Swedish Opinions on Different Energy Sources

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PREFACE

In the 1970s, energy production was politicized big time in the industrialized world. The birth of the environmental movement, the oil crises in 1973/74 and the beginning conflict surrounding civilian nuclear power, put energy issues center stage on the political agenda. Energy policies – especially related to the development of nuclear power – came to dominate election campaigns, like in Sweden in 1976 or be the subject of referendums, like in Austria in 1978 and in Sweden in 1980. Critical voices toward the peaceful use of nuclear power – having started in America before being exported to Europe – gained real strength and public support all over the Western world by the nuclear accident at the Three Mile Island plant in Harrisburg, Pennsylvania in 1979. The energy genie was out of the bottle and out to stay.

Fueled by the nuclear meltdowns in Chernobyl in 1986 and in Fukushima in 2011 and supplemented by conflicts over how to reduce the use of oil and coal, how to sensibly exploit the waste gas reserves, and how to develop renewable energy sources based on sun, wind and waves in order to handle the climate crises and stop the heating of the planet – have made all kinds of energy issues the focal point of political contentions ever since the early 1970s. In Sweden, as in many other countries, energy policies – often with nuclear power in the center – have been one of the most fought-over policy areas during the last thirty-forty years. And the contentious character of energy policies is not limited to the elite level of politics – to politicians, to media pundits or to lobbyists. It is also manifest among ordinary citizens. Energy issues – nuclear power and wind power in particular – are highly polarizing among voters as well.

Given this historic background, starting in the 1970s, it was rather natural that energy questions – featuring most prominently issues related to nuclear power – would be important parts of the voter surveys done by the Swedish National Elections Studies (SNES) at the University of Gothenburg. The first book-length studies of Swedish mass attitudes toward nuclear power appeared already in the late 1970s. Since then all SNES surveys have included measurements of Swedish opinions on various energy issues. A special election study was done in 1980 covering the nuclear power referendum.

Beginning in 1986, SNES´s election year measurements were supplemented by annual studies done by the newly founded SOM Institute at University of Gothenburg. These annual measurements were from the start designed and coordinated by the research project *Energy Opinion in Sweden*, originally financially supported by the now non-existent National Board for Spent Fuel, but since 1999 partly financed by The Swedish Energy Agency.

The analyses in the chapters in this English language e-book, have all been done and published under the auspices of the research project Energy Opinion in Sweden. The time span is quite long, almost thirty years. The writing in Chapter 1 appeared already in 1991, while the results in Chapters 4 and 8 – 12 are from 2018/19. The book is an updated and enlarged version of *Energy Opinion Compared Across Time and Space* published in 2013.

Chapter 1 by Sören Holmberg, The Impact of Party on Nuclear Power Attitudes in Sweden was first published as SKN Report 48, April 1991 by the National Board for Spent Nuclear Fuel. Chapter 2 by Sören Holmberg, Nuclear Power Supporters Maintain Lead in Sweden from 2005 was translated and published by EU Working Group on Energy Technology

Surveys and Technology (ETSAM). Chapter 3 Party Influence on Nuclear Power Opinion in Sweden and Chapter 4 Public Opinion and Swedish Nuclear Power Policy by Sören Holmberg and Per Hedberg were both originally done as part of the international research project Phasing-Out and Phasing-In: The Comparative Politics and Policies of Nuclear Energy in Western Europe. A shortened version of chapter 4 was published in Wolfgang Müller & Paul Thurner (eds) *The Politics of Nuclear Energy in Western Europe* (Oxford University Press) in 2017. Chapter 5 Swedish People´s Opinion on Sun and Wind by Per Hedberg and Chapter 6 Saving Energy by Sören Holmberg and Per Hedberg was published by ETSAM in 2005. Chapter 7 Swedes´ Thoughts about Wind Power by Per Hedberg was first published in the Swedish SOM book *I framtidens skugga* (2012) and in the English book *Stepping Stones* (2013). Chapter 8 is an overview of Energy Opinion in an International Perspective by Sören Holmberg and Per Hedberg. The last four chapters are documentation pieces and published by Energy Opinion in Sweden and the SOM Institute.

A complete listing of all publications in English and in Swedish by the research project Energy Opinion in Sweden can be found on the web page of SNES (www.valforskning.pol.gu.se) and the SOM Institute (www.SOM.gu.se).

A continuation of the project Energy Opinion in Sweden is in place preserving most of the old time series, but with more emphasis on environmental and climate perspectives. Sören Holmberg is part of the new project together with Henrik Oscarsson, Sverker Jagers and Simon Matti. The project is still supported by The Swedish Energy Agency and is named *Den svenska Miljö- Energi- och Klimatopinionen* (MEK), in English Swedish Opinion on Environment, Energy and Climate.

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Sören Holmberg Per Hedberg

Chapter 1

The Impact of Party On Nuclear Power Attitudes in Sweden

Sören Holmberg

Mass attitudes to nuclear power in general and to the more specific problems having to do with the management of nuclear waste are related to each other. People with anti-nuclear attitudes tend to view many of the nuclear waste problems differently than persons who are positive to the use of nuclear power. Hence, the study of mass attitudes to nuclear power is of relevance for the stud y of attitudes to nuclear waste. The present study analyse attitudes to nuclear power as well as attitudes to nuclear waste. The emphasis, however, is on the development of mass attitudes to nuclear power. The setting is Sweden and the time-frame the last 20 years.

Theories purporting to explain public attitudes to nuclear power are not in short supply. On the contrary they abound. As with nuclear weapons, research on attitudes to nuclear power has a proliferation problem. The enigma of what moves nuclear power attitudes and why some people tend to become pro nuclear power while others are con calls out for good answers, but the over-crowded marketplace of unruly social science models makes it difficult to find them. And, paradoxically, amidst all the theories of the importance of economic self-interest, gender, post materialist values, belief systems, psychological traits, risk assessments, level of information, media coverage and center-periphery locations, the most important explanatory variables tend to get lost. They are the political variables.

The conflict over nuclear power in countries like the US, France, Sweden and German y is primarily a political phenomenon.[1] Like most other political issues, the nuclear power issue was politicized at a certain point in time (early 1970s), experienced a period of extensive debate and dispute, and will eventually be depoliticized (which maybe already have happened in France and the US).[2] Actions by different elite groups - especially actions by political parties in systems with strong cohesive parties - are often overlooked as driving forces behind this process. Instead, an idealistic model of the origins of political conflict is taken for granted. Conflicts are supposed to start with the people and opinions are supposedly formed from below by socioeconomic factors, basic values and individual traits. According to this theory, parties aggregate and articu1ate opinions rather than forming them from above.

A more realistic model acknowledges the fact that various elite groups, among which political parties and candidates are the most visible, are engaged in influencing public opinion in all democracies. This process of opinion formation from above is sometimes dismissed as a little suspect and not really belonging to the democratic family. Given the practices of party propaganda across the world, it is an understandable reaction, even if it is erroneous. Naturally, in democracies with freedom of expression, opinion formation in relation to positions espoused by political parties and candidates is an integral and legitimate process.

In this article the conflict over nuclear power in Sweden will be used as a case in point. Based on data from mass surveys, we are going to stud y the impact of party on nuclear attitudes. Changes across time as well as differences between parties will be studied. Results from public opinion polls are employed, but most of the analysis draws on data gathered by the Swedish Election Studies Program. The time period covered will be from 1973, when nuclear power became a politicized issue in Sweden, through 1990, when there are clear signs of nuclear power becoming re-politicized after having been a semi-dormant issue during the years after the 1980 referendum on nuclear power.

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[1] For studies on comparative nuclear power policies, see Kitschelt (1986), Sahr (1985), and Jasper (1990). Jasper (1988) did a comparative study on nuclear power attitudes in France, USA, and Sweden.

[2] For a discussion of Life History Models of the development of public opinion, see Berelson, Lazarsfeld, and McPhee (1954), Downs (1972), and Gilljam (1988).

From Politicization to Re-Politicization: Nuclear Power Attitudes in Sweden 1973-1990

The Swedish debate over nuclear power in the 1970s commenced in concord. In 1970 and 1971, all political parties supported the parliamentary decision to build eleven nuclear reactors in Sweden. At the time energy policies were a problem for experts and a few politicians. Mass media did not pay much attention and the general public was ignorant.

The tranquility was abruptly broken in the years 1973 and 1974. In the spring of 1973, the Center Party suddenly ended the unity among the parties by declaring itself against the nuclear buildup. The politicization process started and came into full gear half a year later when the international oil crises hit Sweden. Energy issues, including nuclear power, became front page news. The political parties, environmental groups and the power industry started information campaigns. An opinion formation process was begun, which, in terms of scope and degree of involvement, is unmatched during the post-world war II-era in Sweden.[3]

The first opinion poll on what the Swedish people thought about nuclear power was done at the start of this process, in December of 1973. As would be expected with a new issue, a large proportion of the people did not have any decided views (43 percent). Among persons who volunteered an opinion, a majority (61 percent) was in favor of expanding nuclear power in Sweden.[4]

The pro-nuclear supporters were not to retain their upper hand for long, however. Already in late 1974 or early 1975 (relevant polls are scarce) public opinion had shifted rather dramatically. The debate and the very intensive opinion moulding that took place during 1974-75 had a marked impact. Anti-nuclear attitudes were augmented while no opinions and pro-nuclear views were decreasing. An opinion poll conducted in January of 1975, comparable to the one done in December of 1973, showed a no opinion-share of 35 percent (down from 43 percent) and a clear majority against a nuclear buildup among people with opinions (68 percent, up from 39 percent). The predominance of the anti-nuclear attitudes was to prevail until after the election of 1976.[5]

On the elite level, the politicization process was brought to a close in the spring of 1975 when all the parties took clear positions on the nuclear issue. The conflict pattern that emerged between the parties was very unusual. In Sweden, most political issues are structured by the ideological left-right dimension. With few exceptions, the parties align themselves according to the same traditional left-right positions. The battlefields differ but the lineup of the troops remain essentially the same.[6]

That was not to be the case for the fight over nuclear power, however. As it turned out the Center Party and the Communists, joined by the small Christian Democratic Party, which at the time was not represented in the Parliament, came out against a nuclear expansion, while the Liberals, the Conservatives, and the Social Democrats all favored a buildup - Conservatives and Social Democrats more so than Liberals. Thus, the Social Democrats and the Center Party, who usually are located adjacent to each other toward the middle of the left-right scale, ended up far apart and on separate extremes on the nuclear power issue.

The unusual elite conflict pattern of the nuclear power issue quickly became apparent also among the sympathizers of the different parties. Results from surveys done in 1975 show supporters of the Center Party being most decidedly against nuclear power, followed by

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[3] On the beginning of the struggle over nuclear power in Sweden, see Salrr (1985), Jasper (1990), Vedung (1979), Holmberg, Westerstähl, and Branzén (1977), and Holmberg and Asp (1984).

[4] On the beginning of the struggle over nuclear power in Sweden, see Salrr (1985), Jasper (1990), Vedung (1979), Holmberg, Westerstähl, and Branzén (1977), and Holmberg and Asp (1984).

[5] The development of attitudes to nuclear power during the years 1973-1976 is analyzed in Holmberg, Westerstähl, and Branzén (1977).

[6] On the dimensionality of Swedish politics, see Petersson (1977), Holmberg (1974) and Särlvik (1968, 1976). The nuclear power issue as a cross-cutting issue to the left-right dimension is analyzed in Vedung (1980) and in Holmberg (1978a).

Communist sympathizers. Followers of the Liberal and Conservative parties were split, while supporters of the Social Democrats were most in favor of nuclear power.

Previously, before the nuclear issue was fully politicized, the pattern of opinion was quite different among party sympathizers.

In the opinion polls taken in 1974, supporters of the Conservative Party were most positive to nuclear power, while followers of the other parties were more skeptical. And most importantly, Social Democratic and Center Party sympathizers had very similar attitudes. It was not until the spring of 1975, that Center Party and Social Democratic supporters parted and went different roads. The supporters of the Center Party followed their party and became anti-nuclear power, while the supporters of the Social Democrats listen to their party and became (or remained) positive to a nuclear expansion.

The Social Democratic party elite was less successful in this opinion moulding process than the Center Party elite. A larger minority of Social Democratic followers was anti-nuclear after the process than Center Party sympathizers who were pro nuclear. This situation was to remain over the years, i.e. Social Democratic supporters being more divided on nuclear power than followers of the Center Party.

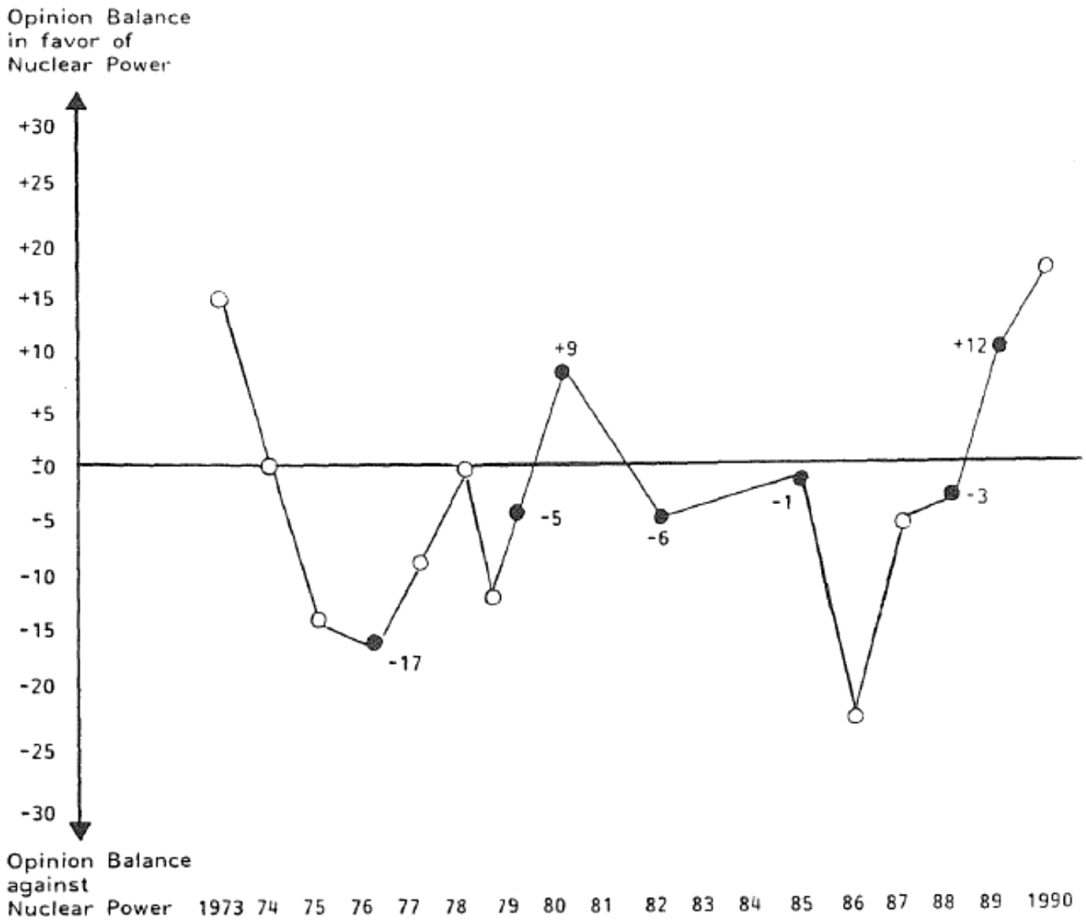
Beginning in the election year of 1976, opinion polls on nuclear power attitudes became more plentiful and probably also more reliable, since we are now dealing with a politicized issue with well publicized policy options. Starting in 1976, we also can draw on data from the Election Studies. The results in Figure l give an overview of how attitudes to nuclear power have developed in Sweden since 1973 all through 1990. For the election years, we have used the results from an Election Studies question on how people classify themselves- for or against nuclear power. It is the only available interview question that has been put the same way all through the years. For non-election years data from various polls have been used to estimate comparable results.

The advantage as well as the main drawback of the simple for or against question (which includes an explicit no opinion response alternative) is that it lacks any concrete policy content, making it possible to use across the years even though the nuclear power debate shifts focus. The drawback is equally obvious. The meaning of being for or against nuclear power might change as the conflict evolves. For our purpose of giving a broad overview of how attitudes to nuclear power have changed in Sweden, this measurement problem is not to serious. To the extent that we can validate the curve in Figure l with other measurements based on questions with more distinct policy options, the results are very similar. No matter what questions are used, the trajectory of nuclear power attitudes looks basically the same. However, the for or against self-placement question tends to give somewhat higher anti-nuclear results than more concrete policy questions.

The trend toward an increase in support for anti-nuclear feelings did not continue after the 197 6 election. The nuclear power issue had been one of the crucial factors behind the Social Democratic loss in the election and the subsequent resignation of the Olof Palme government. In the election campaign, the two pro-nuclear bourgeois parties, the Liberals and the Conservatives, kept a very low profile on the nuclear issue, not to interrupt the Center Party in its attacks on the pro-nuclear policies of the Social Democrats.[7] It was a tactic that paid off. The Social Democrats, but not the Liberals and the Conservatives, lost at the polls because of the nuclear power issue.

[7] Holmberg (1978b) reports an analysis of party profiles and media coverage in the election campaign of 1976.

Figure 1. Attitudes to Nuclear power in Sweden 1973-1990



***Comment*:** For the election years between 1979-1988, the analysis is based on data from the Swedish Election Studies. The res u l t for 1976 come s from Holmberg. Westerståhl, and Branzén, *Väljarna och kärnkraften* (1977). For 1989, the result is based on data from a special survey on attitudes to nuclear power and nuclear waste commissioned by the Nuclear Waste Project at the Department of Political Science in Göteborg with Kent Asp and Sören Holmberg as principal researchers. The interview question was phrased like this: "There are different views on nuclear· power as a source of energy. Which is your attitude? On the whole, are you for or against nuclear power or do you not have any decided opinion on the matter?" The results in Figure 1 are based on a balance measure with proportion of pro-nuclear attitudes subtracted from the proportion of anti-nuclear attitudes, including people with no opinions in the percentage base. The results for the nonelection years are estimates based on different opinion polls conducted by Swedish polling organizations like Sifo. IMU. PUB and FSI. More detailed information is provided in Holmberg and Petersson (1980:141-175, 253-255).

After the 1976 election, Liberals and Conservatives came out forcefully in favor of the nuclear expansion.[8] In the newly formed bourgeois three-party government they "persuaded", alternatively "forced", prime minister Thorbjörn Fälldin of the Center Party to let a completed nuclear reactor in southern Sweden be activated, in spite of the fact that he had promised otherwise in the election campaign.

Immediately a drawn-out debate ensued on deceit in politics and broken election promises. The credibility of Fälldin and the Center Party was hurt and the antinuclear movement lost momentum. The effects on public opinion were dramatic. Anti-nuclear attitudes began to drop while pro-nuclear views became more popular. The pro-nuclear trend was visible across the board in all groups, but it was especially noticeable among supporters of the Conservative and the Liberal parties. The revitalized Liberal and Conservative cues in favor of nuclear power

[8] For a game theoretical and historical perspective on the nuclear power issue in Swedish politics, see Lewin (1984).

were observed. According to poll results from Sifo, Sweden' s largest survey research institute, in half a year after the 1976 election, the proportion of anti-nuclear attitudes decreased from 58 percent to 31 percent among Conservative Party followers and from 64 percent to 35 percent among supporters of the Liberals.[9]

An overview of the development of nuclear power attitudes within parties is presented in Table l. The analysis is based on the for or against question posed in the Election Studies.

Table 1. Attitudes to Nuclear Power Among Supporters of Different Political Parties 1976-1989

	1976	1979	1980	1982	1985	1988	1989
vpk	-30	-60	-58	-58	-47	-40	-23
s	+10	+18	+28	+7	+10	±0	+22
c	-70	-72	-68	-65	-54	-49	-42
fp	-9	-2	+24	-12	-5	+10	+22
m	-5	+30	+57	+30	+39	+60	+64
kds	-73	-50	-66	-70	-61	-37	+9
mp	--	--	--	-86	-68	-68	-49
all	-17	-5	+9	-6	-1	-3	+12

Comment: The results are calculated as measures of opinion balance (see under Figure 1). Positive figures indicate an opinion balance leaning toward a pro-nuclear attitude, while negative figures reveal the opposite, a tendency to anti-nuclear attitudes. The opinion balance measure can vary between -100 and +100.

The downward slide of the anti-nuclear attitudes in public opinion was not interrupted until the fall of 1978. Once more it was something happening on the elite level of politics that triggered the turn around. In October 1978, the Fälldin government resigned because the three bourgeois parties could not agree on how to handle the nuclear power issue. The Center Party left the cabinet and stopped trying to make nuclear power compromises with the Conservatives and Liberals.[10] It gave new life to the debate on nuclear power and provided the anti-nuclear movement with renewed hope. Anti-nuclear attitudes began to increase somewhat again, especially among supporters of the Center Party.

In the spring of 1979, the anti-nuclear movement received another boost caused by the nuclear accident at Three Mile Island in the USA. The proportion of negative attitudes to nuclear power increased by about 5-10 percentage points after the accident. The change occurred in all segments of the population. Among party supporters, it was most pronounced among followers of the Social Democratic Party. One reason for that could have been that a few days after the TMI-accident, Olof Palme and the Social Democratic leadership were the first among the pro-nuclear parties to yield to an old demand by the anti-nuclear movement to hold a referendum on nuclear power. This change - although done under the gallows - was perceived as being anti-nuclear.

The opinion gains accrued by the anti-nuclear movement because of the TMI-accident were not lasting. They crumbled away very fast in the spring and summer of 1979. At the time of the 1979 election in September, public opinion on nuclear power was back to about an even split between pro and anti-nuclear attitudes.

After the 1979 election everybody geared up for the referendum just half a year away in March of 1980. The formal campaign did not begin until after the New Year, but the actual

[9] For an overview of the development of nuclear power attitudes during the years 1976-1980, see Holmberg and Petersson (1980).

[10] Vedung (1979), Larsson (1986), and Petersson (1979) are the best accounts of the government crises of 1978.

campaign started immediately after the parliamentary election was over, with the political parties occupying center stage right from the start. The Social Democrats, Liberals, and Conservatives argued for an expansion of m1clear power before an eventual phase out (what was to be Alternative l and Alternative 2 in the referendum). The Center Party, the Christian Democrats, and the Communists were against a nuclear buildup and favored a phase out of existing reactors in ten years (Alternative 3 in the referendum). At the time Alternatives 1-2 were considered pro-nuclear and Alternative 3 anti-nuclear.[11]

Alternatives 1-2 won the referendum with 58.0 percent of the vote. Alternative 3 received 38.7 percent with 3.3 percent returning a blank ballot. Turnout was 75.6 percent. Thus, the pro-nuclear forces won a resounding victory. The buildup of nuclear power in Sweden could continue. The victory had a catch, though. On the ballot-papers of both Alternative l (supported by the Conservatives) and Alternative 2 (supported by Social Democrats and Liberals) it was stated that nuclear power would be phased out in Sweden sometime in the future. Therefore, following through on the campaign promises in the referendum, the **Riksdag** decided that all Swedish nuclear reactors should be turned off by the year 2010, at the latest.

The referendum was not won for the pro-nuclear side in the formal campaign in the first months of 1980. I t was won earlier in the fall of 1979. I t was the n, under the influence of party campaigns, that positive attitudes to nuclear power pulled ahead of the anti-nuclear attitudes. During the formal campaign, the support of the different alternatives changed very little, although a fair number of individual voters switched alternatives.

Table 2. Party Sympathy and Voting Behavior in the Nuclear Power Referendum 1980

Choice of Alternative	Party Sympathy						Referendum
in the Referendum	vpk	s	c	fp	m	kds	Result
Alternative 1	2	5	4	21	67	9	18.9
Alternative 2	6	74	4	45	13	9	39.1
Alternative 3	90	19	90	28	17	77	38.7
Blank ballot	2	2	2	6	3	5	3.3
Total	100	100	100	100	100	100	100
Number of persons	201	1548	597	239	795	58	
(1) Alt. 1 or Alt 2	8	79	8	66	80	18	58.0
(2) Alt. 1 or Alt 3	90	19	90	28	17	77	38.7
Opinion Balance (1)-(2)	-82	+60	-82	+38	+63	-59	+19.3

Comment: The results are based on the 1980 Referendum Study, which altogether included some 5500 persons in different samples. For more information see Holmberg and Asp, *Kampen om kärnkraften* (1984:22-27, 379-385).

There is no doubt that opinion moulding on the part of the political parties played a very important role behind the opinion shift in a pro-nuclear direction that occurred in the extended referendum campaign that started after the 1979 election. All parties were very successful in mobilizing their own supporters. About 75 percent of the voters in the referendum voted for alternatives that their own party supported.

