4 Supports Alternative 2 in the referendum; a slow phase-out to 2010; finish the construction of 12 reactors.
- 1981 – 1996 4 No major policy change
- 1992 – 1996 4 No major change
- 1997 7 No research ban on nuclear power; keep nuclear power production going as long as the reactors work safely.
- 1998 – 2000 7 No major policy change
- 2001 8 Develop nuclear power; new reactors should be possible to build.
- 2002 – 2010 8 No major policy change. Votes in the *Riksdag* in favor of the possibility of building a maximum of 10 new reactors in Sweden, replacing the present ones.

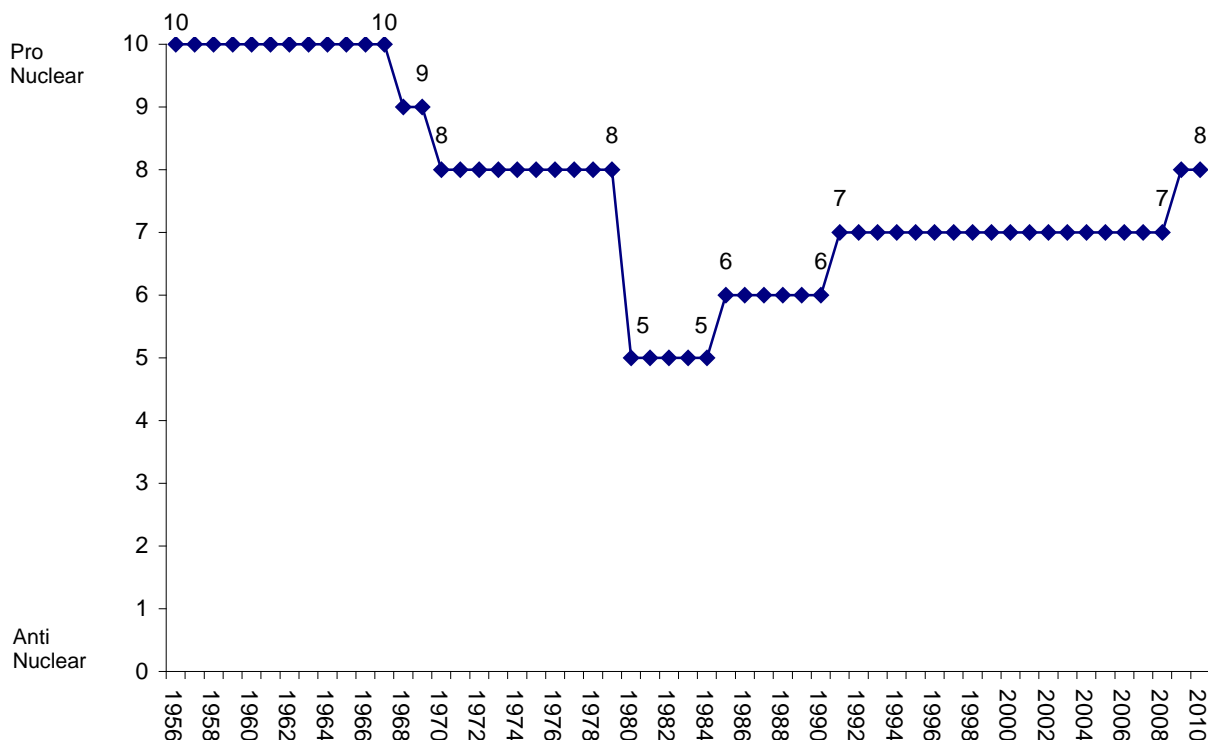
Figure A6 Christian Democratic Positioning on Nuclear Power



Source: The Christian Democratic programs. Classification of nuclear power policy on a 0 – 10 scale done by Per Hedberg and Sören Holmberg. The party was founded in 1964. No information available on the Christian Democrats positioning in the years previous to 1980.

- 1956 - 1963 No Christian Democratic Party
- 1963 – 1979 No information; party not represented in the *Riksdag*.
- 1980 1 Supports Alternative 3 in the referendum; no to construction of new reactors; phase-out existing ones in 10 years.
- 1981 - 1997 1 No major change
- 1998 3 Phase-out paced by phase-in of renewable energy.
- 1999 – 2005 3 No major change
- 2006 4 Agrees with Alliance program; no phase-out during the next 4 years.
- 2007 – 2008 4 No major policy change
- 2009 6 Agreement among the four Alliance parties; no phase-out until renewable energy is available at a cost effective price; opening for the possibility of building a maximum of 10 new reactors in Sweden.
- 2010 7 Votes in the *Riksdag* in favor of the possibility of building a maximum of 10 new reactors in Sweden, replacing the present ones.