A substantial majority of all opinion shifts that occurred during the campaign took place among people who originally had different views on nuclear power from their own party. Of all opinion shifts in the attitude to nuclear power, between the 1979 election and the referendum, about four out of five involved persons who changed their views to that of their preferred party. Among the parties, the Center Party and the Communists were most successful in mobilizing their supporters in the referendum. Social Democrats and

[11] The most comprehensive study on the 1980 referendum is Holmberg and Asp (1984). For a more thorough analysis of the role of the media in the referendum campaign, see Asp (1986).

Conservatives were somewhat less successful, while the Liberals had the most difficulty in getting their supporters to vote according to party.

All in all, it is no exaggeration to state that the 1980 referendum was a party election as well as an election on nuclear power, even if, compared to its predecessor the 1957 referendum on pension plans, the impact of party was down a little in 1980. In 1957, close to 90 percent of the voters supported alternatives that their own parties had endorsed.[12]

After the 1980 referendum, nuclear power very quickly lost its position as the most debated issue on the political agenda. The conflict over nuclear power was not solved, however. On election night, the anti-nuclear movement had promised to continue the fight. But fatigue set in. Most people had talked and heard enough about energy problems, even among persons negative to nuclear power. In the media, other topics, like the general strike/lock out of 1980 and the economic problems of Sweden, replaced nuclear power on the front pages.

The nuclear power issue was not depoliticized, but it became less politicized after the referendum. The parties, to a large extent, withdrew from the fight. As would be expected, these changes had effects on the public opinion. Pro-nuclear feelings became less popular. Negative attitudes to nuclear power regained their strength from before the referendum. One way of interpreting this change is that public opinion on nuclear power returned to a "normal state" after the turmoil of the referendum and the heavy involvement by the parties. One important piece of evidence supporting this interpretation is that a majority of the persons who changed to an anti-nuclear position after the referendum were Social Democratic supporters who in 1979 were negative to nuclear power, but voted for Alternative 2 in the referendum. After the party pressure eased, they returned to being anti-nuclear.

After the referendum and the return-to-normalcy effect that followed it, public opinion on nuclear power did not change much for a number of years. On the aggregate level, attitudes to nuclear power were very stable until the Chernobyl accident in 1986. If there was a shift in nuclear attitudes in those years, it was a slow one in favor of nuclear power.[13]

The reactor accident in Chernobyl in late April1986 interrupted this trend, but only temporarily. Like in most other countries, the Chernobyl accident sent pronuclear attitudes plummeting in Sweden. The immediate effect on public opinion was dramatic. Depending on measurements, attitudes to nuclear power became 10-20 percentage points more negative as an effect of the accident. In some measurements, traces of the Chernobyl-effect on Swedish public opinion were still visible two years later, in 1988, but for the most part the impact of Chernobyl was gone within a year of the accident[14]

One effect of Chernobyl that did not disappear after the accident, however, was its impact on the Swedish political agenda. Nuclear power came back as a problem area in the media and it began to be repoliticized. The question on when to start closing down the nuclear reactors became a disputed issue, as well as whether the phasing out process should be over by the year 2010 (as decided after the referendum) or prolonged. Among the parties, the Conservative Party intensified its old opposition to dismantling nuclear power while the Greens, the Communists, and the Center Party were in favor of an even faster phasing out period ending before the year 2010. The Social Democratic and Liberal leaderships were more split, although the official position was to stick to the decision of discontinuing all nuclear power by the year 2010. Within both parties, there were visible pro-nuclear opposition groups. In the Social Democratic Party they were especially strong among trade unionists.

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[12] On the 1957 referendum, see Särlvik (1959).

[13] See Gilljam's analysis in Holmberg and Gilljam (1987:267-271).

[14] For an analysis of the effect of the Chernobyl accident on Swedish public opinion, including comparisons with the effect of the Three Mile Island accident, see Holmberg (1988). The effect of the TMI-accident on American public opinion is analyzed in Nealey, Melber, and Rankin (1983).

Not surprisingly, the remergence of the nuclear power issue affected public opinion on nuclear power. Starting already before the election of 1988, but dramatized after the election, pro-nuclear attitudes became more popular. The shift occurred among all voting groups, not only among Conservative supporters. Even among sympathizers of the Green Party, positive attitudes toward nuclear became more frequent.[15]

Since the pro-nuclear opinion shift in the last two years has affected all voting groups about equally (see table 1), it is difficult to argue that the party factor has played an essential role. A better explanation for the change, albeit on an ad hoc basis, could be that the pro-nuclear force s of Swedish politics (Industry, so me Trade Unions, and the Conservatives) have been far more active in promoting their ideas in recent years than the anti-nuclear movement.

One obvious reason for the pro-nuclear attitude shift in the last couple of years is the fact that the year 2010 is approaching, as well as the time when the first reactor has to be shut down. If the phasing out of nuclear power is to be stopped, the time to stop it is soon. Furthermore, the fact that concrete actions against nuclear power have to be taken in the near future, in order to ensure a completed phase out by the year 2010, is not to the advantage of the anti-nuclear movement when it comes to public opinion. When reactors are shut down, the price of electricity is going to increase. Thus, phasing out nuclear power involves a cost factor and drawing nearer pay up time is not helpful to anti-nuclear attitudes in the public opinion. It is always easier to be for or against something in the abstract and in the distant future. Attitudes become more difficult to live up to when the time comes to realize them.

But the party factor should not be counted out. The nuclear power issue is making a comeback in Swedish politics, but the degree of politicization is not yet, and was not in the years 1988-1990, nearly as high as in the previous peak years around the referendum.

On the mass level, the strength of the correlation between party and nuclear attitudes could be viewed as one indicator of the degree of politicization of the issue. As is evident in Table 3, the structuring of nuclear attitudes by the party factor was at its highest in Sweden at the time of the referendum.

Table 3. Degree of Politicization Among Voters: Attitude Differences to Nuclear Power Between Voters Supporting Different Political Parties 1976-1989

	Attitude difference between voters supporting		Eta correlation between party and
Year	s and c	m and mp	nuclear power attitude
1976	80	--	.45
1979	90	--	.45
1980	96	--	.49
1982	72	116	.40
1985	64	107	.37
1988	49	128	.42
1989	64	113	.43

Comment: The eta correlations are based on analyses employing party sympathy of the respondents (six parties 1976-1980. seven parties 1982-1989) as independent variable and nuclear power attitude (for or against) as dependent variable. The attitude difference measures, is based on the previously presented measure of opinion balance. l t is a difference measure between pairs of opinion balance measures. In theory it can vary between O (min) and 200 (max). If we restrict the correlational analysis to the five old parties, the eta values become - from top to bottom: .45, .49, .38, .34, .38 and .38.

In the 1980s, the correlation between party and attitudes to nuclear power has been lower, both when we compare with the referendum and with the late 1970s. In an absolute sense, and compared to other issues, the late 1980's correlation between party and nuclear power attitude

[15] See Westerståhl and Johansson (1990) for a study of nuclear power attitudes and attitude change during the years 1986-1990. See also Holmberg (1989b).

could not be regarded as lo w, however. Doubtlessly, it is smaller than the comparable correlations between party and most left-right issues. They usually hover around .50 to .70 (eta) compared to .43 for nuclear power in our 1989 study. But if we compare the party correlations for nuclear power attitudes with similar correlations for other related issues, it is obvious that the party structuring of nuclear power attitudes is comparatively strong, even in the late 1980s.

Table 4. Attitude Differences Between Voters Sympathizing with Different Political Parties on nuclear and Green Issues 1989

Year	s and c	m and mp	Eta correlation between party and nuclear power attitude
Nuclear power			
Self-placement:for vs against	64	113	.43
Phase-out 2010 vs use or phase out later	45	108	.40
Start phase out vs later or not at all	51	113	.41
Nuclear waste			
Definitively closed storage vs storage with control possibilities	6	16	.11
Local veto on placement vs no local veto	27	41	.16
Storage in granite rock is suitable vs not suitable	31	54	.23
Waste-management plan is acceptable vs not acceptable	20	40	.18
Environmental issues			
Lower speed limits on roads	7	87	.23
Forbid plastic bottles and aluminum cans	5	32	.21
Ban inner-city driving	4	73	.27
Ban chemicals in farming	28	35	.09
Stop all plans of building new coal power plants	7	8	.11

Comment: The results are based on a survey with adults in the fall of 1989. Sample size was 2500. Principal investigators are Kent Asp and Sören Holmberg of the Nuclear Waste Project at the Department of Political Science in Göteborg.

No matter how we measure it, the correlation between party and attitudes to nuclear power is clearly stronger than the same correlations for a set of much discussed environmental issues. It is obvious that attitudes on most green issues are much less structured by party than the nuclear power issue. The same is also true for a set of issues that is not yet discussed much in Sweden, but which could become more disputed in the near future. Those issues are the problems associated with the handling of nuclear waste. According to plans, in a couple of years, Sweden will decide on how to permanently store the most toxic waste from nuclear reactors. As is evident by the results in Table 4, the waste issues are not politicized yet, at least not on the mass level. The correlations between party sympathy and attitudes on different waste issues are still low.

Thus, in the family of energy and environmental issues belonging to the new green dimension of Swedish politics, the old nuclear power issue is still towering as the most partisan issue. Back in the 1970s, the nuclear power issue got the new alternative dimension going. Now, in the early 1990s, it is still the backbone of the alternative green dimension, at least on the mass level.

The results in Table 5 sums up our historical overview. They show the current (1989) relationship between party sympathy and attitudes to the most disputed policy question related to nuclear power in present-day Sweden. That question is, if and when, nuclear power should be phased out- in the year 2010, or earlier, or later, or not at all.

Table 5. Party Sympathies and Attitudes to If and When Nuclear Power Should Be Phased Out in Sweden. Results from a Study in the Fall of 1989

	Party Sympathy							
Attitude to Phasing Out Nuclear Power	vpk	s	c	fp	m	kds	mp	all
Shut down immediately	15	3	9	1	1	3	10	4
Phase out faster than by 2010	17	9	17	12	4	14	31	11
Phase out by 2010	31	27	37	22	13	29	31	25
Phase out slower than by 2010	14	27	16	31	26	26	14	24
Use nuclear power, don't phase out	18	23	13	24	47	20	5	25
No pinion, don't know	5	11	8	10	9	8	9	11
Total	100	100	100	100	100	100	100	100
Number of Persons	78	587	153	228	324	35	124	1862
(1) phase out to 2010 or faster	63	39	63	35	18	46	77	40
(2) Use or phase out slower	32	50	29	55	73	46	19	49
Opinion balance (2)-(1)	-31	+11	-34	+20	+55	±0	+53	+9

Comment: The results are based on the Nuclear Waste Project's survey in the fall of 1989.

The party structuring of attitudes is clearly down compared to the situation at the time of the referendum (see Table 2). All parties today, even the Greens and the Conservatives, have sizeable minorities among their supporters who are opposed to the nuclear policies of their chosen party. As in 1980, the Social Democrats and Liberals are most split. For both parties, the situation is somewhat worrisome, since a majority of the two parties' own supporters do not agree with the formal leadership position that nuclear power should be phased out in Sweden by the year 2010.[16] Most Social Democratic and Liberal supporters want to use nuclear power or phase it out slower.

The old conflict pattern is still present. Supporters of the Communist Party and the Center Party, joined by the followers of the Greens, clearly lean toward being in favor of shutting down nuclear power by 2010, at the latest, while a large majority of Conservative sympathizers favor retaining nuclear power after 2010. Social Democratic and Liberal supporters are divided, but the majorities are in both cases positive to a continued use of nuclear power after 2010. Thus, the party structuring of nuclear power attitudes may be somewhat weaker today, but the pattern remains the same as when the nuclear power issue was first politicized. Apparently, the repoliticized nuclear power issue of the 1990s will be fought out as a rematch in old familiar terrain.

Party Driven Attitudes

The argument is not that party means everything, to the exclusion of all other explanatory variables, when it comes to nuclear power attitudes in Sweden. We are not putting forth a mono causal theory of attitude formation. We are well aware that a multitude of other variables beside party, plays a significant role as structuring factors behind attitudes to nuclear power. We are also aware that these other variables of relevance must be taken into account before the importance of the party factor has been proven. l t is not enough to give a historical overview, no matter how convincing, and present bivariate correlations based on cross-sectional data. More bard evidence is necessary to prove the point.

Some such evidence is going to be discussed in this section. Based on data from multivariate as well as multilevel analyses, and studies based on panel data, we will try to prove further the importance of party in the formation of attitudes to nuclear power.

We start by investigating an obvious prerequisite for party influence on mass attitudes - people's knowledge of the standpoints of the parties. If the issue positions of the parties are

[16] As of late 1990, the Liberal party leadership has signaled that the party no more supports the policy of phasing out all nuclear power by the year 2010. The Liberals are now in favor of retaining nuclear power after 2010.

unknown to the public, it is difficult to envisage how parties can influence mass attitudes. The importance of this factor was stressed in **The American Voter**, but often overlooked since.

The results in Tables 6-8 show that the Swedish people, going back all the way to the election of 1976, have bad a satisfactory knowledge of the nuclear power positions of the parties. Large majorities have consistently been able to indicate correctly the positions of the major parties.

Table 6. Perceptions of Party Positions on Nuclear Power Expansion Among Swedish Adults Just After the Election of 1976

Perception	vpk	s	c	fp	m
Party in favor of expansion	9	84	1	52	64
Party agains expansion	63	3	87	28	15
Don't know	28	13	12	20	21
Total	100	100	100	100	100

Comment: The results are based on a more elaborate analysis using specified policy alternatives as response alternatives and, in turn, asking about every single party's position. For more details see Holmberg, Westerståhl. and Branzén (1977:97-104 l . The accurate perceptions are underlined

Table 7. Knowledge of Which Alternative the Political Parties Supported in the 1980 Nuclear Power Referendum Among Eligible Voters Just After the Campaign

Perception	vpk	s	c	fp	m
Party supported Alternative 1	2	5	1	10	86
Party supported Alternative 2	3	86	3	75	4
Party supported Alternative 3	85	2	90	3	1
Don't know	10	7	6	12	9
Total	100	100	100	100	100

Comment; Like in table 6, the results are based on a set of closed-ended questions, asking the respondents about each party's position.

Table 8. Perceptions of Party Positions on Nuclear Power Phase Out Among Eligible Voters in the Fall of 1989

	Perception:			
party	(1) party in favor of phasing out nuclear power faster than by 2010	(2) party in favor of phasing out nuclear power by 2010	(3) party against nuclear power being phased out by 2010	party in favor of phasing out nuclear power by 2010 or faster. (1) and (2) added together
vpk	19	10	1	29
s	14	49	7	63
c	46	22	1	68
fp	4	22	7	76
m	2	5	60	7
kds	2	2	0	4
mp	49	13	1	67

Comment: The results are based on data from three open-ended questions asking the respondents which party or parties were in favor of: (1) phasing out nuclear power faster than by 2010. (2) phasing out nuclear power by 2010, or (3) were against nuclear power being phased out by 2010.

The measurement instruments differs somewhat, but to the extent that we can compare, it is evident that the perceptual accuracy in pin pointing the parties' positions was at its highest at the time of the referendum. On average, people's knowledge of the nuclear power positions of the parties was not as widespread in 1976 or in 1989. It is difficult to compare the results of

1976 and 1989. Among other things, an open-ended question technique was used in 1989. But taken at face value, the results indicate a somewhat higher level of knowledge in 1976 compared to 1989. Thus, there is a correspondence across time between people's knowledge of party positions and the degree to which the party factor has structured nuclear power attitudes. The same kind of connection exists at the individual level. Persons with accurate perceptions of their own party's nuclear position are more likely to hold the same position as their party than persons with no knowledge of their preferred party's position.

Of course, having knowledge of party positions is not sufficient evidence of being influenced by that knowledge when forming personal opinions. In order to substantiate influence we have to study individual change. Therefore, the best proof that people really have been influenced by their party when forming attitudes to nuclear power has to be collected from panel studies. Using across-time data, if we can show that people have a tendency to form or to change nuclear attitudes in accordance with their own parties, we have strengthened our case considerably.

Table 9. The Parties as Successful Opinion Molders in the Nuclear Power Referendum Proportion of Voters With Stable Party Preferences and Different Nuclear Power Attitudes Before the Campaign Who Voted for Their Own Party's Alten1ative in the 1980 Referendum

	Nuclear power attitude in 1979		
Party preference both 1979 and 1980	Nuclear power attitude the same as own party's	No nuclear power attitude	Nuclear power attitude contrary to own party's
vpk	94	100	56
s	94	82	56
c	94	90	38
fp	90	59	22
m	93	82	49
all	93	80	51

Comment: The analysis is based on data from a 1979-80 panel that was part of the 1980 Referendum Study. For more details, see Holmberg and Asp (1984:385-405)

Table 10 Party Preference as a Potential Influence Behind Change in Attitudes to Nuclear Power. Results from Five Swedish Panel Studies.

	Panels				
	1976-1979	1979-1980	1979-1982	1980-1982	1985-1988
Among all people who changed their attitude to nuclear power, the proportion who did it in accordance with their own party's position	62	71	47	35	41

Comment: The results are based on panel data from the Election Studies. For more details about the analyses see Holmberg and Asp (1984: 396-405, 426-436). Given the way we have operationalized the variables for party and nuclear power att1tudes, a null model with all people choosing, and changing party and attitudes to nuclear power in a random fashion, would yield a result of 33 percent.

In Tables 9 and 10, results from a series of such panel analyses are presented. The outcomes are very unequivocal. There is a pronounced tendency for persons with no nuclear attitudes or attitudes different from their own party's to change their position to that of their party.[17]

[17] Of course, cross-pressured between party and attitude, people do not have to change attitude to avoid dissonance. They can also change party. Empirically, among persons in a 1979-80 panel with a conflict between their nuclear power attitudes and their party sympathies, about 45 percent switched attitude while only l O percent changed party group. Very similar results emerged from a 1976-79 panel, with 48 percent attitude changers versus 14 percent party group changers. For more details

The tendency was strongest when the referendum was approaching (panel of 1979-80), but clearly also occurred both before and after. In the referendum, among people with stable party preferences and no decided opinion on nuclear power when the campaign started, full y 80 percent of those who eventually went to the polis voted in accordance with their party's position. Among stable party sympathizers with nuclear power attitudes contrary to their own party' s at the beginning of the referendum campaign, and who later voted (a clear majority of them did vote), 50 percent changed opinion and supported their party' s alternative. A large majority of people with s table party sympathies already bad the same nuclear power opinion as their party when the campaign started. Very few of them changed their views during the referendum campaign. No less than 93 percent of them who voted- and over 90 percent of them did vote- supported their party's position.

If we also include party switchers in to the analysis and investigate the extent to which changes of attitudes to nuclear power have been in accordance with stable or changed party sympathies, the results are quite revealing. In the panels covering the years 1976-79 and 1979-80, a clear majority of all changes of opinions on nuclear power were in agreement with the person's stable or acquired party preferences. The changes could have been influenced by the party factor. The corresponding results for the panels covering the 1980s (1980-82 and 1985-88), indicate a much smaller influence of party on changes in nuclear power attitudes. In the 1980s, less than half of all individual changes in attitudes to nuclear power could be attributed to the influence of party preferences.[18]

The panel results fit in nicely with our previous analysis. As would be expected, given our theoretical perspective, they show that in the years 1976-80, when the nuclear power issue dominated Swedish politics and was a very politicized problem, party played a much larger role in shaping and changing individual attitudes, than in the 1980s when the nuclear power issue became much less politicized.

Naturally, our argument that the party factor is an important explanatory variable behind nuclear power attitudes in Sweden- especially when the issue is politicized - would be greatly strengthened if we could show that party has an effect on nuclear power attitudes independent of other factors. Thus, the question is if party has any sizeable effect on peoples nuclear power attitudes after we have taken account of such relevant variables as gender, occupation, ideological views on environmental issues, and risk assessments. For the period in which we have been able to test a comprehensive model of this kind, the answer is clearly yes. That period is the referendum.

Based on data from the 1980 referendum study, results from multivariate regression analysis show that the party factor had an independent effect on nuclear power attitudes as well as on how people voted in the referendum. The party effect was decidedly stronger than the effect of the green ideological factor, but smaller than the effect of the risk assessments. The latter finding is not surprising if we conceive of the risk assessment factor as being closer, in a causal modeling sense, to people’s nuclear attitudes than the party factor. In the referendum study, we found a model of this kind to be very powerful. As it turned out, people's party sympathies did not only have a direct effect on how they voted in the referendum. They also had a very clear effect on how people assessed various risks associated with nuclear power. The parties affected both risk assessments and attitudes to nuclear power.[19]

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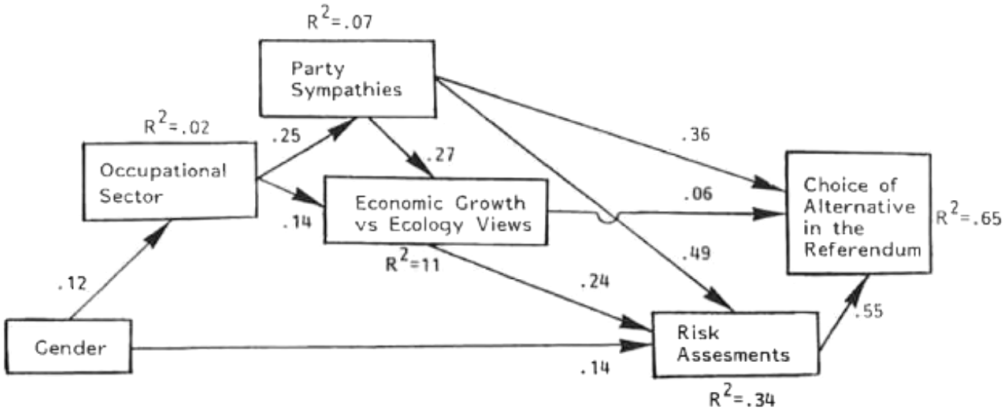
see Holmberg and Asp (1984:404). Comparative results from the 1985-1988 Election Studies panel were almost identical with 49 percent of cross-pressured persons changing nuclear attitude in accordance with their party, while 11 percent switched party group to fit their nuclear attitude.

[18] The analysis based on the 1985-88 panel draws on an interview question dealing with whether it is a good idea or not to employ nuclear power after 2010. Among the parties, at the time, it was only the Conservatives who thought it was a good idea.

[19] For more details, see Holmberg and Asp (1984:509-517).

Figure 2. Choice of Alternative in the 1980 Nuclear Power Referendum in Sweden - An Explanatory Model (regression coefficients)



Comment: The analysis is based on data from the Referendum Study of 1980; see Holmberg and Asp (1984:514)l for details. All variables have been dichotomized in the following manner: *Choice of Alternative In the Referendum* - Alternative 1 and 2 vs Alternative 3. *Risk Assessments* - preponderance of pro-nuclear risk assessments vs preponderance of anti-nuclear risk assessments, *Economic Growth vs Ecology Views* - economic growth orientation vs ecology orientation. *Party Sympathies* – s, fp. and m vs c. vpk and kds. *Occupational Sector* – production, trade, communication and administration vs agriculture, health care and education. *Gender* - men vs women. Only significant coefficients (p=.01 l larger than .05 have been included in the Figure.

Our last evidence supporting the argument that attitudes to nuclear power in Sweden are influenced by party is more indirect. This time the outcome is less clear cut than was the case with the results from the panel studies and regression analyses. In all likelihood, the main reason for this difference lies in the fact that this last analysis deals with data from the late 1980s, while most of the previous investigations dealt with data from the referendum period, when the nuclear power conflict peaked in Sweden.

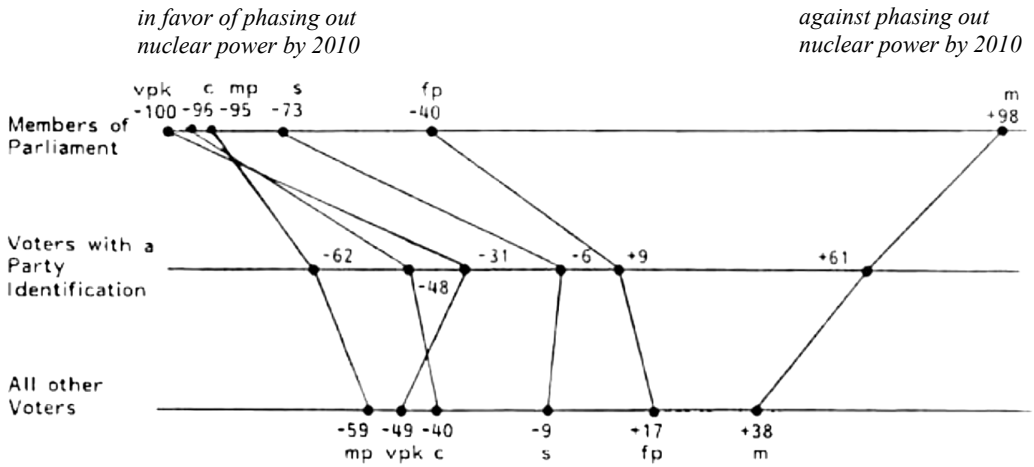
In 1988, under the auspices of that year's Election Study, all members of the Swedish parliament were included in a survey.[20] The purpose of the study was to analyze questions related to representative democracy, for example, the degree of policy congruence between elite and mass in Sweden. However, the availability of this elite study is also useful for our present purpose. We can employ it to compare elite and mass attitudes to nuclear power and use the results in a discussion of representational models.

Previous studies have indicated that the Swedish system is far from the idealistic nation of popular representation run from below. A more elitist model, with a clear emphasis on policy leadership on the part of the political parties, fits the available data much better.[21] The problem is which model is best suited for the nuclear power issue. Presumably it is the elitist model, where mass attitudes are shaped more from above then elite attitudes are shaped from below.

The across-levels analysis of nuclear power attitudes in Figure 3 do not answer the question in any conclusive way, but ma y give some credence to the elitist model of opinion formation.

[20] On the 1988 Election Study, see Gilljam and Holmberg (1990).
[21] See Holmberg and Esaiasson (1988) and Holmberg (1989a).

Figure 3. Policy Agreement on the Nuclear Power Issue Between Members of Parliament and Voters with Different Strength if Party Identification



Comment: The results (opinion balance measures) are based on data from the 1988 Election Study as well as on data from a mail questionnaire study with all members of the Swedish Riksdag in the fall of 1988 (the response rate was 96 percent l. For more details about the Study of the Parliamentarians, see Holmberg and Esaiasson, *De folkvalda* (1988).

The results show the extent of policy agreement between members of parliament and voters with different degrees of party identification. If an elitist mode of policy formation is the dominant process, we would expect to find more polarized party elites than party voters. Furthermore, among voters we would expect partisans to have views closer to the opinions of the party elites than other voters. If opinions originate and primarily disseminate from above, and if involvement and party loyalty play a role in the process, this is the pattern we would expect.

Most of the expectations of the elite model are borne out in the results in Figure 3. Compared to voters, party elites in the **Riksdag** are far more polarized on the nuclear issue. The difference between voter attitudes and the attitudes of the members of parliament is especially pronounced among Social Democrats. In 1988, Social Democratic voters were fairly evenly split as to when nuclear power should be phased out. 46 percent supported the official party position that all reactors should be shut down by the year 2010, while 40 percent wanted to continue to use nuclear power after 2010. Among Social Democratic members of parliament opinions were quite different. Avery large majority, 86 percent, favored the party line of dismantling all reactors by 2010. Only 13 percent among Social Democratic members wanted to postpone the phase out process or employ nuclear power in the future.

Among voters, the attitude divergence between persons with different strength of party identification is not as distinct as the opinion disparity between voters and members of parliament. But the expected pattern is most often there. In all voting groups, except among Communists and to a certain extent also among

Social Democrats, people with a party identification had nuclear power attitudes most akin to the views of their party's members of parliament. Voters with no party identification were less polarized on the nuclear power issue and had, on average, opinions farther removed from those of the party elites in parliament.

The conclusion of our across-level analysis can be phrased in a straightforward manner. The results from our study of elite and mass attitudes to nuclear power lend more support to an elitist mod el of policy representation in Sweden than to the competing notion of popular representation run from below. What could be called a Eulauean conclusion is not out of place, even if it is drastic. Heinz Eulau, an American political scientist, in a eview of Converse and Pierce's book Political Representation in France, discards most of the ideas

about influence from below that he thinks "pervade all the current models of representative democracy". Eulau proposes a different model that acknowledges the existence of party elites and the prevalence of opinion formation from above. "In all modem representative democracies", says Eulau, "it is the electorate that responds in a more or less active manner to elites' policy initiatives, thus indeed having some 'power' ... to hold the elites responsible within a policy framework set by the elites rather than by the citizenry". [22] Heinz Eulau's model can be construed as cynical or realistic, depending on one's own perspective, but it says something essential about the Swedish political system and about how nuclear power attitudes have evolved in Sweden.

Nuclear Power Attitudes Influenced by Parties and Accidents

The most important factors explaining the structure and movement of mass attitudes to nuclear power in Sweden have been the positions taken by the leaders of the political parties and the occurrence of major accidents. The influence of the positioning of party elites have been more lasting and longterm. The impact of accidents have been dramatic but shortterm. Three Mile Island in 1979 and Chernobyl in 1986, shook public opinion like earthquakes, elevating fears of nuclear power and suppressing pro-nuclear attitudes, but only for limited periods of time.

The single most important factor explaining how the conflict over nuclear power has evolved in Sweden, both on the elite and mass levels, is the anti-nuclear stance taken by the Center Party in 1973. The Swedish Center Party was the first major party in the world which went against nuclear power, and by doing so, it not only started one of the most heated political conflicts in Swedish history, it also began what was to develop into an entirely new issue dimension in Swedish politics.

Starting in 1973-75, the standpoints taken by the political parties for or against nuclear power and the degree to which the issue has been disputed on the elite level, have been the primary factors behind the movement of public opinion. Party elites have played a very important role as formulators of policy alternatives and opinion moulders.

Looking forward into the 1990s and the repoliticized conflict over nuclear power, i t is by no means certain that the parties will be as successful in influencing public attitudes as they were in the 1970s. Trust in parties and politicians is much lower today than in the 1970s. The same is true for the proportion of party identifiers, especially strong identifiers. The Swedish parties' grip over their voters has slackened, meaning that successful opinion moulding will be more difficult in the 1990s. Perhaps, the rather dramatic pro-nuclear opinion shift in the last couple of years is the first signs of this new development. The anti-nuclear parties have not been able to stop the pro-nuclear change, not even among its own sympathizers.

[22] Eulau's review appeared in Legislative Studies Quarterly 1987:171-214.

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Chapter 2

Nuclear Power Supporters Maintain Lead in Sweden

Sören Holmberg

What happened in 2003 was not a chance occurrence. For the first time nuclear power supporters were more numerous than nuclear power opponents in Sweden. In the latest 2004 SOM survey nuclear power supporters maintained their lead, although with a somewhat smaller advantage than the previous year: 45% want to use nuclear power in the long term, compared with 36% who want to abandon it. In the 2003 survey the proportion of nuclear power supporters was 46%, compared with 34% opponents (see Table 1 and Figure 1).

Table 1 Views on the long-term use of nuclear power in Sweden (per cent)

question: "What is your view on the long-term use of nuclear power as an energy source in Sweden?"

view	1996	1997	1998	1999	2000	2001	2002	2003	2004
phase out nuclear power by 2010 at the latest	22	19	17	16	15	14	12	12	11
phase out nuclear power, but use the nuclear reactors we have until they have served out their time	31	32	40	34	29	28	27	22	25
use nuclear power and then renovate the nuclear reactors, but do not build more	18	19	21	19	26	29	28	31	30
use nuclear power and invest in more nuclear reactors in future	6	7	5	7	10	9	11	15	15
no particular view/no response	23	23	17	24	20	20	22	20	19
total per cent	100	100	100	100	100	100	100	100	100
number of people	1779	1754	1740	1703	1704	1739	1777	1818	1774
proportion phase out	53	51	57	50	44	42	39	34	36
proportion use	24	26	26	26	36	38	39	46	45
net balance, phase out	+29	+25	+31	+24	+8	+4	±0	-12	-9

Comments: The wording of the question in the years 2000-2004 was somewhat different to the wording in the years 1996-1999.

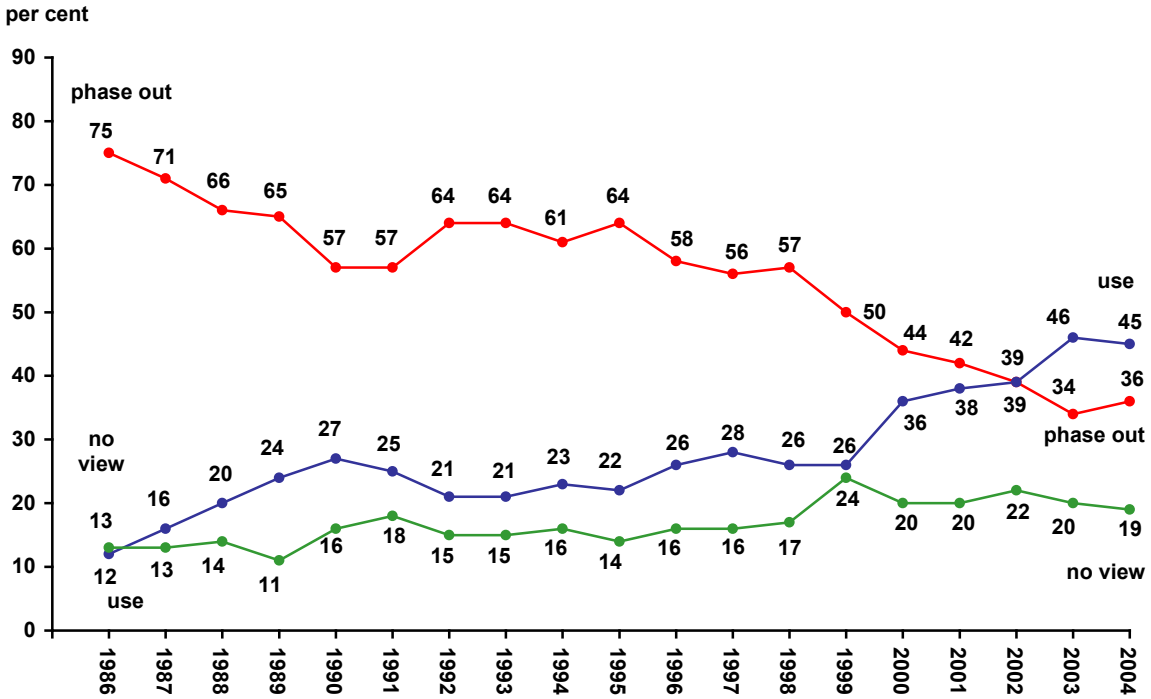
It should be noted that we are not talking about short-term opinions concerning current nuclear power disputes, such as, for example, the closure of the Barsebäck reactors. When it comes to immediate issues of that kind, the positive opinion towards nuclear power was already stronger than the negative opinion. The closure of Barsebäck I in 1999 was carried out against majority opinion, not with it. The same applies to this year's closure of Barsebäck II.[1]

What we are talking about is the long-term use of nuclear power in Sweden – whether it should be used as an energy source or not. And in this regard Swedish opinion has always clearly favoured phasing out rather than use, ever since the battle over nuclear power was started in the middle of the 1970s (Holmberg, Westerståhl and Branzén 1977). But it changed in 2003 when the supporters of nuclear power overtook the opponents for the first time.[2]

[1] In a SIFO survey from January 2003, 62% responded "no" to the question "Do you think that the nuclear power station Barsebäck 2 should be closed, or not?". The proportion that responded "yes" was 24%, while 13% were doubtful or responded "don't know" (Sifo 2003). Broken down by party preference, the results look as follows: Left Party no 37%/yes 50%; Social Democrats 62/23; Centre Party 46/44; Liberal Party 76/18; Moderate Party 86/9; Christian Democrats 75/11 and Green Party 27/63. The outcome points to a clear leaning towards "no" among supporters of the Social Democrats, the Liberal Party, the Moderate Party and the Christian Democrats, a slight leaning towards "no" among Centre Party supporters, a slight leaning towards "yes" among Left Party supporters and a clear leaning towards "yes" among Green Party supporters. In other words, the Social Democrat Government does not have a majority of its own voters behind it on the decision to close Barsebäck II. In fact, a clear majority of Social Democrat supporters are against closing Barsebäck II (62%). On the other hand, this situation is not news. A majority of Social Democrat voters were also against starting the phasing out of nuclear power in 1999 (Holmberg 2000:326).

[2] An historic perspective on the development of opinions on nuclear power can be found in the booklet "Kärnkraftsopinionen 25 år efter folkomröstningen" ("Opinions on nuclear power 25 years after the referendum"). The measurements were carried

Figure 1 Phase out or use nuclear power in the long term? Development in opinion 1986-2004 (per cent)



Comments: See Table 1 for the wording of the survey question in 2004. Response options 1-2 have been defined as "phase out", while response options 3-4 have been classified as "use". In the years 1986-1997 and 1996-1999 a slightly different survey question was used. In Figure 1 the older five-part survey question was used for the years 1986–1997 and the new four-part one thereafter.

At the time of the 1980 referendum opinions were very different, with 66% wanting the phasing-out of nuclear power in the long term, against 30% preferring to use nuclear power (Holmberg and Asp 1984). Immediately after the Chernobyl accident in 1986 the proportion who wanted to phase out nuclear power increased to as much as 75%, against a record low of 12% who wanted to keep it (Holmberg 1988).

The favourable wind for supporters of nuclear power has even meant that the proportion of people who not only want to use existing reactors, but also want to actively invest in more nuclear reactors increased from 2% in 1980 to 6% in 1996 and 15% in 2004 – still a minority, but a slowly growing minority. Other measurements in the SOM survey point in the same direction. Opinion is shifting towards more support for using nuclear power and towards increased support for building more reactors (see Table 1 in Per Hedberg's chapter).

The recovery in opinion on the side of nuclear power supporters came in two stages. First at the end of the 1980s when the immediate effects of Chernobyl faded away. Then in the most recent five-year period when the phasing out of nuclear power started, the electricity market was exposed to competition and electricity prices increased dramatically. All this over a twenty year period in which no serious nuclear accidents have occurred.

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out by Temo and financed by the organisation Kärnkraftssäkerhet och utbildning AB (Nuclear power safety and education AB) which is close to the nuclear power industry. See Modig (2005).

Table 2 Phase out nuclear power in the long term

statement: "Sweden should phase out nuclear power in the long term"

	1998	1999	2000	2001	2002	2003	2004
very good proposal	22	21	22	19	17	14	14
quite good proposal	25	23	22	21	23	19	19
neither good nor bad proposal	21	22	21	23	23	23	23
quite bad proposal	16	16	18	17	17	20	20
very bad proposal	13	13	12	14	14	19	18
no response	3	5	5	6	6	5	6
total per cent	100	100	100	100	100	100	100
number of people	3561	3503	1842	3638	3606	3675	3612
proportion good	47	44	44	40	40	33	33
proportion bad	29	29	30	31	31	39	38
net balance, good proposal	+18	+15	+14	+9	+9	-6	-5

Not as Dangerous

The reduced opposition to nuclear power is clearly connected with people's assessment of risk. Nuclear power is not regarded to be as dangerous now as it was twenty or thirty years ago. It has been a long time since anything nasty occurred. The risk of a major nuclear accident in Sweden was given on average – on a scale of 1 (low risk) to 10 (high risk) – a value of 6.2 by the Swedish people in 1980 and 6.8 in 1986 immediately after the Chernobyl accident. Today in the 2000s the corresponding risk assessment is much lower, 5.4 in 2004 (see Table 3). This is one of the main reasons for the reduced opposition to nuclear power in Sweden. But it does not explain why opposition has declined in recent years. The danger of nuclear power has not been judged to be declining in the past six to seven years. The level of risk is perceived as roughly the same today as at the end of the 1990s. In other words, no toned-down risk assessments lie behind the shift in opinion in favour of nuclear power in recent years.[3] In the short term other factors have had an effect.

[3] The correlation at the level of individuals between views on nuclear power and various risk assessments is strong, but in many cases even these have diminished in recent years, with one exception – the risk that eastern Europe cannot safely manage its nuclear power. The correlations is as follows in some SOM studies in various years. The risk of a reactor accident in Sweden: .62 1986, .57 1993 and .50 2004. The risk that we cannot safely manage the ultimate disposal of nuclear power in Sweden: .61 1986, .55 1993 and .53 2004. The risk of the spread of atomic weapons: .45 1986, .43 1993 and .36 2004. The risk that eastern Europe cannot manage nuclear power safely: .13 1995, .16 2002 and .20 2004. In other words, it is the assessments of the Swedish-related nuclear power risks that are most strongly linked to the views on the future of nuclear power in Sweden.

Table 3 Risk assessments on the question of nuclear power 1980-2004 (average)

question: "What is your view on the following risks which have been discussed in connection with nuclear power? How big is the risk …"

How big is the risk:	80	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04
that nuclear power leads to more and more countries obtaining nuclear weapons?	6.2	6.8	6.5	5.8	5.7	5.5	5.9	5.7	5.9	5.8	5.6	5.9	5.2	5.2	5.5	5.0	5.0	5.2	5.4	5.4
that we in Sweden cannot manage and ultimately dispose of nuclear waste in a safe way?	---	6.1	6.1	5.8	5.7	5.2	5.4	5.3	5.1	5.3	4.8	5.2	4.5	5.0	4.6	4.8	4.6	4.5	4.7	4.5
of a major accident with radioactive discharge at a nuclear power station in Sweden?	4.8	4.8	4.4	3.9	3.9	3.5	3.7	3.7	4.0	3.9	3.6	3.9	3.7	3.6	3.6	3.5	3.6	3.4	4.0	3.6
that the countries of eastern Europe cannot manage their nuclear power stations and nuclear waste in a safe way?	---	---	---	---	---	---	---	---	---	8.8	8.7	8.9	8.4	8.5	8.5	8.5	8.2	8.1	8.2	8.0

Comments: The average can vary from 1.0 (very low risk) to 10.0 (very high risk). The figures for 1980 are taken from *Kampen om kärnkraften* (The battle over nuclear power) by Sören Holmberg and Kent Asp (1984: 476). A "–" indicates that the question was not asked.

Electricity Price Sensitivity

A factor on which there is speculation is the increases in electricity prices. There has been talk of continued high electricity prices, or even increasing prices, if nuclear power is phased out. However, we do not have any firm evidence that the increased electricity prices have really influenced opinion in favour of nuclear power. But it is thought that groups sensitive to electricity prices in particular are among those who have become more positive towards nuclear power – self-interest shall have kicked in. However, a more thorough test of such a hypothesis cannot be carried out since we lack data on people's electricity price sensitivity over time. But we are not entirely at a loss. On at least one occasion the Swedish people's economic sensitivity to the price of electricity has been measured. That is in the 2004 SOM survey. We cannot measure the time-series relationship, but we can examine the link at the level of individuals between views on nuclear power and electricity price sensitivity.

We asked: "How financially dependent is your household on the price of electricity?" There were four response options from very dependent to not dependent at all. The results show that a majority indicated that they were very dependent or quite dependent on the price of electricity (58%), while a quite large minority responded that there were not particularly or not at all dependent (38%). According to the hypothesis, we would expect to find a larger proportion of nuclear power supporters among electricity price sensitive people than among those who say they are not particularly financially dependent on the price of electricity. The results point to a directly reversed relationship. Electricity price sensitive people tend to be somewhat *less* positive towards using nuclear power that people who are not electricity price sensitive. The most positive towards nuclear power are people who say that they are not at all financially dependent on the price of electricity (see Table 4). The relationship is relatively weak, but it does go in the opposite direction to that predicted by the self-interest hypothesis.

The results may be somewhat surprising to those who believe that *Homo Economicus* always makes his presence felt. In this case we must look deeper to find his faint shadow. If we control for income – which is important because rich people are both less electricity price

sensitive than poor people and more positive towards nuclear energy – it transpires that the relationship is the one expected, although very weak. That is to say that within each income group electricity price sensitive people tend to be somewhat more positive towards nuclear power than people who are not particularly electricity price sensitive. The factor "electricity price sensitivity" thus has the expected effect on attitudes to nuclear power, but the effect is very modest.

Unchanged Social Patterns

The big changes in views on the issue of nuclear power in recent years have not given rise to any new patterns with regard to which social and political groups tend to be for or against nuclear power. Old truths still apply. The front lines are the same as in the 1970s. It is still women, young people, low earners and people living in rural areas who tend to be most negative towards nuclear power. Men, older people, people living in towns and high earners provide the core of nuclear power supporters today just as in the 1970s (see Table 4). However, the differences in views between various social groups should not be exaggerated. They exist, but they have always been relatively modest.

Left-Right

The differences in views between different political groups are far more interesting. Here we find much bigger differences. People's views on nuclear power are primarily shaped by political and ideological factors, not by social circumstances or by short-term economic considerations. The results in Table 4 illustrate very clearly that political factors, such as left-right ideology, green attitude and party preference, have a very obvious link with people's views on nuclear power. And again things are largely reminiscent of the 1970s when it comes to political party and green attitude, but, interestingly enough, not when it comes to left-right ideology. Today, as in the years surrounding the 1980 referendum, the largest proportion of nuclear power opponents are among Left Party, Green Party and Centre Party supporters, while nuclear power supporters are clearly strongest among the Moderates.[4] The new environmentally critical attitudes of the 1970s also tended to be anti nuclear power and they still are in the 2000s (Bennulf 1994). But when it comes to the left-right dimension a clear change can be seen. In the 1970s there was no connection between views on nuclear power and left-right. Nuclear power opponents and supporters could be found both on the left and on the right; even somewhat more on the right in the first surveys (Holmberg, Westerståhl and Branzén 1977). Nuclear power was a new and separate dimension of conflict in Swedish politics in the years around 1976-1980. But that is no longer so. Amongst the wider public nuclear power has increasingly become a left-right issue. The correlation(s) between people's attitudes to nuclear power and their left-right views stood at around .00 at the time of the 1980 referendum. The first SOM surveys in the 1980s showed corresponding values of correlations of around -.15. In the most recent SOM studies the correlations have moved further to values

[4] The proportion of votes for option 3 in the 1980 referendum (the most anti nuclear power option) breaks down as follows among the parties' supporters in March 1980: Left Party/Communists 90%, Centre Party 90%, Christian Democrats 77%, Liberal Party 28%, Social Democrats 19% and Moderate Party 17% (Holmberg and Asp 1984:381). In the 1976 election the order of the party supporters was somewhat different: Centre Party 72%, Left Party/Communists 60%, Liberal Party 40%, Moderate Party 38% and Social Democrats 21% (no reliable data on Christian Democrats). The 1976 results concern the proportion consistently against nuclear power on a nuclear power views index (Holmberg, Westerståhl and Branzén 1977:90). This means that in the 1976 election Social Democrat voters were the most positive/least negative towards nuclear power. At the time of the 1980 referendum we had the pattern we have today, with Moderate Party voters as the most positive/least negative towards using nuclear power.

Table 4 Phasing out or using nuclear power in the long term, by various social and political variables (per cent)

	phase out	use	no view	total percent	number of respondents	net balance
gender						
male	32	57	11	100	882	-25
female	40	33	27	100	892	+7
age						
18-30	41	37	22	100	350	+4
31-60	35	47	18	100	918	-12
61-85	34	47	19	100	506	-13
education						
basic level	37	40	23	100	453	-3
intermediate level	34	48	18	100	789	-14
university	39	47	14	100	501	-8
place of residence						
rural area	44	34	22	100	261	+10
built-up area	35	46	19	100	391	-11
town, large built-up area	34	48	18	100	820	-14
the three big cities	37	47	16	100	268	-10
income						
very low	42	33	25	100	343	+9
quite low	38	45	17	100	439	-7
medium	38	42	20	100	301	-4
quite high	37	50	13	100	291	-13
very high	29	61	10	100	369	-32
financial dependence on the price of electricity						
very dependent	35	45	20	100	365	-10
quite dependent	38	45	17	100	624	-7
not particularly dependent	38	50	12	100	548	-12
not at all dependent	35	56	9	100	95	-21
left-right dimension						
firmly on the left	53	31	16	100	134	+22
somewhat on the left	46	39	15	100	431	+7
neither left nor right	35	39	26	100	557	-4
somewhat on the right	30	58	12	100	419	-28
firmly on the right	15	72	13	100	141	-57
green dimension						
firmly green	54	27	19	100	220	+27
somewhat green	43	42	15	100	473	+1
neither green nor grey	34	46	20	100	523	-12
somewhat grey	28	61	11	100	334	-33
firmly grey	19	65	16	100	116	-46
party preference						
Left Party	62	27	11	100	149	+35
Social Democrats	35	43	22	100	570	-8
Centre Party	51	37	12	100	109	+14
Liberal Party	31	59	10	100	164	-28
Moderate Party	18	69	13	100	354	-51
Christian Democrats	37	39	24	100	80	-2
Green Party	66	13	21	100	92	+53
other parties	36	43	21	100	70	-7
no party	31	33	36	100	186	-2
all repodentsl	36	45	19	100	1774	-9

Comments: The interview question on nuclear power is shown in Table 1. The results relate to the year 2004. The question of dependence on the price of electricity read: "How financially dependent is your household on the price of electricity: very dependent, quite dependent, not particularly dependent, not at all dependent?" The income variable relates to household income. Households with incomes between SEK 0 and 200 000 have been categorised as very low, 201 000 to 300 000 as quite low, 301 000 to 400 000 as medium, 401 000 to 500 000 as quite high and household incomes from SEK 501 000 upwards as very high. The measure of the green dimension is based on a question about an environmentally friendly society. The question is formulated as a proposal where the respondent is requested to judge whether the proposal is very good, quite good, neither good nor bad, quite bad or very bad. The wording of the question was: "Invest in an environmental society even if it means low or zero growth." In the table, the scale from "very good proposal" to "very bad proposal" has been translated into points on a green-grey dimension where "very good proposal" corresponds to "firmly green" and "very bad proposal" corresponds to "firmly grey". People's left-right ideology was measured through a self-classification question.

of around -.30. In this context, a negative coefficient indicates that opposition to nuclear power and the left tend to go together, as do supporters of nuclear power and the right.[5] At the mass level, nuclear power is no longer an alternative dimension of conflict. The left-right dimension has incorporated its competitor.