Figure A7 Conservative Party Positioning on Nuclear Power



Source: The Conservative programs. Classification of nuclear power policy on a 0 – 10 scale done by Per Hedberg and Sören Holmberg.

1956 - 1967	10	Supports the independent Swedish nuclear program; visions of a nuclear society.
1968	9	No to a Swedish atom bomb
1969	9	No major change
1970 - 1972	8	Agrees with the other <i>Riksdag</i> parties to construct 11 reactors in Sweden
1973 - 1979	8	No major change; but in 1975 opts for constructing 13 reactors.
1980	5	Supports Alternative 1 in the referendum; a slow Phase-out process; finish the construction of 12 reactors; in 1980, Alternative 1 was perceived as the most pro-nuclear alternative.
1981 - 1984	5	No major change
1985	6	No fixed year for the completion of the phase-out; and no fixed year for a phase-out start.
1986 - 1990	6	No major change
1991	7	Continue to use nuclear power; no phase-out
1992 - 2008	7	No major change
2009	8	Agreement among the four Alliance parties; no phase-out until renewable energy is available at a cost effective price; opening for the possibility of building a maximum of 10 new reactors in Sweden.
2010	8	Votes in the <i>Riksdag</i> in favor of the possibility of building a maximum of 10 new reactors in Sweden, replacing the present ones.

Table A1 Parallel or Different Changes in Swedish Nuclear Policies and Nuclear Opinions Across Ten Parliamentary Mandate Periods Between 1976 – 79 and 2006 – 10 (Percent)

Change Pattern Between Opinion and Policy	General Public Opinion and Official Policy	Mean for 7 Parties
		Opinion of Party Sympathizers and Party Policies
Change in the Same Direction	50	30
Indecisive Change	40	69
Change in Different Direction	10	1
Sum Percent	100	100
Number of cases	10	67

Comments: The analysis is based on inspections of change patterns of official nuclear power policy and public opinion during 10 parliamentary periods starting 1976 – 1979 and ending 2006 – 2010. If policy and opinion change in then same way becoming more or less pro-nuclear during a mandate period, it is classified as a change in the same direction. If policy and opinion move in opposite directions it is coded as change in different directions. When policy is stable while opinion changes, we notice indecisive change. Similar inspections are performed for seven parties involving opinions of party supporters and party policy on nuclear power across ten mandate periods. The results in the table are means for seven parliamentary parties. The data for official nuclear policy come from Figure 2 and Table 1. Information about nuclear opinions come from Figures 4 – 7.

Table A2 Time-Lagged Change Patterns Between Swedish Nuclear Policies and Nuclear Opinions Across Ten Parliamentary Mandate Periods Between 1976 – 79 and 2006 – 10 (Percent)

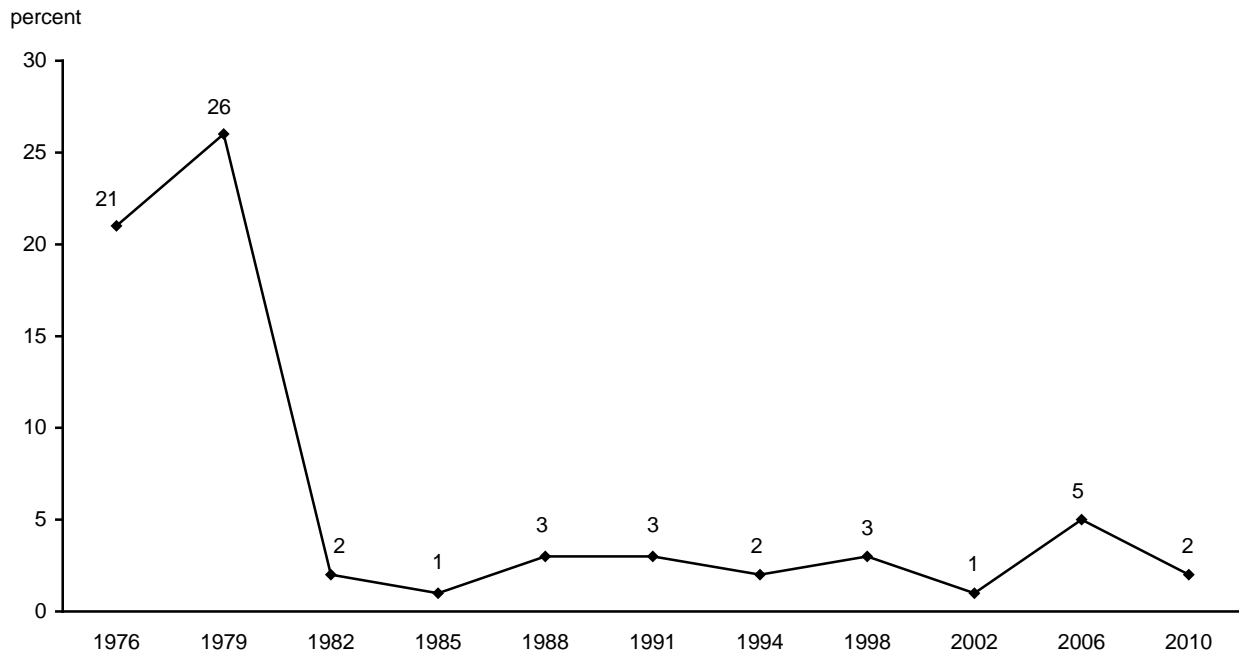
Time-Lagged Change Pattern Between Opinion (t-1) and Policy (t)	General Public Opinion and Official Policy	Mean for 7 Parties
		Opinion of Party Sympathizers and Party Policies
Change in the Same Direction	20	21
Indecisive Change	40	66
Change in Different Direction	30	13
Sum Percent	100	100
Number of cases	9	61