Party Polarisation

However, the pattern of opinions on nuclear power among the parties' supporters largely looks the same as in the 1980 referendum. Now, as then, supporters of the Left Party, Green Party and Centre Party have the most anti nuclear power views, with net balances in favour of phasing out nuclear power in the long term. Among supporters of the Social Democrats, Christian Democrats, Liberal Party and Moderate Party the current balance of opinion is that nuclear power should be used in the long term, with Liberal Party and Moderate Party supporters the most positive, and Social Democrats and Christian Democrats somewhat more divided. Compared with 1980, Christian Democrats in particular have moved in terms of opinion from a clear majority voting for option 3 to a net balance today in favour of using nuclear power in the long term. Among Social Democrat, Liberal and Moderate voters only minorities chose option 3 in 1980. Even at that time most voted for the more pro nuclear power options 1 or 2. However, on paper, these entail support for a long-term phasing out of nuclear power. In the 1980 referendum it was not possible to vote for using nuclear power, only for phasing it out in the long term!

Compared with the situation in 2003 supporters of all parties have become somewhat more negative towards nuclear power, with two exceptions – the Social Democrats, who have not changed at all, and the Moderates, who have become somewhat more positive. Supporters of the other parties have become somewhat more negative or less positive. Left Party and Green Party supporters have made the largest shift towards the negative corner, while there is also a clear move towards the critical corner among supporters of the Centre Party.[6] Thus the favourable wind for nuclear power among Centre Party supporters which could be observed in 2003 has not continued in 2004. Instead we can see a certain recoil back towards more anti nuclear power views.

The shifts in opinions in 2004, which were not dramatic in themselves, mean that party polarisation is again increasing somewhat on the issue of nuclear power. Last year the polarisation appeared to be clearly on the way down, but that development has not continued in 2004. We can measure the polarisation using the statistical correlation coefficient eta, which can vary between .00 (no party polarisation) and 1.00 (maximum polarisation). When the issue of nuclear power reached its peak in Swedish politics in the years around 1980 the eta coefficient was around .45 to .50. In SOM studies since 1986 eta has been at lower levels, between a high of .40 (1991) and a low of .28 (2003). In the 2004 survey eta achieved a value of .40, equalling the highest value we have measured in SOM. Party differences amongst the wider public on the issue of nuclear power, measured as the degree of polarisation, are thus at least as great today as they has ever been over the last twenty years – much smaller than they were during the nuclear power debate around 1980, but still considerable.

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[5] The correlation between subjective left-right position and nuclear power view was -.13 in 1986 and 1987 and -.20 in 1988. In the SOM surveys in 2002, 2003 and 2004 the corresponding correlations were -.29, -.27 and -.28 respectively (Holmberg 2004:189).

[6] The net balance of opinion in favour of phasing out nuclear power was as follows among the supporters of the various parties in 2003 and 2004 respectively (the higher the positive value the more negative the view on nuclear power): Left Party +21, +35; Social Democrats -8, -8; Centre Party +6, +14; Liberal Party -31, -28; Moderate Party -48, -51; Christian Democrats -13, -2; Green Party +41, +53.

Trust in Players

Trust is always a key factor when it comes to forming opinion. We are influenced not only by arguments but also by who is promoting them. Messages are important, but so are messengers. And this is where trust comes in. We are more influenced by messengers who we trust.

Since they started in 1986, the SOM surveys have measured people's trust in some of the most important players in the nuclear power debate. The results in Table 5 point to some interesting changes with regard to who we trust when it comes to energy and nuclear power.

Table 5 Trust in various players on the issue of energy and nuclear power. Proportion of people indicating a very high or quite high degree of trust (per cent)

question: "How much trust do you have in the following groups when it comes to information on energy and nuclear power?"

	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04
environmental organisations	57	65	63	64	61	64	69	68	65	71	67	59	59	65	59	55	61	61	60
nuclear power industry	36	46	47	49	58	52	45	48	42	45	45	41	52	53	52	54	52	55	58
the government	52	52	49	37	36	44	36	43	46	39	38	28	43	42	44	54	52	52	42
scientists	81	89	88	85	87	83	80	83	81	81	85	81	82	85	87	85	85	82	85
journalists	16	21	28	26	20	24	28	30	26	28	29	26	26	30	29	22	25	25	30
national authorities	40	40	44	35	36	38	36	45	42	41	40	33	45	47	56	58	60	59	57
local authority where you live	--	--	--	--	--	--	--	--	--	--	--	26	35	36	33	37	39	41	34
electricity companies	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	29	27	--	26

Comments: The question also included the response options "little" and "very little" trust. People who did not answer the trust questions (between 4% and 10% over the years) are not included in the percentage base. A "–" indicates that the question was not asked.

Until now environmental organisations and the nuclear power industry have been opponents in the debate on nuclear power and the environmental side has benefited from a higher degree of trust than the industry. The trust figures for environmental organisations have always been higher than corresponding figures for the nuclear power industry. But it is evening out. Compared with ten years ago, trust in environmental organisations is standing still or falling somewhat, while trust in the nuclear power industry is increasing. In the latest 2004 survey, 60% expressed trust in environmental organisations, compared with 58% for the nuclear power industry. The corresponding figures in 1994 were 65% for environmental organisations and 42% for the nuclear power industry. Thus it is not only views on nuclear power that have become more positive. Trust in the nuclear power industry has also grown.

When it comes to other players, it is worth noting the low figures for electricity companies, the very strong and stable figures for scientists, and the relatively high figures for national authorities. The latter result in particular is very positive. Supervisory authorities who have the task of checking that everything is being done correctly should have a high level of trust. If we do not trust all the parties, we should at least be able to trust the referee.

Advantage Nuclear Power

Nuclear power opponents and environmental organisations are losing public support at the same time as nuclear power proponents and the nuclear power industry have the wind in their sails. This is how the SOM survey trends can be summarised in simple terms. Energy and nuclear power issues are no longer big issues on the voters' agenda. Only 1% of respondents in the 2004 SOM survey pointed to energy/nuclear power as an important social issue. As recently as 1990 the corresponding proportion was 11%. And if we go further back to the 1976 and 1979 elections, nuclear power topped the voters' list of important issues (Holmberg and Oscarsson 2004). But that is no longer the case.

The question is what will happen in the 2006 election in the aftermath of the closure of Barsebäck II and at the start of a Swedish and international debate on not phasing out nuclear power and instead investing in its expansion (Domenici 2004). One of the main arguments of the proponents of expansion relates to the greenhouse effect. More nuclear power does not contribute to global warming. Among voters the greenhouse effect is perceived as one of the greatest threats to the environment. Only the thinning of the ozone layer was seen as a bigger threat in the 2004 SOM survey. When we measure the degree of concern about changes in the earth's climate we get similar results, i.e. relatively high proportions who express concern – higher proportions than for economic crises, for example, but lower than for terrorism.[7]

The problem for the proponents of expansion is, however, that so far public opinion is *not* showing a link between concern over/fear of the greenhouse effect and a positive attitude towards nuclear power. At present the opinion patterns are the exact opposite. People who see the greenhouse effect as a big risk or are concerned about climate changes tend to be the least positive towards nuclear power, not the most positive.[8] Environmental and climate arguments have clearly not worked particularly well so far for the proponents of expansion.

However, the 2006 election could bring a change in this. Over the past twenty years the battle over nuclear power has been about phasing it out. Over the coming years will the battle instead be about expansion?

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Avveckla Barsebäck 2. Stockholm. Sifo 2003.

[7] SOM's surveys of environmental threat and concern for the future were financed by a research project lead by Lennart J. Lundqvist. The measurements of environmental threat cover around ten different threats and the time series extend back to 1993. The concern measurements relate to the degree of concern for the future and began in 1986. So far they cover around 20 phenomena (e.g. destruction of the environment, unemployment, terrorism, economic crisis, increased numbers of refugees etc.), but not every one is measured every year. The results of the concern and environmental threat surveys are documented in Holmberg and Nilsson 2005.

[8] Environmental threats are measured on a scale of 1 (low) to 10 (high). In the 2004 survey the *lowest* proportion of nuclear power supporters was found among people who put the greenhouse threat at 10, i.e. among those who perceived the greenhouse effect as the most serious. The *highest* proportion of nuclear power supporters was among people who gave the greenhouse threat a risk value of 4, i.e. just below the middle of the scale. The concern question had four response options between very worrying to not at all worrying and concerned what people themselves perceived as worrying for the future. The *lowest* proportion of nuclear power supporters was found among people who thought that climate changes were very worrying (4) (40%, 625 people). We find the *highest* proportion of nuclear power supporters among the small group of people who do not think that climate changes are worrying at all (65%, 40 people).

Chapter 3

Party Influence on Nuclear Power Opinion in Sweden

Sören Holmberg **Per Hedberg**

Theories purporting to explain public attitudes to nuclear power tend to overflow.[1] As with nuclear weapons, studies on nuclear power opinions have a proliferation problem. There are too many models in a crowded marketplace of theories pointing at, for example, the importance of economic self-interest, psychological traits, gender differences, post-materialist values, knowledge levels, media coverage, belief systems and occupation. Paradoxically, the perhaps most important explanatory variables tend to get lost. They are the political variables and the opinion molding by the political parties.

The conflict over nuclear power is primarily a political phenomenon, not a social or psychological phenomenon. Like most other political issues, the conflict over nuclear power was politicized at a specific point in time - in the early 1970s in the Swedish case – then experienced periods of intensive and not so intensive dispute, and will eventually be depoliticized. Or maybe the conflict will be repoliticized time after time after more or less dormant periods. After all, it will take time before all high level radioactive waste is harmless.

An often overlooked driving force in processes like this is different elite groups – especially political parties in systems with strong cohesive parties. Usually, instead, an idealistic opinion forming model is presupposed. Conflicts and opinions are supposed to originate from below - from the people – and be formed by self-interest, socioeconomic factors, basic values and different individual traits. In a socio-psychological model like this, the role of political parties is to aggregate and articulate opinions coming from below. The role of parties is not to form opinions from above.

A more realistic model acknowledges the fact that in all democracies various elite groups, among which political parties and candidates are the most noticeable, engage themselves in trying to influence public opinion. This process of opinion molding from above is occasionally dismissed as somewhat suspect and not really belonging to the democratic family. Given the historic experience of party propaganda it is an understandable reaction, even if it is erroneous. However, in democracies with freedom of expression, opinion formation executed from above by candidates and parties are an integral and legitimate process. We can not have a system where everybody is allowed to speak, but political parties and candidates.

In this article Sweden and the thirty five year long conflict over nuclear power will be used as a case in point. The impact of party will be analyzed based on data from mass surveys. Changes in opinion across time as well as differences between parties will be highlighted. Results from commercial polls are used, but most of the analysis draws on data gathered by the Swedish National Election Studies (SNES) and by the annual surveys done by the SOM-Institute at the University of Gothenburg (Oscarsson and Holmberg 2008; Holmberg and Weibull 2008). The period covered will be from 1973, when nuclear power began to become politicized in Sweden, through 2008/2009 when there are signs of nuclear power once again becoming repoliticized after having been more or less a semi-dormant issue ever since the referendum in 1980.

The Formative Years

It all commenced in concord. In the beginning of the 1970s all political parties supported a *Riksdag* decision to build eleven nuclear reactors in Sweden. At the time energy policies were a

[1] Parts of this article is inspired by and follows closely *The Impact of Party on Nuclear Power Attitudes in Sweden* (Stockholm: SKN Report 48 1991) by Sören Holmberg. A first draft of the present article was presented at a conference in Mannheim, April 24-25 2009.

topic for experts and a limited number of politicians. Mass media was silent and the general public ignorant.

The tranquillity was abruptly broken in the years 1973/74. The Center Party (formerly the Agrarian Party) suddenly ended the unity among the parties by declaring itself against a nuclear buildup. A politicization process started fueled by the international oil crises. Nuclear power as well as other energy issues became front page news. Political parties, environmental groups and the power industry started information campaigns. An opinion forming process began which in terms of scope and intensity is unmatched in modern Swedish history (Vedung 1979, Jasper 1990, Sahr 1985, Holmberg, Westerståhl and Branzén 1977).

The first opinion polls in the beginning of the politicization process revealed large proportions of no opinions and a majority in favour of expanding nuclear power in Sweden. Very soon, however, already in late 1974 or early 1975 (useful polls are scarce) public opinion shifted drastically under the influence of the intensive debate. Anti-nuclear sentiments were augmented while no opinions and pro-nuclear views decreased. A majority of the public came to support a no to a nuclear buildup. The anti-nuclear majority among the public was to prevail until after the parliamentary election of 1976.

On the elite level, the politicization process was brought to a close in 1975 when all parties took clear positions on the nuclear issue. The conflict pattern that emerged was very unusual for Swedish politics. Traditionally in Sweden, most political issues are structured by the dominant left-right cleavage. That was not the case for the nuclear power issue, however. The lineup of the parties was different from the usual left-right ordering. The Center Party was joined by the Left Party Communists and by the Christian Democrats (not represented in parliament at the time) in opposing a nuclear expansion, while Social Democrats, Liberals and Conservatives all favored a buildup – Social Democrats and Conservatives more so than Liberals. Consequently, Social Democrats and the Center Party ended up far apart and in different camps. On most left-right issues the two parties are usually positioned adjacent to each other in the middle.

The new and unusual lineup of the parties quickly had an impact among the public. Previously, before the parties positioned themselves in the new way Conservative voters were most pro-nuclear and, most interesting, Social Democratic and Center Party sympathizers had very similar views. However, after the politicization in the spring of 1975, Social Democratic and Center Party supporters went their separate ways. Social Democratic voters followed their party and became (or remained) in favour of a nuclear expansion while Center Party voters adjusted their views in accordance with the new party line and became negative to a nuclear buildup.

Social Democratic leaders were less successful in this opinion forming process than the leaders of the Center Party. A substantial minority of Social Democratic followers was still anti-nuclear after the process. Among Center Party sympathizers attitudes were more unanimous. This situation was to remain through the years, i.e. Social Democratic followers being most often more divided on nuclear power than supporters of the Center Party.

The trend toward increasing opposition to nuclear power among the general public did not continue after the 1976 election. Opposition to the buildup of nuclear power had been one of the decisive factors behind the Social Democratic loss in the election. In the campaign leading up to polling day, the two pro-nuclear non-Socialist parties – the Liberals and the Conservatives – kept a very low profile on the nuclear issue not to disturb the Center Party in its critique of the pro-nuclear policies of the Social Democratic government. It was a tactic that paid off. The Social Democrats, but not the Liberals and the Conservatives, lost at the polls because of the party's pro-nuclear position (Holmberg, Westerståhl and Branzén 1977, Holmberg 1978).

After the election win, Liberals and Conservatives came out forcefully in favour of nuclear expansion. In the newly formed non-Socialist government they "forced" Prime Minister Thorbjörn Fälldin of the Center Party to activate a reactor, despite that he personally had promised not to in the election campaign. A drawn-out discussion ensued on deceit and broken promises. The credibility of Fälldin and the Center Party was seriously hurt and the anti-nuclear movement lost momentum.

Effects on public opinion were dramatic. Anti-nuclear sentiments started to plummet while pro-nuclear attitudes became more frequent. The pro-nuclear opinion shift was visible across all political and social groups, but it was especially noticeable among followers of the Liberal and Conservative parties. The revitalized opinion molding in favour of nuclear power from the Liberal and the Conservative parties were effective. A Sifo poll in early 1977 showed that opposition to nuclear power since the election had dropped by an astounding 27 percentage points among Conservative followers and by 29 points among sympathizers of the Liberal Party.

The downward slide of anti-nuclear views was not to stop until late 1978. Once more it was something occurring on the elite level of politics that triggered the turn around. In October the Fälldin three-party government fell apart because they could not agree on how to handle the nuclear issue. The Center Party left the government and stopped compromising with the Liberals and the Conservatives. This gave new life to the debate and instilled new hope into the anti-nuclear movement. Opposition to nuclear power began to increase again, especially among followers of the Center Party.

In the spring of 1979, the anti-nuclear movement received another boost caused by the Three Mile Island accident in the USA. Negative attitudes to nuclear power increased immediately by about 5-10 percentage points. The change was noticeable in all segments of the public. Among party supporters the shift was most pronounced among followers of the Social Democrats. A reason for that was that a few days after the TMI-accident, Olof Palme and the Social Democratic leadership were the first among the pro-nuclear parties to yield to an old demand by the anti-nuclear movement to hold a referendum. This change was perceived as being anti-nuclear. When the Social Democratic leaders "changed" their position many of their supporters followed suit.

However, the opinion gain accrued by the anti-nuclear movement because of the Harrisburg accident were not to last. It disappeared very fast in the spring and summer of 1979. When the parliamentary elections were held in the fall of 1979 public opinion was back to about an even split between support and opposition to nuclear power.

As soon as the elections were over everybody geared up for the referendum in March 1980. Social Democrats, Liberals, and Conservatives argued for an expansion of nuclear power before an eventual phase out (alternative 1 and 2 in the referendum). The Center Party together with the Communists and the Christian Democrats opposed the nuclear buildup and favored a fast phase out of existing reactors in ten years (alternative 3). At the time alternatives 1-2 were considered pro-nuclear and alternative 3 anti-nuclear.

The pro-nuclear alternatives 1-2 won the referendum with 58.0 percent of the vote. The anti-nuclear alternative 3 got 38.7 percent with 3.3 percent returning a blank ballot. Turnout was lower than in parliamentary elections but nevertheless relatively high. It was 75.6 percent. The victory for the pro-nuclear side had a catch, though. On the ballot papers of alternative 1 (supported by the Conservative) as well as alternative 2 (supported by Social Democrats and Liberals) it was stated that nuclear power would be phased out in Sweden sometime in the future. Consequently, it was a strange referendum. You could not vote but for phasing out nuclear power. Alternative 1 was perceived as the most pro-nuclear position but even alternative 1 did talk about an eventual phasing out of nuclear power in Sweden.

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

The pro-nuclear side did not win the referendum in the spring campaign leading up to the vote. They won it earlier in the fall of 1979. It was then, under the influence of party campaigns that positive sentiments to nuclear power pulled ahead of anti-nuclear attitudes. Opinion forming originating from the parties was very successful in the referendum. A substantial majority of all opinion shifts that occurred during the campaign happened among voters who originally had different nuclear opinions than their own parties. They followed cues from their party and changed their nuclear vote. Of all opinion shifts on nuclear power between the 1979 election and the 1980 referendum, about 80 percent involved voters who changed their views to that of their preferred party. Among the parties, the Center Party and the Communists were most successful in mobilizing their followers in the referendum. Social Democrats and Conservatives were somewhat less successful, while the Liberals were least successful in getting their own supporters to vote according to party (Holmberg and Asp 1984).

All in all, 75 percent of the voters in the referendum voted for an alternative that their own party supported. Among Center Party and Communist followers 90 percent voted the party line. The comparable figure for the Social Democrats is 74 percent, for the Conservatives 67 percent, for the Christian Democrats 77 percent, and for the Liberals 45 percent. It is no exaggeration to conclude that the 1980 referendum was a party election as well as a vote on nuclear power. The political parties played a major role in influencing how people voted.

Between Referendum and Chernobyl

After the referendum, nuclear power quickly lost its dominant position on the public agenda. In the lead up to the referendum in the elections of 1976 and 1979 nuclear power was named the most important election issue by 21 and 26 percent of voters, respectively, and ranked number 1 on both occasions. Since then the comparable proportion of voters mentioning nuclear or energy issues as important for their vote has been much smaller - between 1-3 percent in the elections in 1982-2002, but with a little upturn to 5 percent in the election of 2006.

However, the nuclear power issue was not completely depoliticized after the referendum, but it became less politicized. In media other topics like the general strike/look out of 1980 and the economic problems of Sweden replaced nuclear power on front pages. To a large extent the parties withdrew from the fight. As could be expected these changes had an effect on the public opinion. The campaign-induced pro-nuclear feelings of the referendum period began to fade somewhat. Negative attitudes to nuclear power regained their strength from before the referendum. A majority of voters who changed to an anti-nuclear standpoint after the referendum were Social Democratic followers who in 1979 were negative to nuclear power, but voted for the party line (alternative 2) in the referendum. As soon as the party pressure had eased they return to being anti-nuclear.

After the referendum and the return-to-normalcy effect that followed, public opinion on nuclear power did not change much for a number of years. If there were a trend in those years, it was a small one favoring nuclear power. The stillness, however, was drastically changed by the Chernobyl disaster in April 1986. Like in many other countries, the accident sent pro-nuclear attitudes downwards in Sweden. The immediate effect was huge. Attitudes to nuclear power became 10-20 percentage points more negative depending of what measure we use. The dramatic effect was only temporary, however. In some data the spike in anti-nuclear sentiments was still

visible two years after Chernobyl, but for the most part the impact was gone within a year of the catastrophe.

One consequence of the accident, however, that did not disappear as quickly was the impact on the Swedish political agenda. Nuclear power made a comeback in the media and the degree of politicization began to increase once more. When to start closing down reactors became a disputed issue as well as whether the phasing-out process should be completed in 2010 as decided by the Riksdag or prolonged. Among the parties, the Conservatives intensified their old opposition to dismantling nuclear power while the Greens (a new party founded after the referendum), the Communists and the Center Party argued for an even faster phasing-out period ending before 2010. Social Democrats and Liberals were more split, although the official position was to uphold the decision to phase-out all reactors by the year 2010. Within both parties there were vocal pro-nuclear groups. In the Social Democratic Party the pro-nuclear voices were especially strong among some trade unionists.

Not surprisingly, the rebirth of the nuclear issue affected public opinion. Starting already before the elections of 1988, but intensified after, pro-nuclear opinions became more prevalent. In the 1991 elections when the non-Socialist parties won a decisive victory pro-nuclear support soured. The increase in support for nuclear power occurred among followers of all non-Socialist parties, including among Center Party and Christian Democratic voters, but also among Social Democratic supporters. It was only among supporters of the Greens and the Communists that the pro-nuclear trend was resisted. Their voters did not become more in favour of nuclear power going into the election of 1991.

The 1980s was a rollercoaster for the nuclear issue in Sweden. The decade started with the referendum in 1980 and the decision to phase-out nuclear power, ran into the Chernobyl disaster in 1986 and ended up in the election of 1991 with a new non-Socialist government and increasing public support for using nuclear power.

In the following we will leave the historical account of how the conflict over nuclear power has evolved in Sweden among parties and in public opinion. Instead we will concentrate on analyzing more concrete data from mass surveys focusing on the question of the potential influence of party on nuclear power attitudes. The historical overview indicated that party played a decisive role in forming mass attitudes to nuclear power, especially during the formative years in the 1970s. The question we will address is if and how the impact of party on nuclear sentiments has changed in the less politicized period of the 1990s and early 2000s.