Time-Lagged Change Pattern Between Policy (t-1) and Opinion (t)	General Public Opinion and Official Policy	Mean for 7 Parties
		Opinion of Party Sympathizers and Party Policies
Change in the Same Direction	20	18
Indecisive Change	40	70
Change in Different Direction	30	12
Sum Percent	100	100
Number of cases	9	60

Comments: See Table 3. The time-lag involves comparing change patterns in a previous mandate period with change patterns in a later period. For the Greens, there are no relevant information for the periods 1976-79 and 1979-82. For the Christian Democrats, there are no policy information for the period 1976-79.

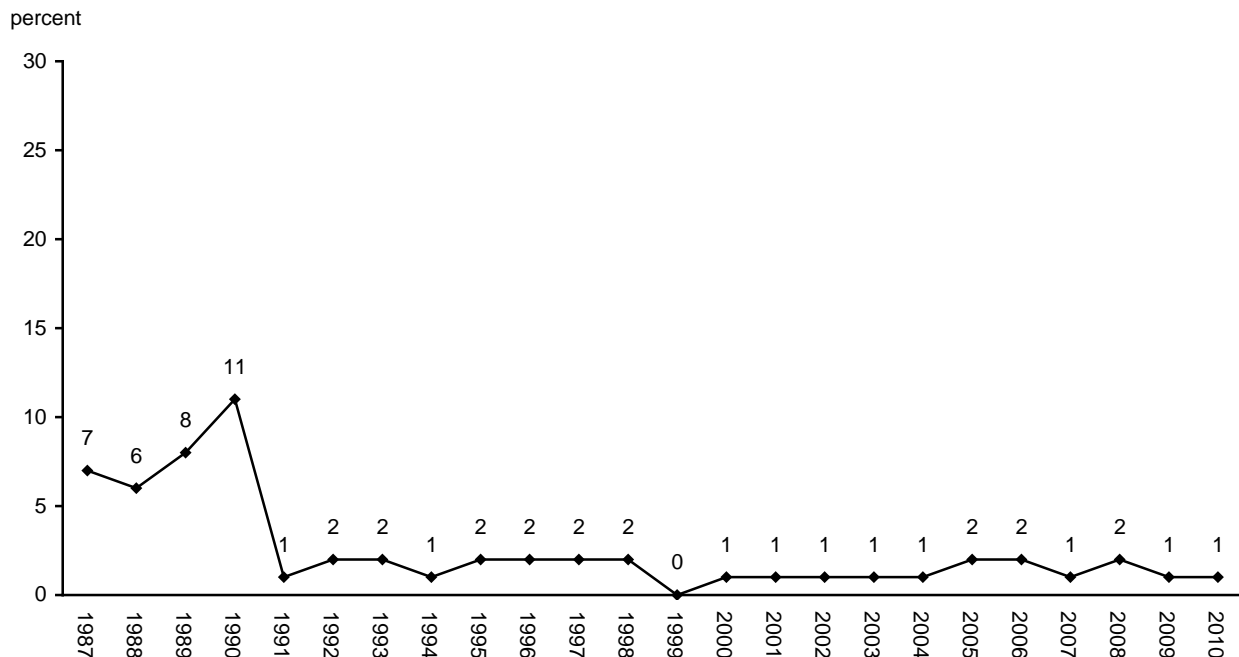
APPENDIX B

Figure B1 Energy/Nuclear Power as an Important Issue for How to Vote 1976 – 2010



Comments: The results in 1979 – 2010 come from the Swedish National Election Studies (SNES). The result for 1976 comes from a SIFO survey.

Figure B2 Energy/Nuclear Power as an Important Societal Problem 1987 – 2010



Comments: The results in 1987 – 2010 come from the annual SOM-studies.

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