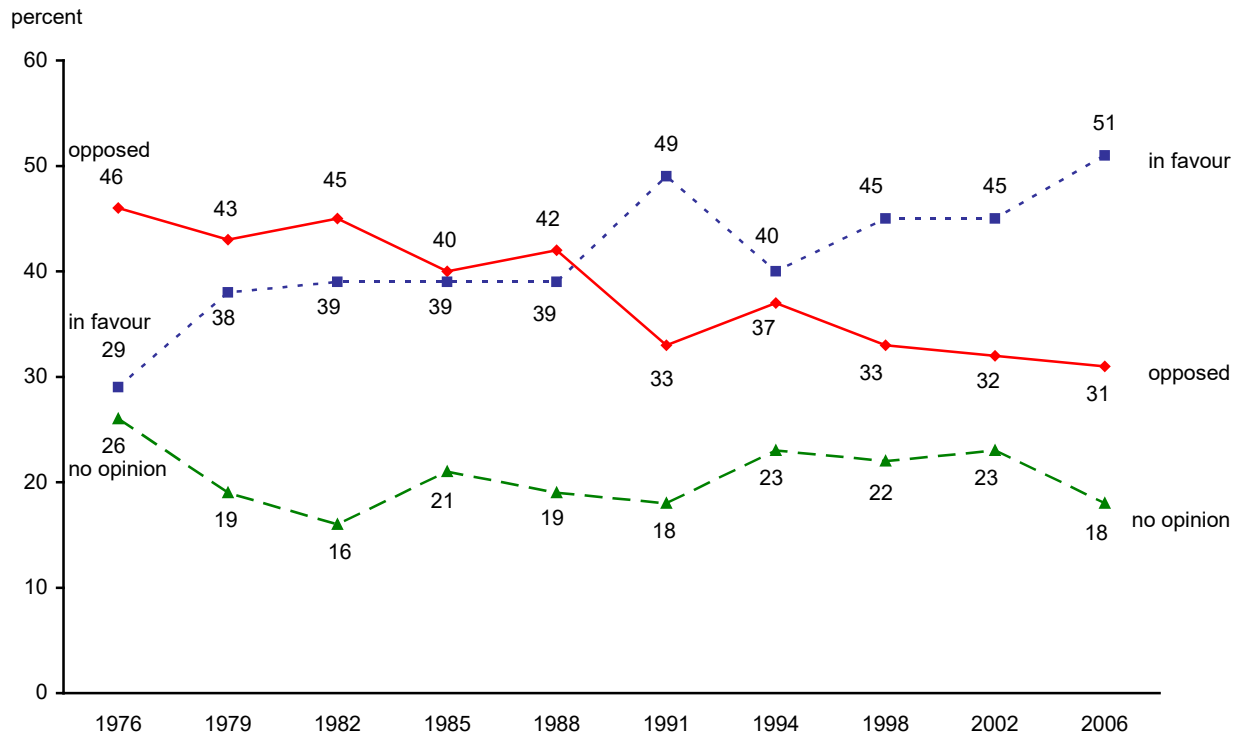
Swedish Opinion on Nuclear Power 1976-2008

The results in Figures 1 and 2 summarizes Swedish mass attitudes to nuclear power since the issue was first politicized in the mid 1970s. In Figure 1 nuclear opinion is measured using a subjective self-classification question with three explicit response alternatives – mainly in favour of nuclear power, mainly against nuclear power or no decided opinion. The question wording is: "There are different views on nuclear power as an energy source. What is your view? Are you mainly in favour or against nuclear power or don't you have any decided opinion?"

The advantage as well as the drawback of a simple self-classifying question like this is that it lacks any specific policy content. In that sense it resembles the classic left-right question. It measures some kind of ideological self-identification. That makes it possible to use the self-classifying question across time even though the nuclear power discussion might shift focus. The drawback is equally obvious. The question lacks policy content. Policy wise, the meaning of being for or against nuclear power might change over time.

In contrast, our other measurement series in Figure 2 is based on a question specifying a number of more specific policy options regarding the long term use of nuclear power in Sweden. The question wording has been the same through the years but the exact formulation and number of response alternatives has changed somewhat over time. The question is: "What is your view on the long term use of nuclear power as an energy source in Sweden?" The explicit response alternatives have been five in the most recent studies: "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 Figure 2 the results have been classified into three opinions – in the long run *abolish* nuclear power, in the long run *use* nuclear power and *no decided opinion*.

Figure 1 Swedish Opinion on Nuclear Power 1976 – 2006 (percent)



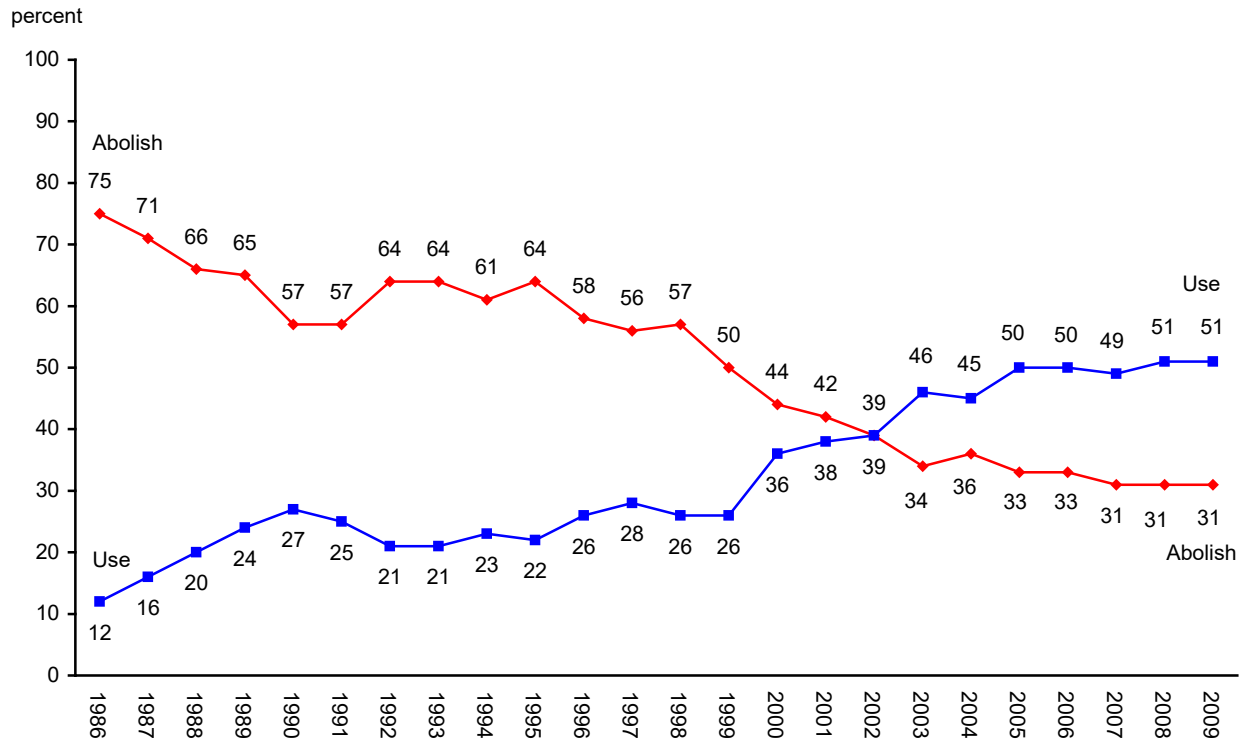
Comment: The results for 1976 come from Holmberg et al *Väljarna och kärnkraften* (1977). The results in 1979 – 2006 come from The Swedish National Election Studies (SNES). Percentages are computed among all respondents. ***Question***: "There are different opinions on nuclear power as an energy source. What is your view? Are you mainly in favour or mainly opposed to nuclear power or don't you have any decided opinion?"

The longest time series in Figure 1, based on people's self-classification of themselves, show that opposition to nuclear power was strongest in the election of 1976 and that people identifying themselves as against nuclear power were more numerous than the number of people supporting nuclear power up until the 1988 election. After that, starting in 1991, people classifying themselves as in favour of nuclear power have been more numerous than people opposing nuclear power; most decidedly so in the last election in 2006. Thus, the long term trend has been in favour of nuclear power. Swedes classifying themselves as in favour of nuclear power have

increased from 29 percent in 1976 to 51 percent in 2006. At the same time, the proportion of Swedes identifying themselves as against nuclear power has gone down from 46 percent in 1976 to 31 percent in 2006.

Our other time series starting in 1986 and based on a more specific policy-based question show the same trend. Support for using nuclear power long turn has increased in Sweden from 30 percent at the time of the referendum in 1980 and from 12 percent immediately after the Chernobyl accident in 1986 to 51 percent in 2008. During the same period, support for the contrary view that nuclear power in the long run should be abolished has diminished from 66 percent in 1980 and 75 percent in 1986, after Chernobyl, to 31 percent in 2008. The relative majority among Swedes has changed from supporting phasing-out nuclear power up until 2001 to supporting retaining nuclear power from 2003 and onwards.

Figure 2 Swedes on the Use of Nuclear Power as an Energy Source (percent)



Comment: The data come from the SOM institute, based on annual nationwide surveys in Sweden; Sample size 3 000 persons 15-85 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.

Ironically, most of this opinion change happened when Sweden actually started to phase-out nuclear power in the period 1999-2005 when the two reactors at Barsebäck just outside Malmö were closed. In 1998 before the closing of reactor I in Barsebäck, 57 percent supported the phase-out plan. In 2005 after the shutdown of reactor II only 33 percent still supported abolishing

nuclear power. Neither of the two decisions to shut-down the reactors had a majority support in the public opinion.[2] On the contrary, at the time, most Swedes opposed the closing of the reactors, included most followers of the Social Democratic government who took the decisions with the support of the Center Party and the Left Party (Holmberg 2000).

In terms of self-identification the pro-nuclear movement in Sweden secured support from a relative majority of the people already in the early 1990s. However, in policy terms, whether Sweden in the long run should phase-out or not phase-out nuclear power, the same relative majority did not materialize until the early 2000s, after the phase-out phase actually started. Today, an absolute majority of Swedes are identifying themselves as in favour of nuclear power and want Sweden to use nuclear power, not phase it out.[3]

In a comparative perspective, Swedish public opinion is one of the most pro-nuclear in Europe. In a Eurobarometer survey in 2008, among all twenty seven member states, Sweden was ranked as number 5 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.

Swedes are not nuke averse anymore. Swedes today are nuke accepting, if not nuke embracing. A majority want to use nuclear power in the long run. But it is only a minority so far who want Sweden to build more reactors than the present ten. In the 2008 SOM Study only 21 percent indicated that they wished more reactors built. Present day Swedish opinion is conservative. Use what we have as long as possible. Do not phase out. But do not expand.[4]

Opinion Changes Among Different Party Sympathizers

The results in Tables 1 and Tables 2 document how attitudes to nuclear power have evolved among sympathizers with different parties since the 1970s in Sweden. In Table 1, the development based on the self-classifying question can be found. Table 2 presents the comparable results for the policy-based question. In Figures 3 and 4 - in a more pedagogical manner - we highlight what has happened by using multi-colored graphs indicating how different groups of party sympathizers have changed their views over time. In the graphs we focus on the

[2] In 1998 the SOM Institute asked when the nuclear phase-out should start. A majority (52 percent) answered never or later than in the decided period 1999-2002. Only 29 percent were in favor of the decided early decommissioning (Holmberg 1999). In the fall of 2004 Temo, a polling institute, asked whether Swedes thought it was good or bad to shut down Barsebäck II, which was planned to happen in the spring of 2005. Bad answered a majority (60 percent). A minority of 29 percent said it was good. Among party sympathizers only supporters of the Left Party and the Greens more often answered good than bad. All other party followers more often answered bad than good, including supporters of the Center Party and the Social Democrats.

[3] On the individual level there is a semi-strong positive correlation between our self-classifying and our policy based nuclear opinion measures. However, in the 1980s and 1990s, the aggregated level estimates looked quite different. Anti-nuclear answers were less common and pro-nuclear answers were more common using the self-classifying question. The policy-based question produced more anti-nuclear responses and less pro-nuclear answers. This meant that a fair number of people classified themselves as in favour of nuclear power but they did not want nuclear power used in the long run. They wanted a phase-out, but they wished to use the existing power plants as long as possible. This difference between the two measures does not exist anymore in the 2000s. Self-classification and policy view go more hand in hand today.

[4] In February 2009, the non-Socialist four party government opted for a new nuclear policy. The phase-out law should be abolished and it should be possible to build new reactors on the sites of the old ones when they are worn out. However, not more than ten reactors could be constructed replacing the present ten. The Center Party and the Christian Democrats, who had been supporting the phase-out plan since the referendum, signed on to the compromise. So did the Liberals, but the Liberal Party quit supporting the phase-out plan already in the middle of the 1990s. Less surprising is that the Conservatives signed on as well - they have never "really" supported any phase-out of nuclear power in Sweden. Now their position since thirty years is to be the law of the land. The three opposition parties - Social Democrats, Greens and the Left Party (former Communists) – are still true to the old plan of phasing-out nuclear power in Sweden; but only very slowly not to hurt industry and welfare and provided that renewable energy sources are at hand.

slow downturn in opposition to nuclear power. Sympathizers with all parties have become less anti-nuclear over the years; but more so for some parties than for others.

Table 1 Opposition to/Support for Nuclear Power Among Party Voters in Sweden 1979 – 2006 (percent)

Party	1979	1982	1985	1988	1991	1994	1998	2002	2006
Left Party	76/16	76/18	68/21	63/23	59/28	61/20	55/24	60/19	58/28
Social Democrats	30/48	36/44	33/43	39/39	29/50	34/40	31/46	27/45	27/49
Greens	-	93/7	82/14	80/12	80/7	74/11	76/17	68/17	78/14
Center Party	80/8	78/13	69/15	68/19	65/21	69/17	59/24	55/21	46/40
Liberals	40/38	50/38	43/38	36/46	35/53	31/49	31/48	20/62	25/60
Christian Democrats	65/15	82/11	73/12	61/23	45/36	37/40	34/45	33/49	27/53
Conservatives	25/55	29/60	22/61	14/74	15/71	18/66	14/75	14/73	13/74
New Democrats	-	-	-	-	19/66	-	-	-	-
Sweden Democrats	-	-	-	-	-	-	-	-	23/46
all	43/38	46/39	40/39	42/39	33/49	37/40	33/45	32/45	30/51

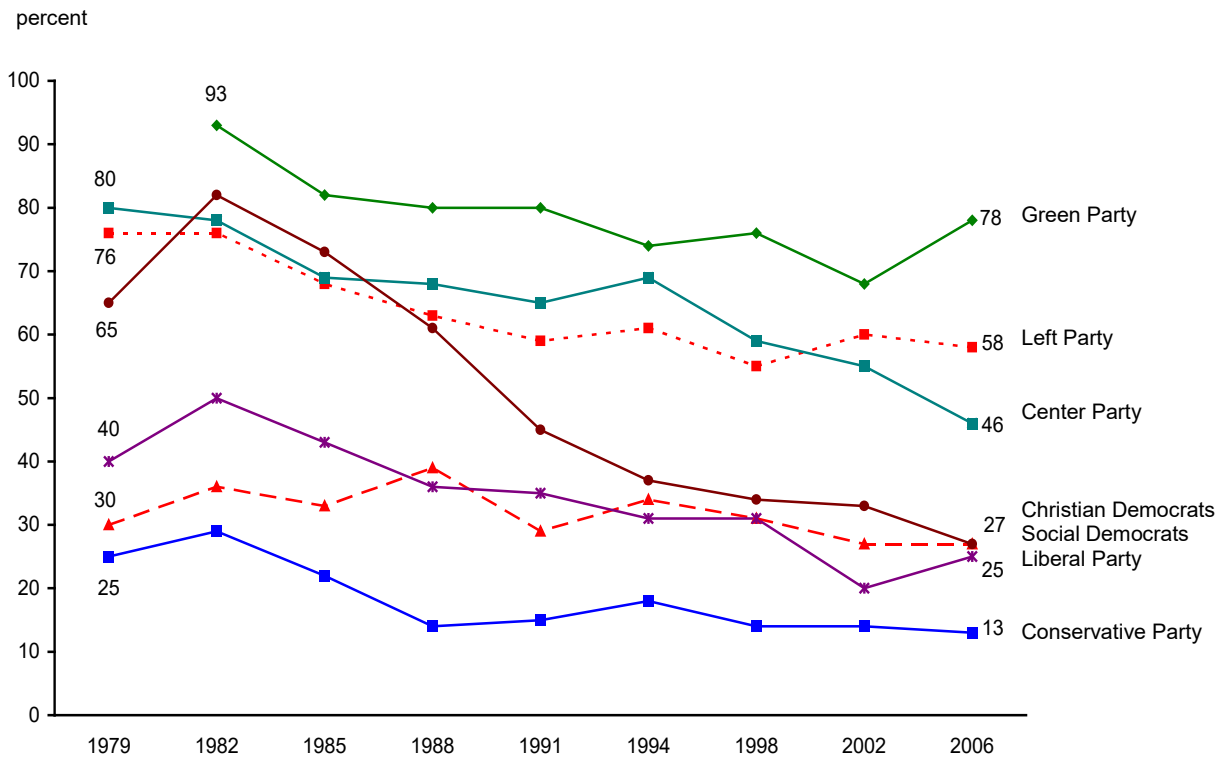
Comment: See Figure 1 for the question wording. The results show percent respondents answering that they oppose/are in favour of nuclear power. Party is operationalized as party vote in the Riksdag elections. Results broken down by party is not available for the 1976 election.

Starting by looking at Figure 1, the party line up on nuclear energy in the 1970s and 1980s and in the referendum is clearly visible among party voters. Supporters of the anti-nuclear parties (alternative 3-parties in the referendum) - the Center Party, the Communists, the Christian Democrats and the Greens – are decidedly more against nuclear power than supporters of the more nuclear-positive parties, especially compared to followers of the Conservative Party (an alternative 1-party 1980), but also in comparison with supporters of the Social Democrats and Liberals (alternative 2-parties in the referendum).

The decline in opposition to nuclear power has occurred across all party groups but at a different pace. If we compare opinions at the elections in 1979/82 with the situation at the last election in 2006, the proportion of voters answering that they are against nuclear power has gone down most drastically among sympathizers with Christian Democrats (-38 percentage points) and the Center Party (-34 points). The comparable downturn is around -10 to -20 points among followers of the most anti-nuclear parties, the Greens and the Left Party (former Communists), as well as among supporters of the most pro-nuclear parties, the Liberals and the Conservatives. Supporters of the Social Democratic Party have changed considerably less. Among them self-identification as a person against nuclear power has always been a minority position, but it has only diminished by -3 points between 1979 and 2006.

The result for the Social Democrats is interesting and could be perceived as a bit awkward for the party. Since the referendum the party has been supporting a nuclear phase-out policy while at the same time most supporters have identified themselves as in favour of nuclear power. It is not a paradox, however. To some extent it is a result of image building at the time of the referendum.

Figure 3 Opposition to Nuclear Power Among Voters for Different Swedish Parties 1979-2006 (percent)



Comment: See Figure 1 for the question wording. The data come from SNES. The results for New Democrats in 1991 were 19 percent opposed. For Sweden Democrats the percent opposed were 23 percent in 2006. Social Democrats depicted as 4 -- -- --- 4 and Christian Democrats as)--------).

Alternative 2 meant first building up nuclear power than phase it out slowly. Two messages were deliberatively sent. Social Democrats and alternative 2 were in favour of nuclear power in the short and intermediate perspective, but against in the long run. It was a successful strategy in 1980. It helped alternative 2 to be the winner in the referendum and it kept the Social Democratic Party together.

Looking at relative majorities across time for all parties in Table 1, it is interesting to note that in terms of self-identification most party groups have not changed their majorities over the years. More followers of the Conservative Party and the Social Democrats have always classified themselves as in favour of nuclear power rather than against.[5] More so among Conservatives than among Social Democrats, however. In a comparable fashion, most followers of the Center Party, the Greens and the Left Party have also always identified themselves in a stable manner, but in this case as against nuclear power. Center Party followers are close to switching side in the election of 2006, but not quite. Two party groups have switched side, though. Most Liberal followers changed from classifying themselves as opposing nuclear power to supporting it in 1988 and have stayed nuclear supporters ever since, most decisively in 2002 and 2006. Christian Democratic voters took the same route but a little later. Starting in 1994, most supporters of the

[5] In the election of 1988, Social Democratic voters split evenly between being in favour or being against nuclear power. Thirty nine percent supported each position. The remaining 22 percent had no opinion.

Christian Democrats have been identifying themselves as pro-nuclear, most evidently in the election of 2006.

Now, moving over to look at how the more policy-based opinions have changed among different party groups, it is apparent that most developments look the same (see Figure 4). Support for phasing-out nuclear power has dwindled among followers of all parties. Most dramatically for sympathizers with the Liberals. Among them the old phase-out plan has lost backing from 79 percent in 1986 down to only 19 percent in 2008, a change of -60 percentage points. The comparable result is around -45 points for the followers of the Conservatives, the Christian Democrats, the Center Party and the Social Democrats. The loss of support for the phase-out plan is somewhat less dramatic among followers of the Green Party and the Left Party – down by -23 points among Greens and by -27 points among Leftists.

Looking more closely at the latest results from 2008, one notices that the phase-out plan is only supported by relative majorities among sympathizers with three parties – the Greens, the Left Party and the Center Party (only barely). Most supporters of the other four parties are in favour of using nuclear power. Most evidently for Conservative and Liberal followers, but also for supporters of the Social Democrats and the Christian Democrats.

Table 2 In the long run, abolish or use nuclear power in Sweden (percent abolish/use)

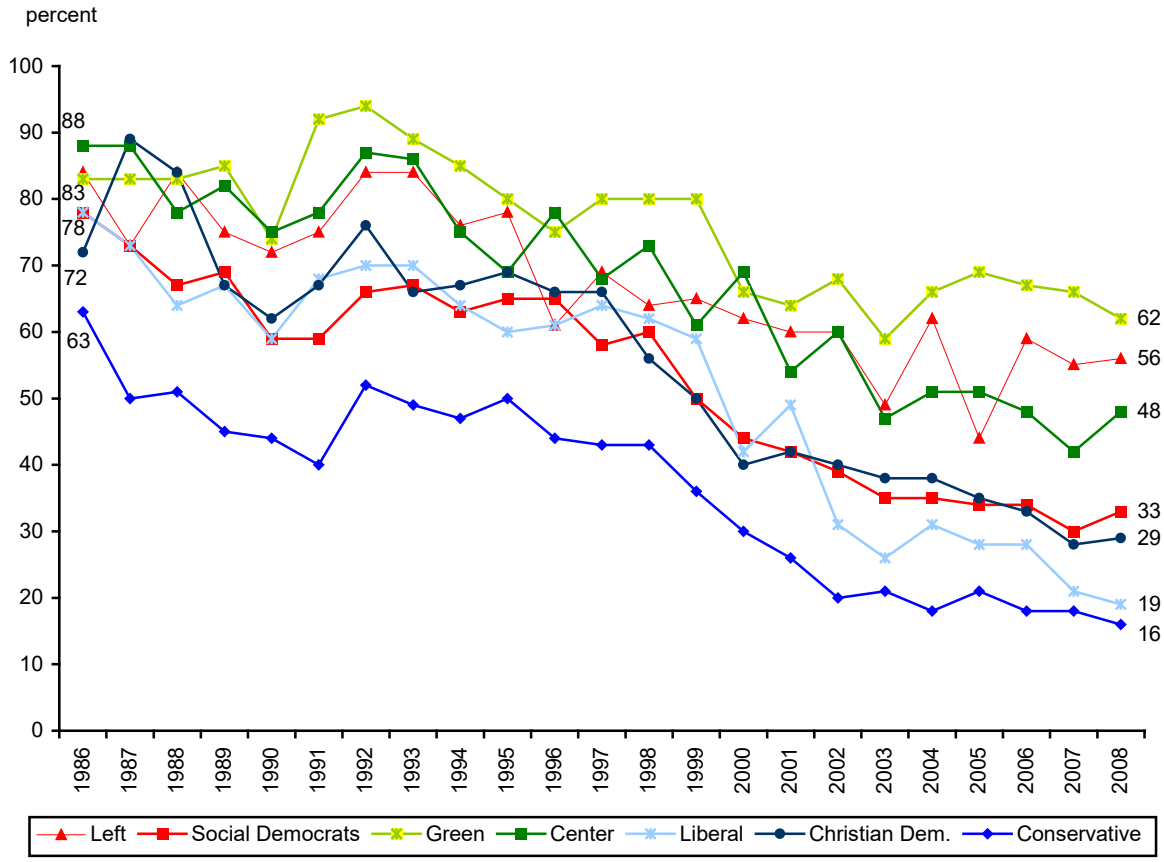
Party	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Left Party	83/5	73/15	84/12	75/22	72/19	75/14	84/9	84/10	76/14	78/13	58/18
Social Democrats	79/9	73/15	67/19	69/19	59/22	59/24	66/17	67/16	62/20	65/21	58/22
Greens	85/7	83/9	83/4	85/5	74/14	92/0	94/0	89/0	85/5	80/9	73/12
Center Party	89/1	88/2	78/11	82/12	75/17	78/9	87/4	86/4	75/12	69/12	76/8
Liberals	79/10	73/16	64/24	67/24	59/27	68/17	70/19	70/21	64/25	60/25	53/28
Christian Democrats	73/16	89/0	84/4	67/17	62/21	67/15	76/7	66/18	67/24	69/15	57/16
Conservatives	63/25	50/38	51/43	45/47	44/48	40/47	52/37	49/41	47/42	50/41	41/42
New Democrats	-	-	-	-	-	45/33	49/35	58/25	45/36	-	-
Sweden Democrats	-	-	-	-	-	-	-	-	-	-	-
all	75/13	71/16	66/20	64/24	57/27	57/25	64/21	64/21	61/23	64/22	53/24

Party	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Left Party	67/12	64/18	65/14	62/23	60/24	60/18	49/28	62/27	44/37	59/29	55/27	56/29
Social Democrats	54/25	60/21	50/24	44/33	42/34	39/37	35/43	35/43	34/47	34/49	30/47	33/47
Greens	71/5	80/8	80/4	66/14	64/17	68/19	59/18	66/13	69/15	67/20	66/22	62/23
Center Party	61/12	73/12	61/14	69/18	54/30	60/21	47/41	51/37	51/43	48/39	42/45	48/37
Liberals	63/22	62/27	59/24	42/38	49/42	31/52	26/57	31/59	28/57	28/59	21/63	19/65
Christian Democrats	56/16	56/24	50/29	40/41	42/43	40/43	38/51	38/39	35/56	33/51	28/51	29/54
Conservatives	41/43	43/46	36/47	29/58	26/61	20/65	21/69	18/69	21/69	18/68	18/68	16/73
New Democrats	-	-	-	-	-	-	-	-	-	-	-	-
Sweden Democrats	-	-	-	-	-	-	-	-	-	11/78	18/65	22/62
all	51/26	57/26	50/26	44/36	41/38	39/39	34/46	36/45	33/50	33/50	31/49	31/51

Comment: See Figure 1 for the question wording. The results come from annual surveys done by the SOM Institute at the University of Gothenburg. The question also includes a none opinion response alternative which is included in the percentage base together with no answers. See Holmberg and Weibull (2009). *Trends in Swedish Opinion 1986-2008*.

Going back to the time of the Chernobyl disaster, results in Table 2 reveal that clear majorities of followers of all parties, chocked by the accident, favoured a nuclear phase-out in Sweden. Since then four party groups have changed their relative majorities and become opposed to a nuclear phase-out. Conservative supporters have been split very long but most of them switched over to opposing a phase-out, first in 1989-1991 and than again more permanently in 1996. Most Social Democrats became against the phase-out plan later, in the year 2003. Liberal sympathizers changed their relative majority about the same time, more specifically a year before in 2002. Most Christian Democrats, finally, switched over even earlier than that. In 2000, a relative majority of Christian Democratic followers were abandoning the phase-out plan.

Figure 4 **Percent in Favour of Abolishing Nuclear Power Among Swedes With Different Party Sympathies (percent)**



Comment: See Figure 2 for the question wording.

Most followers of the three other parties have stayed loyal to the old phase-out plan all across the years. Most decisively among Green Party supporters, but also among followers of the Left Party. The results for the Center Party are somewhat less clear cut, however. The relative majority in support of the phase-out plan has been rather slim since 2003 and on one occasion, in 2007, the relative majority actually flipped over and showed more support for *not* phasing out nuclear power.

Knowledge of Party and Voter Positions

One obvious prerequisite for parties being able to "rationally" influence voter attitudes, is that party positions are known to the general public. Irrational influence through wrongful perceptions and wishful thinking is always a threat but if parties want their own real positions to have an impact they better make their standpoints known to the voters. In the Swedish case we have studied how well voters know the nuclear positions of the political parties at three occasions – at the 1976 election, at the referendum in 1980 and in a special study in 1989. Regrettably, more recent studies have not been made. The results in Tables 3, 4 and 5 show the outcome of the three investigations.

Table 3 Perceptual Accuracy – Swedish Voters' Knowledge of the Political Partities' Positions on Nuclear Power Before and After the Election in 1976 (percent)

	Left		Center		Soc Dem		Lib.		Cons.	
	B	A	B	A	B	A	B	A	B	A
Correct perception	43	70	89	95	88	92	50	57	58	70
Incorrect perception	20	10	4	1	3	3	27	31	18	17
Don't know	37	20	7	4	9	5	23	12	24	13
Sum percent	100	100	100	100	100	100	100	100	100	100

Comment: The results show how all eligible voters perceived the nuclear power positions of the five parties before (B) and after (A) the election in 1976. Data come from a special election study done by SIFO in cooperation with Holmberg, Westerståhl and Branzén (1977). The Left Party and the Center Party were against expending nuclear power in 1976 while the three other parties were in favour.

The level of accurate knowledge was highest at the referendum. Among all voters no less than between 75 to 90 percent could correctly pinpoint the positions of the five parties then represented in parliament. In 1976, perceptual accuracy was on the same level for the two main contenders the Social Democrats and the Center Party. They scored 92 and 95 percent correct perceptions respectively after the election. For the other three parties the comparable figures were somewhat lower, although still an impressive 57 to 70 percent accurate perceptions. The results for 1976 also reveal that all parties were effective in spreading their nuclear messages during the election campaign. Correct knowledge about all parties' nuclear positions was better after the campaign than before. On average for the five parties, the campaign resulted in an increase in the proportion of accurate perceptions by 11 percentage points. Campaigning parties matter.

Table 4 Knowledge of Which Alternativ the Political Parties Supported in the 1980 Nuclear Power Referendum Among Eligible Voters Just After the Campaign

Perception	Left	Soc Dem	Center	Lib.	Cons.
Party supported Alt. 1	2	5	1	10	<u>86</u>
Party supported Alt. 2	3	<u>86</u>	3	<u>75</u>	4
Party supported Alt. 3	<u>85</u>	2	<u>90</u>	3	1
Don't know	10	7	6	12	9
Total	100	100	100	100	100

Comment: Like in Table 3 the results are based on a set of closed-ended questions, asking the respondent about each party's position. The accurate perceptions are underlined.

Table 5 **Accurate Perceptions of Party Positions on Nuclear Power Phase-Out Among Eligible Voters in 1989 (percent)**

	Percent Accurate Perceptions of Phase-Out positions	Percent Accurate Perceptions of a Don't Phase-Out position
Left Party	29	--
Social Democrats	63	--
Greens	62	--
Center Party	68	--
Liberals	26	--
Christian Democrats	4	--
Conservatives	--	60

Comment: The results are based on data from a series of open-ended questions. The percentages show the proportion of all eligible voters who voluntarily named the respective parties' nuclear power positions correctly.

The outcome of the 1989 study is a little difficult to compare with the results from 1976 and 1980 since the 1989 study is based on a series of open-ended questions while the other two studies are based on closed-ended questions asking the respondents for each party's position. Taken at face value, however, the results in 1989 also indicate high levels of knowledge of party standpoints, although maybe not as high levels as previously during the formative years in the 1970s. The nuclear positions of the major parties, Social Democrats and Conservatives, as well as of the two most profiled anti-nuclear parties, the Greens and the Center Party, were correctly known to some 60 percent of all grown-up Swedes in the late 1980s. That is not all that bad. Actually, it is quite good. It is difficult *not* to argue that Swedes' knowledge of the parties' nuclear positions in the 1970s and 1980s were quite satisfactory for the purpose of making it possible for the political parties to have an influence on the nuclear attitudes of the voters.

Table 6 **Members of the Swedish Parliament Perceive What Their Own Voters Think About Nuclear Power in 1985 and 2006 (percent)**

	Percent Members of Parliament Who Correctly Perceive the Majority Position on the Nuclear Power Issue Among Their Own Party's Voters	
	1985	2006
Left Party	100	76
Social Democrats	72	60
Greens	--	89
Center Party	97	89
Liberals	63	92
Christian Democrats	--	58
Conservatives	96	89
All Members	82	76

Comment: The results come from the Swedish Riksdag Studies in 1985 and 2006 (Brothén and Holmberg 2009). The response rate among members were above 90 percent on both occasions. For details see Holmberg and Esaiasson 1988:120 and Holmberg 2009.

It is more simple for political parties to conduct campaigns and mold opinions if they know what voters think. Movement is always easier and more effective if the terrain is known. In Sweden,

we have twice measured how well leading politicians (members of parliament) are aware of their own voters' position on the nuclear issue. It was done in the Riksdag Studies of 1985 and 2006 (Brothén and Holmberg 2009). The result was very similar (see Table 6). Members in all parliamentary parties are very knowledgeable about their own voters' nuclear attitudes. On average about 80 percent of the members can accurately locate the majority position of their voters on the nuclear issue – somewhat better in 1985 (82 percent) than in 2006 (76 percent).

The conclusion is pretty clear. Available evidence on the elite as well as on the mass level indicates that the potential for party influence on citizens' nuclear attitudes has been quite good in Sweden, at least in the 1970s and 1980s.

Party Driven Opinions

At the time of the referendum in 1980 a clear majority of Swedes had the same attitude to nuclear power as their preferred party. In the referendum, only a small minority of on average 16 percent voted against their party's position. Most voters followed their party (80 percent on average). To a large degree that was the effect of successful party molding. Panel data for the period 1979-1980 indicate that voters who in 1979 did not have any decided nuclear attitude or had an opinion different to that of their preferred party had a strong tendency to change their nuclear attitude toward that of their party (Holmberg 1991, Holmberg and Asp 1984). Among all people who changed their opinion on nuclear power, the proportion who did it in accordance with their own party's position was 71 percent in the 1979-1980 election panel. The comparable result for the panel 1976-1979 is 62 percent. Party clearly had an impact on the forming of nuclear attitudes in Sweden during the formative years in the late 1970s.

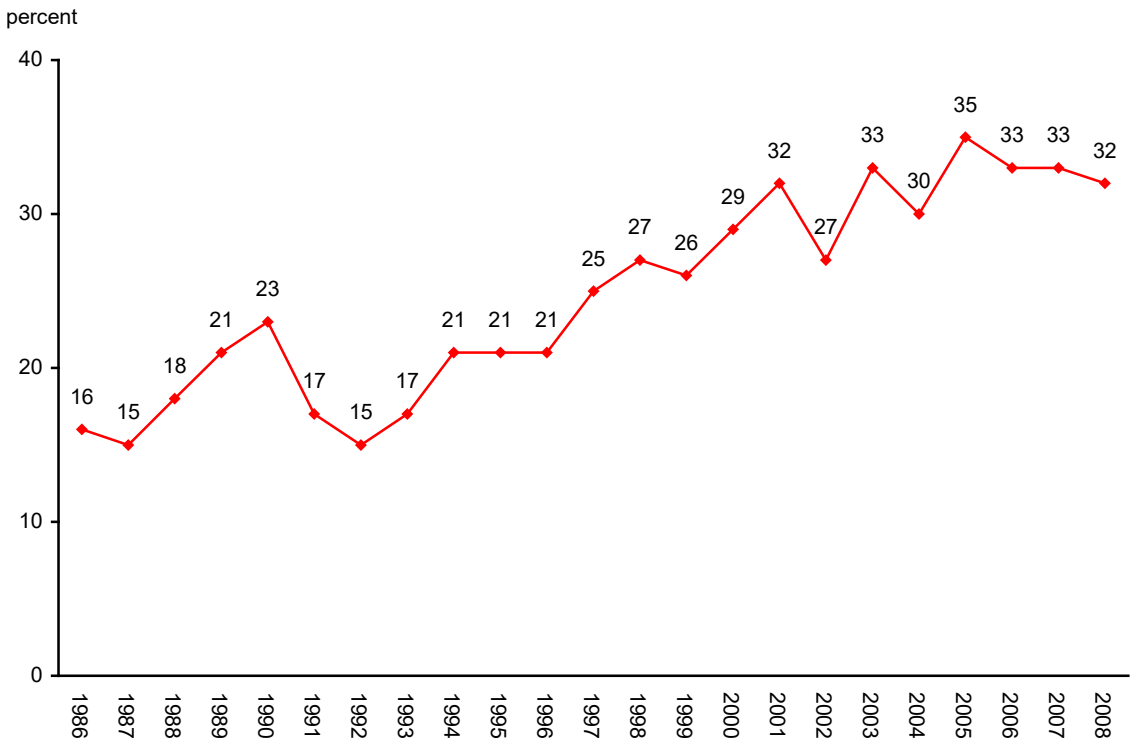
The interesting question is to what extent this changed when the nuclear issue became less politicized after the referendum. A first indication that the impact of party has diminished is that panel data covering the elections in the 1980s reveal fewer people changing their nuclear attitudes to be in line with their party's. In the Swedish National Election Study (SNES) election panels of 1979-1982, 1982-1985 and 1985-1988 only about 40 percent of all attitude changers on the nuclear issue change their point of view in accordance with their own party. In the formative years the comparable result was between 60-70 percent.

Another indication of the lessening impact of party on nuclear attitudes is that the proportion of Swedes who have a different opinion than their own party has steadily risen since the referendum and the mid 1980s. The proportion of Swedes who on average across six or seven parties differ from their party's position on nuclear power was 16 percent in the referendum and still about that same proportion immediately after the Chernobyl accident. Since then, however, the proportion of party dissenting Swedes on the nuclear issue have gone up considerably to around 25 percent in the mid and late 1990s and to somewhat over 30 percent in the early 2000s (see Figure 5). Most Swedes still think as their party on the nuclear issue, but the deviating minority has grown larger over the years.

Yet another very revealing bit of evidence supporting the finding that the influence of party on mass level nuclear attitudes was strong in the 1970s in Sweden, but that the impact of party has weakened since then, can be found if we study individual level attitude changes on the nuclear issue in the election panels of the Swedish National Election Studies (SNES). Specifically, we have looked at instances of attitude changes in the direction of where the voters' party stand on nuclear power. Among stable party voters and among party switchers what are the proportions of people who change their nuclear opinion to that of their own stable or new party between time 1 and time 2? The hypothesis is that the proportion of opinion changers in the direction of their own party's standpoint was larger in the formative years in the 1970s, than has been the case

since. Parties have become less effective as opinion molders when the nuclear issue is no longer a hot issue among voters. The attitude changes measured via an index in Figure 6 show the outcome of the analysis for seven panels covering the elections between 1976 and 2006. The index runs from –1.0 (all possible attitudes changes are going in the wrong direction, away from the standpoint of the preferred party) to +1.0 (all possible attiudes changes are going in the right direction, toward the position of the preferred party).

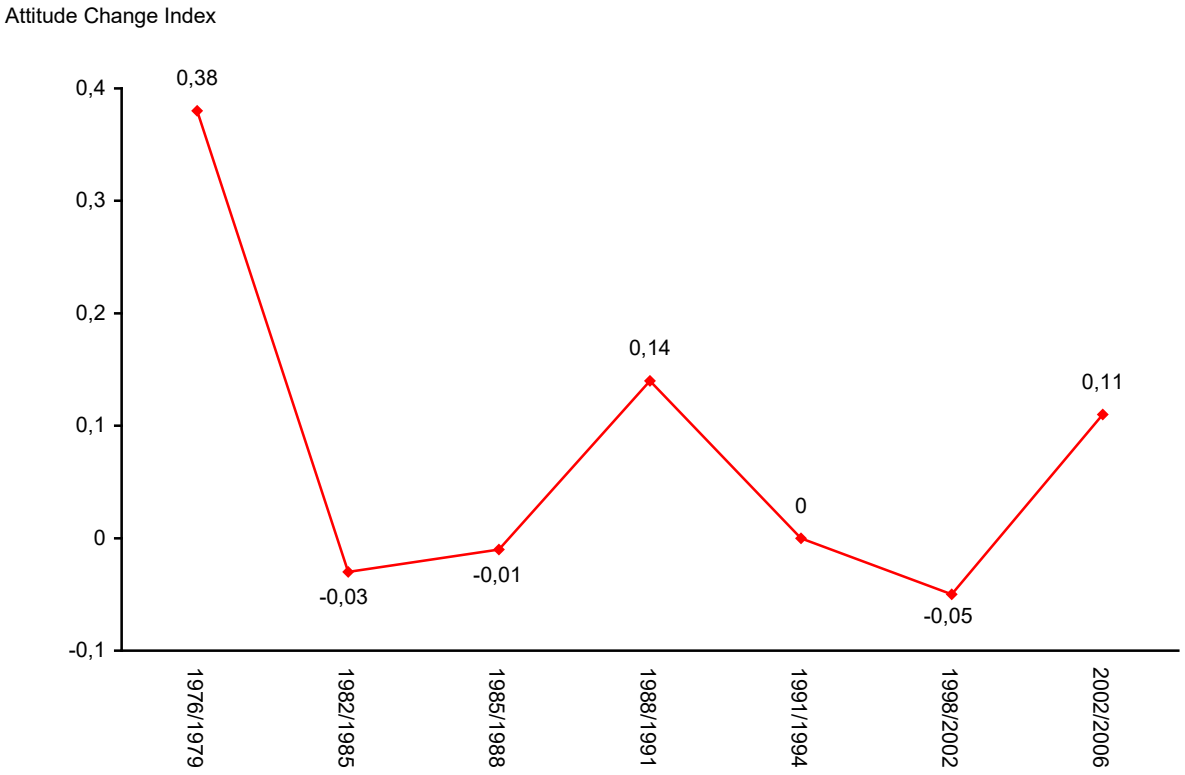
Figure 5 **Proportion of Party Sympathisers With a Different Nuclear Opinion Than Their Own Party 1986-2008 (percent)**



Comment: The data come from the annual SOM studies. The results are means for seven parties and based on the computations in Table 2. Phase-out nuclear power has all the years been defined as the party standpoint for the Left Party, Social Democrats, Greens, Center Party, Christian Democrats and Liberals (1986 – 1996). Not phasing-out nuclear power is classified as the Conservative Party line all years and for the Liberals since 1997.

The results give a nice and illustrative support to our hypothesis. Between elections, in the late 1970s, the average rate of opinion shifts among stable party voters and party switchers in the direction of the preferred party was +.38 on our index. In the later election panels in the 1980s, 1990s and early 2000s, the rate of comparable attitude changes in the direction of a preferred party's standpoint have been much less frequent varying between on average of –.05 to +.14 with an average of +.03 for the whole 1982 – 2006 period.

Figure 6 **Change in Attitudes to Nuclear Power Potentially Induced by Party (panel data; change towards (+) or away (-) from the standpoint of a preferred party)**



***Comment**:* The results are based on panel data from the Swedish National Election Studies (SNES). The computations show, via an index, the average rate of attitude changes in the direction of the voters' stable or new party's standpoint (+) or away from the voters' stable or new party's standpoint (-) among stable party voters and among party switchers in seven two-election panel studies. The index runs from –1.0 (all possible changes are going in the wrong direction, away from the standpoint of the preferred party) to +1.0 (all possible changes are going in the right direction, toward the position of the preferred party).

If we restrict the analysis to only stable party voters, excluding party switchers and thus eliminate the possibility of attitudes influencing the choice of party, the results stay the same. Among stable party voters in 1976-1979, the rate of average opinion shifts in the direction of the party line was +.22. A bit lower than previously, but still in support of the hypothesis. In the election panels between 1982 and 2006, the rate of attitude shifts toward the position of a preferred party were much more seldom hovering between -.11 and +.16 with an average of ±0 for all the six panels. There can be no doubt, the impact of party on nuclear attitudes was much stronger in the 1970s than it has been since. The parties' grip over their voters' attitudes have slackened on the nuclear issue. Parties were more in control in the 1970s and at the referendum.

Forming or Following Mass Opinions

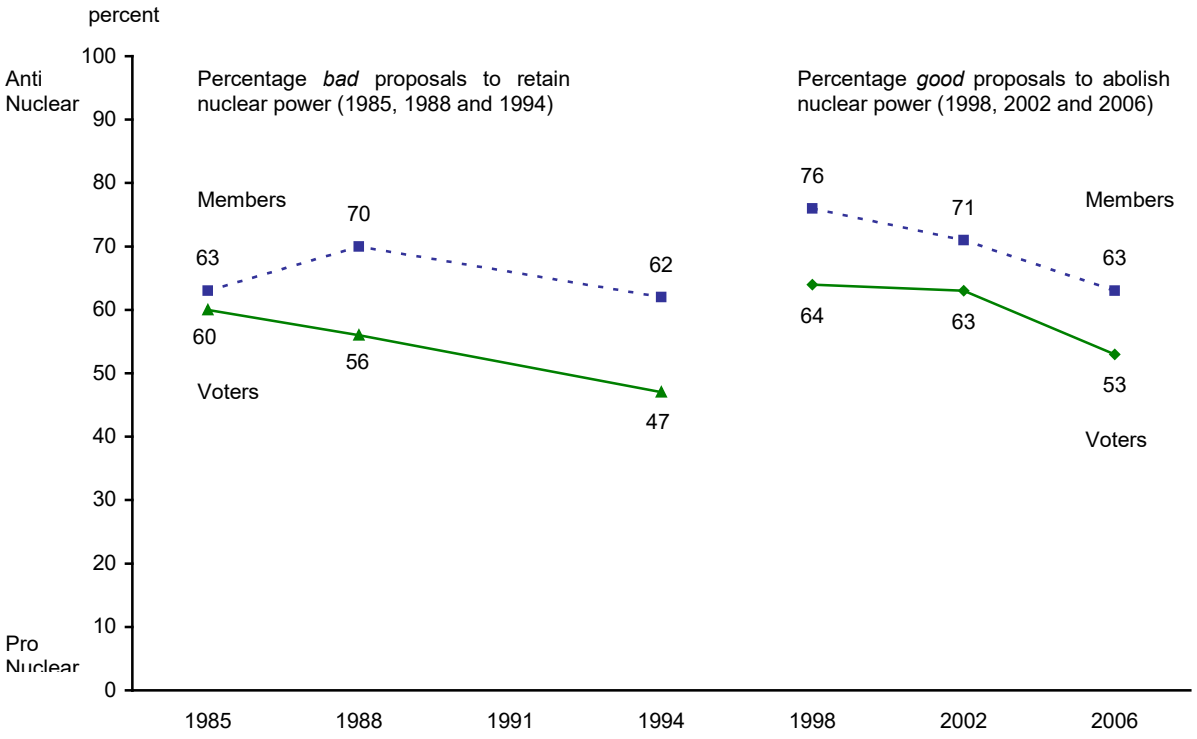
One obvious interpretation of our result is that less conflict and politicization means less effective opinion molding on the part of the political parties. If and when the nuclear issue makes its comeback as a hot and disputed topic on top of the voters' agenda, the parties will be back in business again molding mass opinions. However, another possible reading of the result could be

that today's parties overall are less good at forming voter opinions than was the case twenty or thirty years ago.

Voters in the 2000s are more volatile and independent-spirited, and less identified with there preferred parties, than was true in the 1970s. In Sweden the proportion of party switchers between the elections of 1976 and 1979 was 18 percent. Between the elections of 2002 and 2006 the comparable number was 37 percent. At the same time the proportion of party identified voters has declined from 59 percent in 1979 to only 31 percent in 2006 (Oscarsson and Holmberg 2008). Consequently, the prerequisites for successful opinion molding are less advantageous for today's Swedish parties than thirty years ago. If this is true, what has happened in the nuclear area is not unique to that area. Parties have across the board become less effective as opinion molders on all political issues.

One last bit of evidence further strengthening our case that in the last twenty years parties and political elites have become less successful in forming mass level nuclear attitudes, can be picked up from a series of Swedish studies on political representation. Starting in 1985 Swedish members of parliament have been asked some of the same survey questions on nuclear power as the voters. Over 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 (procent)



Comment: The results come from the Swedish National Election Studies (Oscarsson and Holmberg 2008) and the Swedish Riksdag Studies (Brothén and Holmberg 2009). 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 2009.

In a dynamic fashion we can study whether members' opinions have tended to lead the way and voters followed suite or if the process has been the reversed with member opinion following voter opinion over time. In the first case we talk of representation from above. Voters' attitudes are potentially formed from above by the parties and their leaders. In the second case we talk about representation from below. Members' opinions follow voters'. In Sweden, most issues tend to fall into the category of being cases of representation from above (Holmberg 2009). The nuclear issue, however, is an exception (see Figure 7).

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 electorate. But as the voters, members have over time become more positive to nuclear power.

However, never becoming more positive, or as positive as the electorate. Members' opinion has followed public opinion in slowly accepting the long term use of nuclear power in Sweden. We have a nice case of representation from below. Potentially, members' nuclear attitudes have been influenced by what the voters think. In the 1970s it was the other way around. Then, to a large degree, party elites formed what voters thought about nuclear power.

Today, those glory days of powerful opinion forming parties are gone – at least in Sweden and in the nuclear field.

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Chapter 4

Public Opinion and Swedish Nuclear Power Policy

Sören Holmberg **Per Hedberg**

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 twenty-five 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 thirty 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 then came the catastrophe in Fukushima in 2011. Once again phase-out plans were activated (Germany) and nuclear build-ups were halted, especially in Western democracies.[1]

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.[2]

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[1] Wolfgang Muller and Paul Thurner *The Politics of Nuclear Energy in Western Europe* (Oxford University Press, 2017). The book includes a chapter on Sweden that is a slightly revised and changed version of this chapter.

[2] 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*.

From In to Out and Back to In Again – and Then Once More Back to Out

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, 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 top level at about 45-50 percent in the mid 1980s.

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]

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

[3] The reason behind the three alterantives was a tactical decision by the Social Democrats and the Conservatives. They did not want to be behind a joint alternative and thought it adventageous 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 soulution in parliament but were run over by a majority composed of Social Democrats, Liberals and Conservatives.

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. 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 and a new relative majority for abandoning nuclear power (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). But the relative majority in favor of a long term phase-out of nuclear power was not changed; and has not changed since then.

In contrast, in 1979, the immediate anti-nuclear effect of the Harrisburg accident on Swedish public opinion was 5 – 10 percentage points and lasted only 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 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.

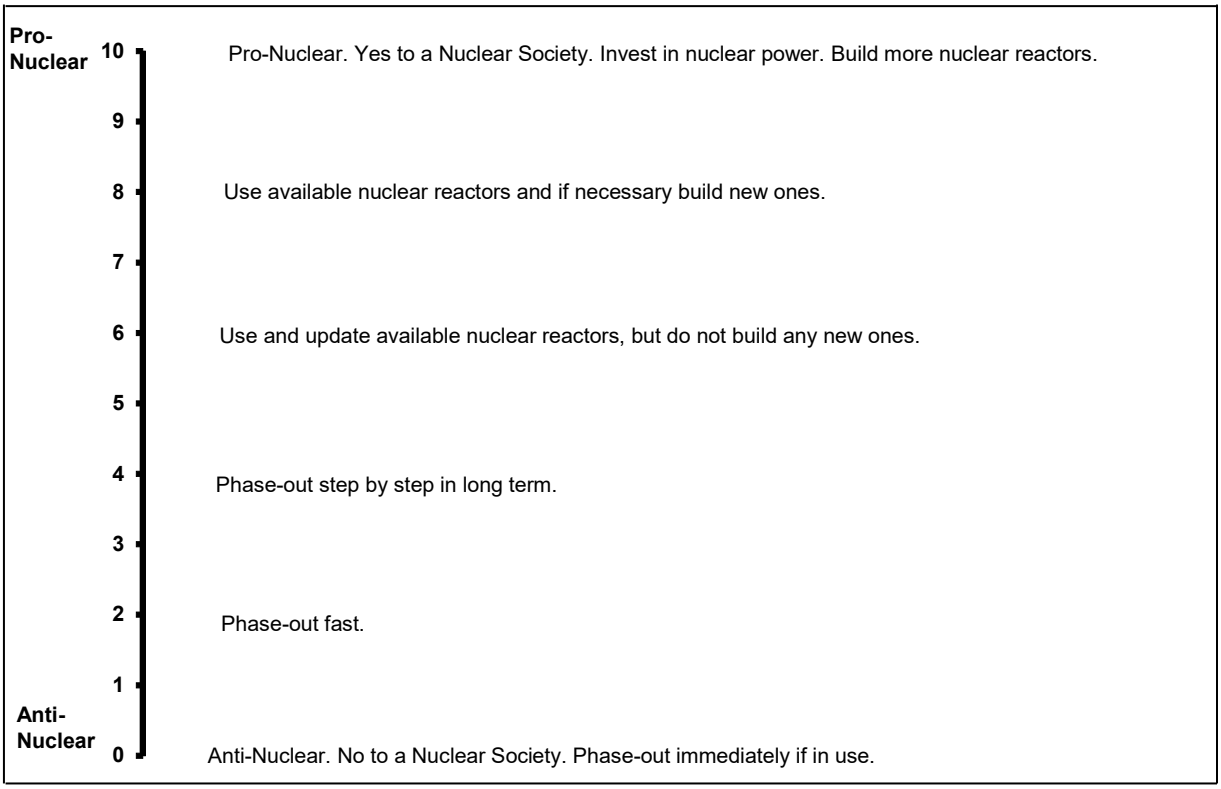
In accepting this challenge we have opted for the use of an eleven point scale running from 0 (maximum anti-nuclear) to 10 (maximum pro-nuclear). The scale is intended to grade official nuclear power policies as well as the policies of the political parties. The scaling of official policies is based 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 been validated by 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]

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.

[4] Most of the policy data for the years 1945-2010 have been collected and put together by Rebecka Åsbrink as research assistant in the project *Energy Opinion in Sweden*. Sara Persson has collected the policy texts for the years 2011-2018.

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

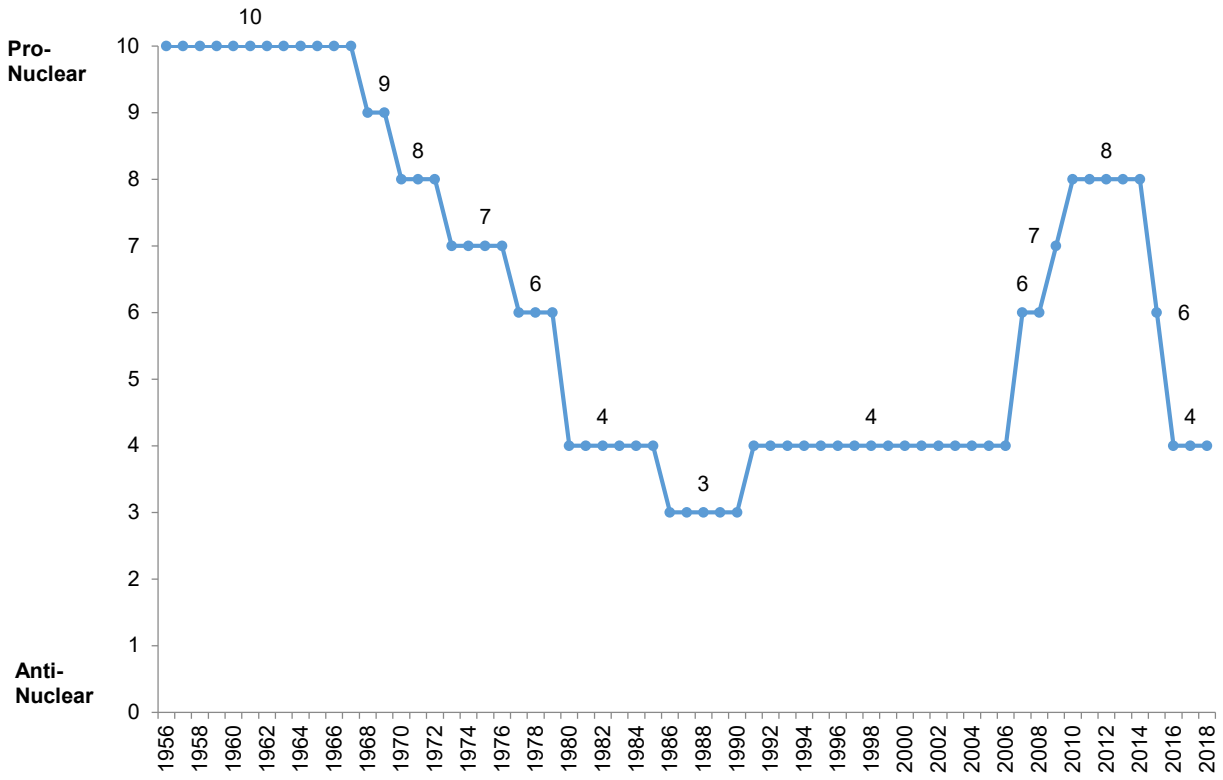


Comments: The scale is intended to measure official nuclear power policy. The grading is based on policies on the ground (implemented) as well as on goal-oriented policy decisions taken by the parliament. The scale has been constructed by Per Hedberg and Sören Holmberg.

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.

Figure 2: Swedish Nuclear Power Policy 1956 – 2018



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	*AB Atomenergi* 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.
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
2005-2006	4	Barsebäck 2 phased-out. Research reactor R2 is decommissioned.
2007	6	Decision to *not* phase-out any reactors in 2006 – 2010; restrictions on nuclear research lifted
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
2011-2014	8	No major change
2015	6	Increased tax on nuclear production (tax on thermic effect)
2016-2018	4	Agreement between five parties (S, MP, C, KD M). All electricity production should be based on renewable energy sources in 2014; hence a phase-out of nuclear power.

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. 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 was 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 was to make it possible to replace those with ten new ones. The intervening thirty years with an official phase-out policy was history; but not quite. Fukushima happened and changed history once again. Swedish public opinion changed instantly. The phase-out option became more popular. But government policy did not change as a consequence of the Japanese accident. The grade stayed on 8 for the duration of the non-socialist rule up through the election of 2014, in which the governing parties lost seats and eventually were replaced by a Social Democratic-Green coalition cabinet. The new government implemented an increased tax on nuclear production in 2015 and Vattenfall and E.ON announced that four old unprofitable reactors would be closed down ahead of previous closing plans. Consequently, the nuclear policy grade is put down to 6.

One year later, in 2016, the policy reversal continued. The two Red-Green governing parties together with the Conservatives, the Christian Democrats, and the Center Party agreed on some future goals for Swedish energy policy.[5] The most important agreement was that in 2040, one hundred percent of electricity production in Sweden should be renewable; nuclear power should be completely phased out. A sort of caveat was added, however: "This is a goal, not a stop date forbidding nuclear power, neither a phasing out of nuclear power with a political decision." The

[5] Liberals and Sweden Democrats did not take part in the Energy Agreement. They did not want to sign on to a phase-out of nuclear power. The Left Party did not participate in the agreement. Either it wanted the phase-out to be faster.

nuclear policy grade is lowered to 4, but not more since the agreement can be interpreted as leaving a possible opening for future nuclear ventures.

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.

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

	Official Swedish	Party Position							
year	Policy	V	S	MP	C	FP/L	KD	M	SD
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	4	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	9

2010	8	3	4	2	6	8	7	8	9
11	8	3	4	2	6	8	7	8	9
12	8	3	4	2	6	8	7	8	9
13	8	3	4	2	6	8	7	8	9
14	8	3	4	2	6	8	8	8	9
15	6	3	4	2	6	8	8	8	9
16	4	2	3	3	4	8	6	6	9
17	4	2	3	3	4	8	6	6	9
18	4	2	3	3	4	8	8	8	9

Comments: The Nuclear Policy Scale runs between 0 (anti-nuclear) to 10 (pro-nuclear), see Figure 1 fore 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/L=Liberals, KD=Christian Democrats and M=Conservatives and SD=Sweden Democrats. 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. Sweden Democrats were founded in 1998; no information on nuclear power policies available earlier then 2009.

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 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 eight Swedish parties represented in the Riksdag in the last fifty years are presented in Table 1. How the nuclear policies of the eight parties has changed is detailed in Appendix A.

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 have influenced official Swedish nuclear 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 the Table, an average of the difference measure results across all relevant years is also provided for all parties.

To 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 -0,6 across the relevant 49 years starting in 1970 and ending in 2018. Thus, on average, Social Democratic nuclear 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 35 of the 49 relevant years (1970-76, 1982-1991, 1994-2006, 2014-2018). On the other hand, it is not self-evident that parties are successful in using the government position to implement their policies. However, in the Swedish case at least, it is obvious that the Social Democrats have been

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

Left Party (V)

Years	Difference
1970 – 1972	0
1973 – 1979	-6/-7
1980 – 2006	-2/-3
2007 – 2010	-4/-5
2011 – 2014	-5
2015 – 2018	-2/-3

Average over 49 years –3,2

Social Democrats (S)

Years	Difference
1970 – 1976	0
1977 – 1979	+1
1980 – 2006	0
2007 - 2010	-2/-4
2011 – 2014	-4
2015 – 2018	-1/-2

Average over 49 years -0,6

Greens (MP)

Years	Difference
1981 – 2006	-3/-4
2007 – 2010	-5/-6
2011 – 2014	-6
2015 – 2018	-1/-4

Average over 38 years –3,7

Center Party (C)

Years	Difference
1970 – 1972	0
1973 – 1976	-7
1977 – 1985	-3/-5
1986 – 1996	-2
1997 – 2006	-1/0
2007 – 2010	-1/-2
2011 – 2014	-2
2015 – 2018	0

Average over 49 years -2,1

Liberals (FP/L)

Years	Difference
1970 – 1996	0/+1
1997 – 2006	+2/+3/+4
2007 – 2009	+1/+2
2010	0
2011 – 2014	0
2015 – 2018	+2/+4

Average over 49 years +1,3

Christian Democrats (KD)

Years	Difference
1980 – 1997	-2/-3
1998 – 2010	0/-1/-2
2011 – 2014	0/-1
2015 – 2018	+2/+4

Average over 39 years -1,4

Conservatives (M)

Years	Difference
1970 – 1976	0/+1
1977 – 1985	+1/+2
1986 – 2006	+3
2007 – 2010	0/+1
2011 – 2014	0
2015 – 2018	+2/+4

Average over 49 years +1,9

Sweden Democrats (SD)

Years	Difference
2011 – 2014	+1
2015 – 2018	+3/+5

Average over 8 years +2,8

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.

quite successful in carrying their nuclear power policy through. The only years when the difference measure reveals that Social Democratic nuclear policy has been somewhat off compared to official policy are the years 1977-79 and the recent years 2007-2014. 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 +1,3 across the forty-nine years, the second smallest among the parties. 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 15 of the relevant 49 years. The main reason 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 begun 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 1997-2006, 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.

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 member of a governing coalition!, and a period of continued support for the phase-out process (1986-2008) followed by a phase (2009-2014) 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 was a part. Over the years the average difference measure for the Center Party is -2,1, 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, and the most pro-nuclear party, the Sweden Democrats with a difference score of +2,8. The comparative results for the Christian Democrats and the Conservatives are -1,4 and +1,9. The result for the Conservatives indicate that they through the years on average have been, together more recently with the Sweden Democrats, the most positive party to nuclear power in Sweden, however under some competition from the Liberals since the early 2000s and also from Christian Democrats in the last couple of years.[6] After the government shift in 2006, the Conservative and the Liberal pro-nuclear policies were the law of the land. They were 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.

The election in 2014 and the shift in government, once again changed the law of the land. The energy agreement of 2016 meant that nuclear power long term was to be phased-out in Sweden. Now the nuclear policies of the Social Democrats and the Greens ruled.

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 to two units..

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.[7] 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

[6] In late 2019, the Conservatives and the Christian Democrats left the Energy Agreement. The reason being that they do not want to phase out nuclear power.

[7] Potential party influence is present when official policy is shifted in the direction of party policy.

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.

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 1982-2018 (see Appendix B). Nuclear power was not depoliticized on the mass level, but it became less politicized.

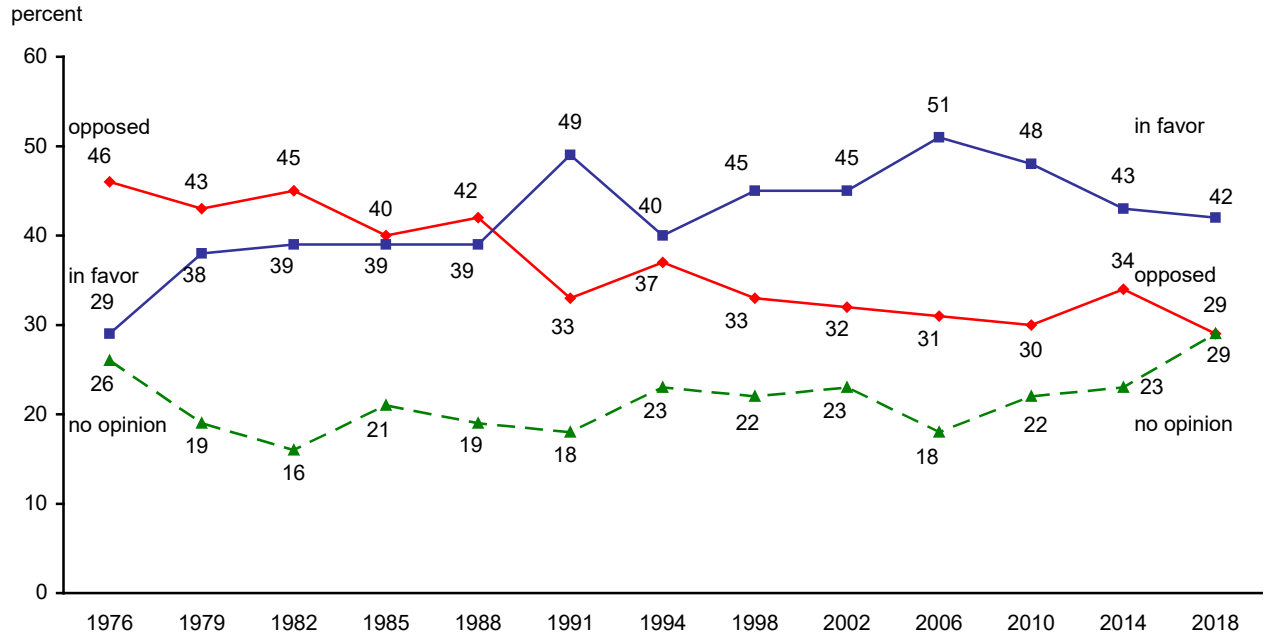
After the referendum and the return-to-normalcy process that followed, public opinion did not change much for a number of years. If there was a trend in those years it was a weak one favoring nuclear power. The stillness was to change dramatically by the Chernobyl accident in 1986. Like in many other European countries support for nuclear power plummeted. In the short term, attitudes to 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 surveys reveal about how Swedish public opinion has evolved across the fifty years between the mid1970s and the second 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 and 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 – 2018 (percent)



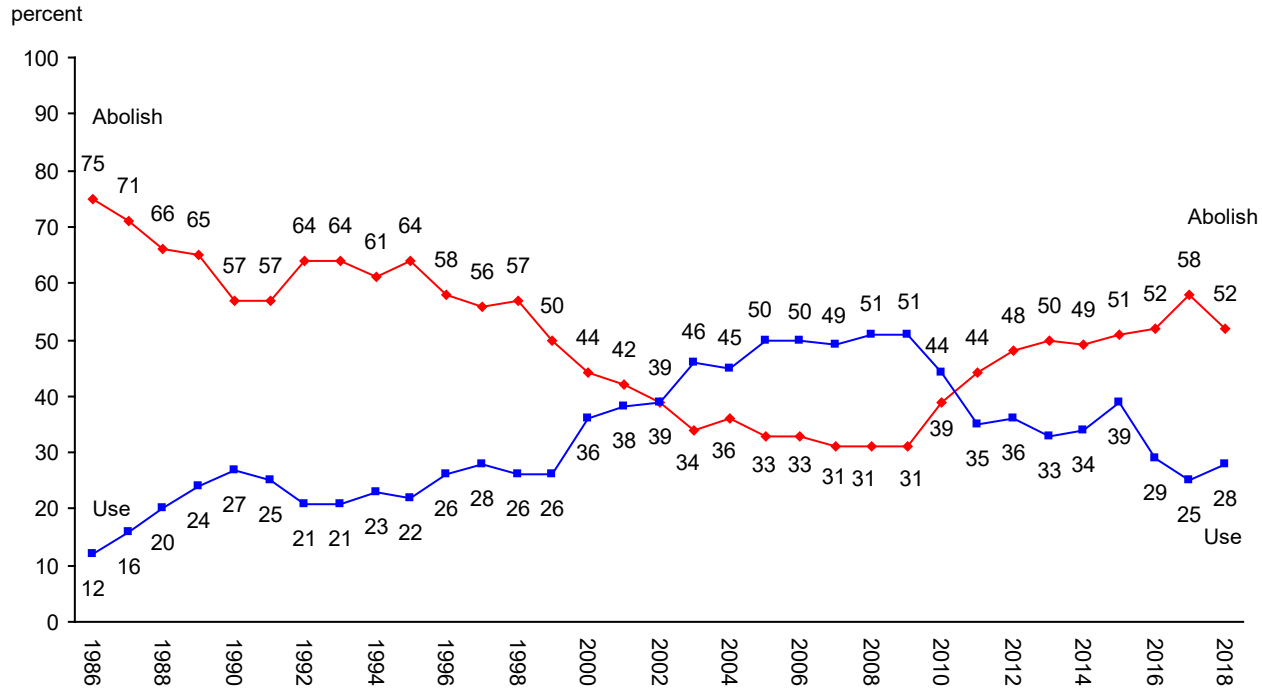
Comments: The results for 1976 come from Holmberg et al *Väljarna och kärnkraften* (1977). The results in 1979 – 2018 come from The Swedish National Election Studies (SNES). Percentages are computed among all respondents. ***Question***: ”There are different opinions on nuclear power as an energy source. What is your view? Are you mainly in favor 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 the years. In the most recent surveys the response alternatives have been five: “Abolish nuclear power very soon; Abolish nuclear power, but use the 10 reactors we have until they are worn out; Use nuclear power and replace our present reactors with at most 10 new ones; Use nuclear power and build more reactors than the 10 we presently have in the future; No definite opinion”.

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 went up to 51 percent in 2006 and to 48 percent in 2010, but fell back in 2014 and 2018 to 43 and 43 percent, respectively.

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, in the most recent surveys down to around to 55 percent. *Question used since 2010*: "What is your view on the long term use of nuclear power as an energy source in Sweden?" Five response alternatives; "Phase out nuclear power very soon; Phase out nuclear power, but make use of the 10 reactors we have until they are worn out; Use nuclear power and replace the present reactors with a maximum of 10 new reactors; Use nuclear power and build more reactors than the present 10 in the future; no definite opinion" (see Chapter 10). 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.

Our other time series staring 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 39 percent in 2010.[8] The relative majority of Swedes changed from being in favor of a long term phase-out of nuclear power up until 2001 to supporting a continued use of nuclear power from the year 2003. However, then happened the meltdown in Fukushima. Swedish public opinion responded quickly by once more becoming more positive to a phase-out of nuclear power.

[8] 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).

Ironically, most of the opinion shift in the late 1990s occurred 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 Democrats – 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 in the early 1990s.[9] 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 began to have second thoughts. During a couple of years a clear relative majority of Swedes was in favor of nuclear power and wanted Sweden to use nuclear power, not phase it out. That ended by the accident in Fukushima. Since then a strong relative majority of Swedish citizens has been in support of a long term phase-out of nuclear power.

How these drastic changes came about among the different party supporters is highlighted in multi-colored graphs in Figures 5 and 6. Sympathizers with all parties became more supportive of nuclear power up to pre-Fukushima in 2010, but clearly more so for some parties than for others.

Looking at Figure 5, the line up of the parties in the beginning of the period is very recognizable from the 1980 referendum. 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 pro-nuclear 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 up to 2010 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. Focusing on the development after the Fukushima accident, positive identification with nuclear power went down somewhat for all party supporters, including for sympathizers with the new party, the Sweden Democrats. But there were two exceptions. Supporters for two small parties, the Christian Democrats and the Liberals, did not exhibit a weakened identification with nuclear power.

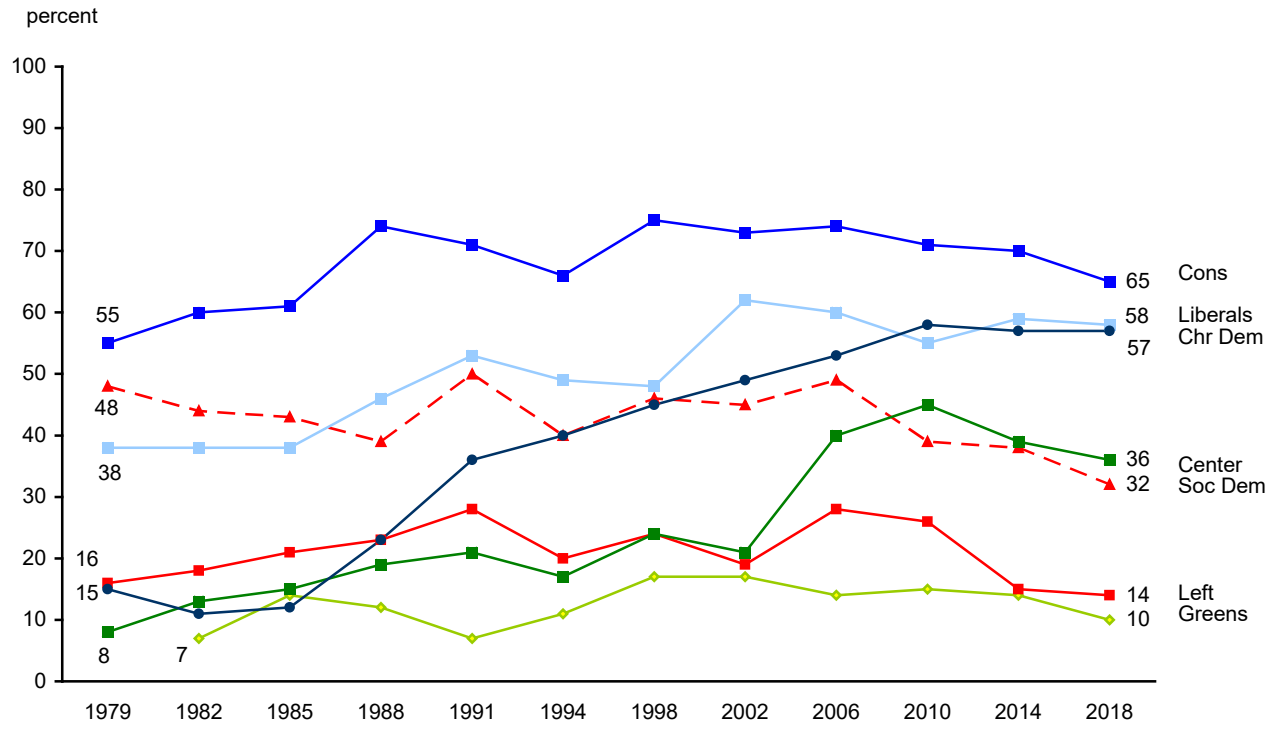
Looking at relative majorities across time for different party sympathizers, it is interesting to note that most party groups have not shifted their majority position. More supporters of the Conservatives, the Sweden Democrats and the Social Democrats have always identified themselves as in favor of nuclear power rather than against; more so among Conservatives and

[9] That relative majority is still intact, although somewhat weakened, up through the election of 2018. The self-classification question does not specify any time horizon for the use of nuclear power. It just asks in favor or against nuclear power.

Sweden Democrats, however, than among Social Democrats.[10] In a similar fashion, most followers of the Greens and the Left Party have always classified themselves as against nuclear power.

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 of nuclear power rather than against.[11]

Figure 5 Percent In Favor of Nuclear Power Among Voters for Different Swedish Parties 1979-2018 (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 favor. For Sweden Democrats the percent in favor is 68 percent in 2010, 56 percent in 2014 and 61 percent in 2018.

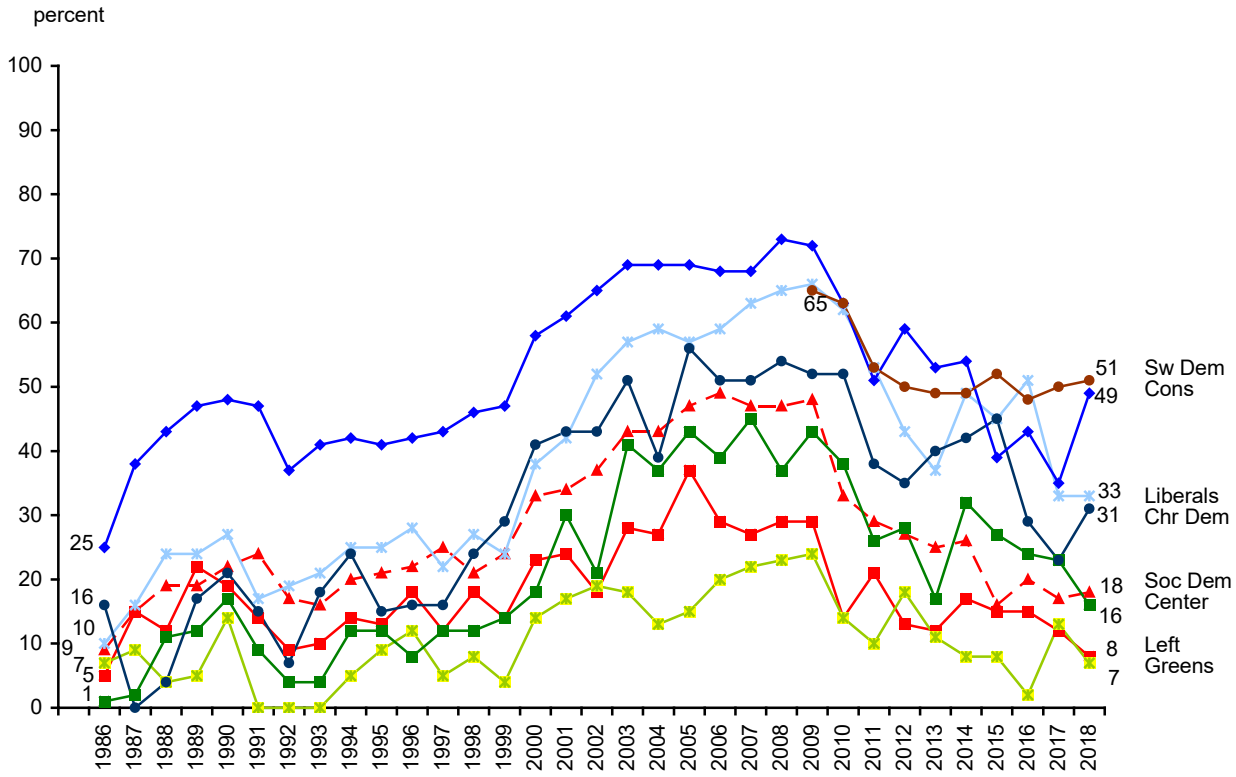
Now, focusing on how the more policy-based nuclear attitudes have changed among different party groups, it is apparent that most developments basically are the same as for the measurement based on the self-classification question. As is shown in Figure 6, support for using, not phasing-out nuclear power has increased up to 2010 among sympathizers of all parties compared to the

[10] Actually the relative majority of Social Democratic supporters identified against nuclear power in 2018, 34 percent did so as compared to 32 percent who identified in favor of nuclear power. A small difference, but a difference that moved a relative majority of S-sympathizers over to the anti-nuclear side.

[11] In 2014 Center supporters were evenly split between being for or against nuclear power, while in 2018 a small relative majority favored the nuclear option (36 percent) versus 34 percent against.

situation in 1986; most noticeable among Non-Socialist supporters.[12] The shift among Social Democrats, Greens, and Left Party sympathizers has been more modest. Least attitude change in the direction of using nuclear power is found among supporters of the Greens (+7 points). After Fukushima support for nuclear party decreased again in all parties, most notably among Liberal sympathizers, less so among followers of the Conservatives or the Sweden Democrats.

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



Comments: See Figure 4 for the question wording.

Studying relative majorities is instructive. When it comes to phase-out or not phase-out nuclear power there are five parties whose followers have been consistent in their views all along – the Left Party, the Greens, the Center Party and Feminist Initiative with a relative majority of voters always in favor of a phase-out, and the Sweden Democrats with supporters always leaning toward using nuclear power.[13] Sympathizers with the other parties have changed their majority views at different occasions since the 1980s. Among S-supporters the relative majority has been in favor of a phase-out most years, except for the period 2003-2009. The result for Liberal and Christian

[12] 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 Liberal than for the Center Party supporters (Holmberg and Hedberg 2009)

[13] One exception, in 2007 the relative majority of Center Party sympathizers was against a phase out, 45 percent versus 42 percent for a phase out.

Democratic followers is similar – in favor of a phase-out most years except 2002-2011/2000-2010 and 2014-2016/2015. Conservative sympathizers have been most volatile of all – with relative majorities against a phase out most of the time, but in favor of a phase-out in 1986-1988, 1992-1995 and in 2015 and 2017. In 2018, only followers of two parties exhibit a relative majority in favor of using nuclear power long term – Conservative and Sweden Democratic voters. Relative majorities in the other seven parties are positive to stop using nuclear power in the long run.

Public Opinion Effects on Official Nuclear Policy

The ultimate question of whether there 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. But then came the accident in Fukushima and Swedish public opinion shifted. Phase-out once more became the dominant view. And as a consequence, after a few years official Swedish policy was changed again. Now - long term - all electricity production should me based on renewable energy sources; by 2040 nuclear power should be gone in Sweden.

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 twelve mandate periods covered by our investigation, starting with the period 1976-79 and ending with 2014-18. 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 twelve 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 (8 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 five periods show indecisive change patterns, with in all cases policy being stable while opinion moved.. Thus, official Swedish nuclear power policy has most often changed together and in a parallel fashion with Swedish nuclear opinion across the forty two years between 1976 and 2018. 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 twelve mandate periods we can base the conclusions on many more cases (8 parties across 12 mandate periods). And reassuringly enough, the mean outcome for eight parties over the forty two year period is much the same as when we studied the relationship between the general public and official policy. Parallel changes are more common (28 percent) than changes in different directions (3 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 a 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.[14]

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 thirty years we can systematically follow the development of nuclear attitudes in the Riksdag as well as among the electorate.

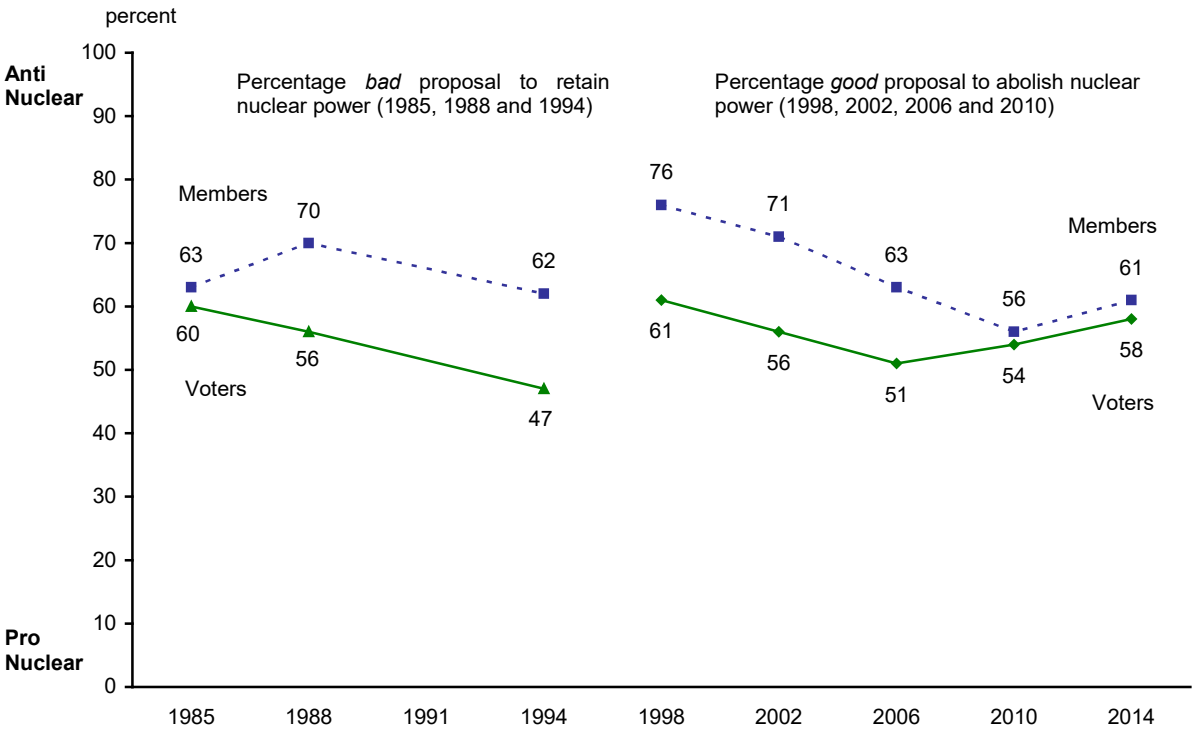
In a dynamic fashion we can study whether the opinions of members have tended to lead the way and voters followed suite, or if the process has been the opposite with politicians´ opinions following voter opinion over time. In the first case we talk of representation from above, in the second case we 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.

[14] In 18 per cent of the cases we find a potential effect of opinion change on policy change, while in the opposite circumstance we find a potential effect of policy change on opinion change in 9 percent of the cases. Thus, somewhat more often we find representation from below than representation from above.

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. And like the voters, politicians became more positive to nuclear power up to 2010 and then after Fukushima more negative again; yet, never becoming more positive - or as positive - as the electorate.

In most cases, nuclear views of politicians have followed public opinion.[15] Hence, since the mid-1980s we have a pattern of representation from below on the nuclear issue. Potentially, members´ nuclear attitudes have been influenced by what voters think. Mass opinions have been affecting elite opinions.

Figure 7 Policy Representation in Sweden – Attitudes on Nuclear Power Among Members of Parliament and Eligible Voters in 1985 – 20014 (percent)



Comment: The results come from the Swedish National Election Studies, the SOM-studies and the Swedish Riksdag Studies. 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").

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

[15] Six opinion change patterns can be analyzed in Figure 7. Three are potentially mass-driven, one potentially elite-driven, one potentially elite- and mass driven, and one show no related opinion shift. See Holmberg 2011.

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.

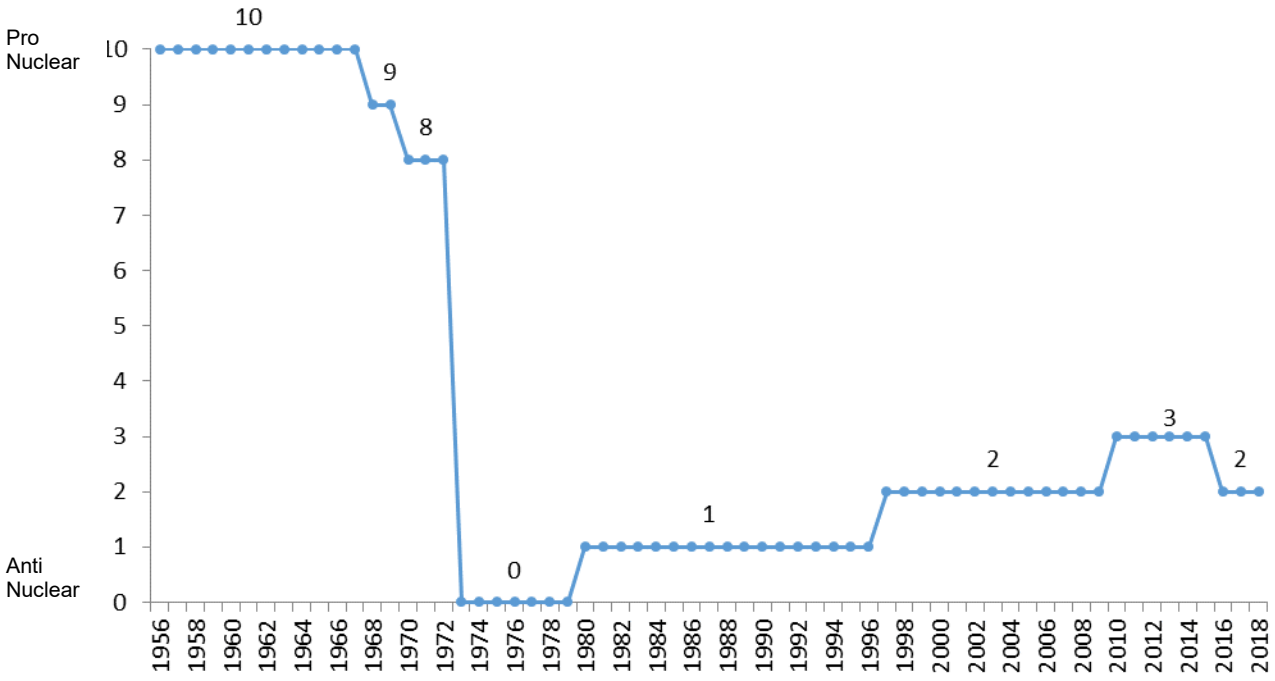
In the early 1970s, all parties and the majority of the Swedish people agreed with official policy. Sweden was to go nuclear. Then in the late 1970s and in the 1980s, all parties´ policies as well as public opinion became decidedly more anti-nuclear, as did official policy. After a referendum, Sweden 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 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. But history did not end there. The catastrophe in Fukushima and a government shift in 2014 and a multi-party agreement once again reversed Swedish nuclear policy. Phase-out was back as official policy. And again, the decision was in harmony with public opinion. After Fukushima a strong relative majority of Swedes wanted a long term phase-out of nuclear power.

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. A walk that was halted by the accident in Fukushima. Instead public opinion and official policy now aim for a walk out of 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

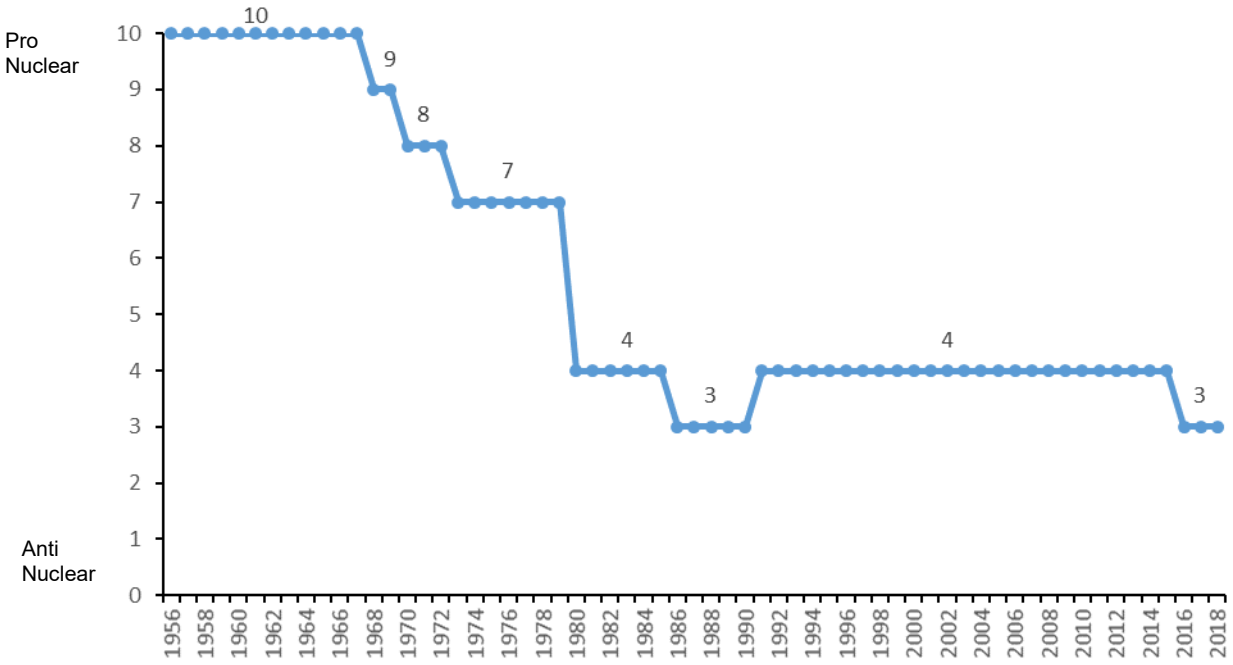
Figure A1 Left Party Positioning on Nuclear Power



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.
2011 – 2015	3	No major change
2016	2	Did not sign on to the five-party Energy agreement. The party wants a faster phase-out.
2017 – 2018	2	No major change

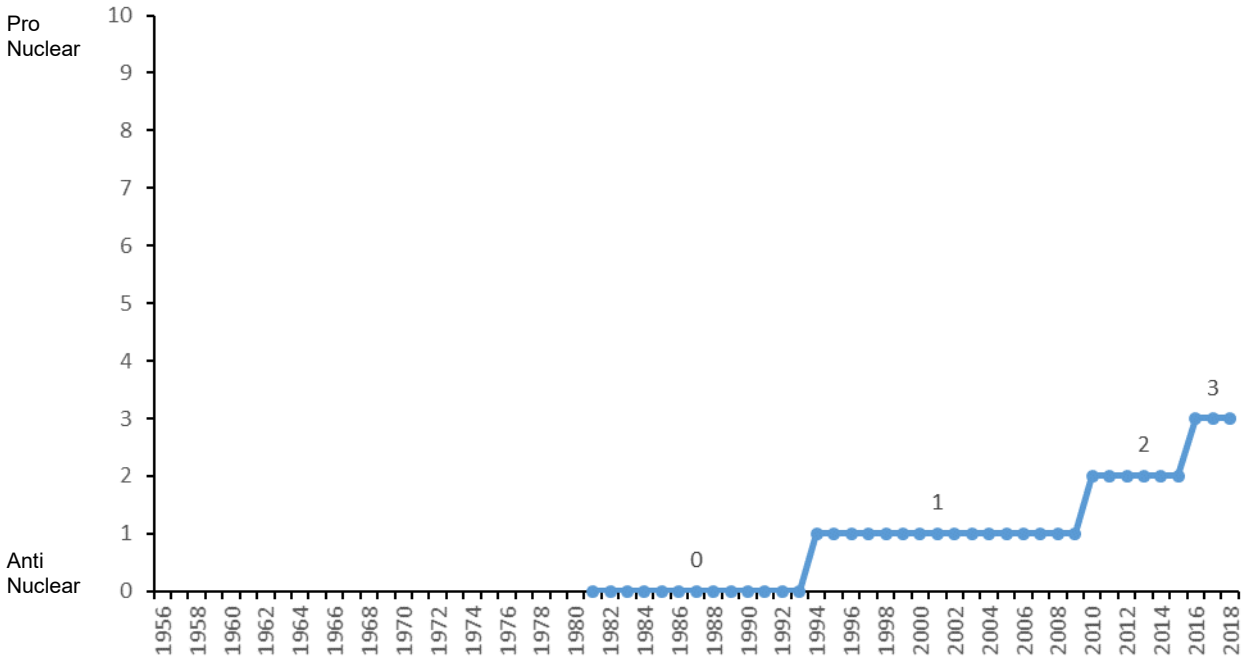
Figure A2 Social Democratic Positioning on Nuclear Power



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
2011 – 2015	4	No major change
2016	3	Sign on to the Energy agreement.
2017 – 2018	3	No major change

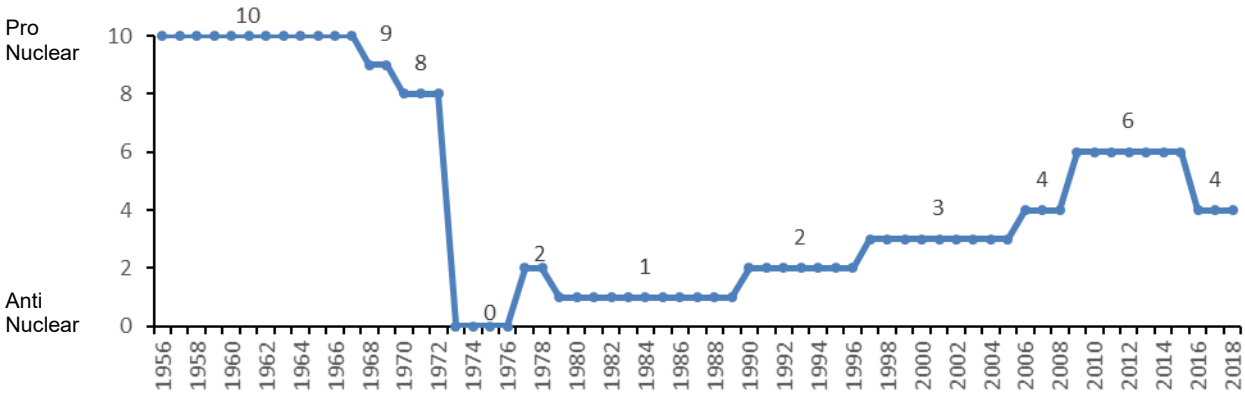
Figure A3 Green Party Positioning on Nuclear Power



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.
2011 – 2015	2	No major change
2016	3	Sign on to the Energy agreement. Thus agreed to a later phase-out than previously.
2017 – 2018	3	No major change

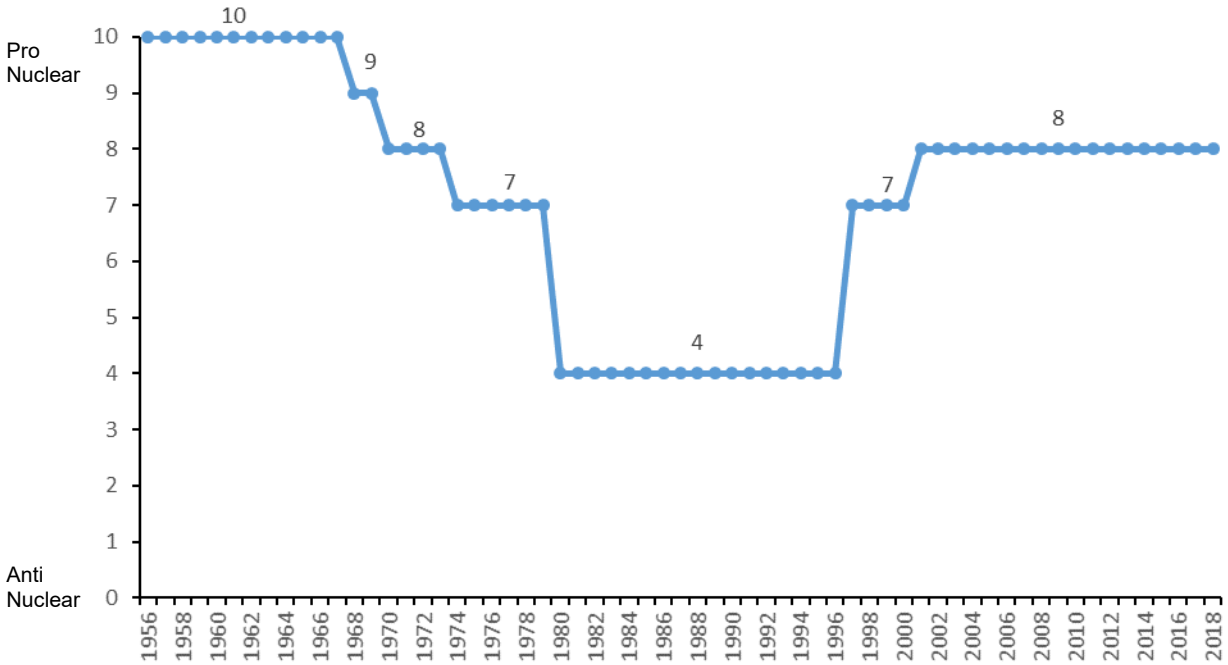
Figure A4 Center Party Positioning on Nuclear Power



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 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	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.
2011-2015	6	No major change
2016	4	Sign on to the Energy agreement.
2017 – 2018	4	No major change

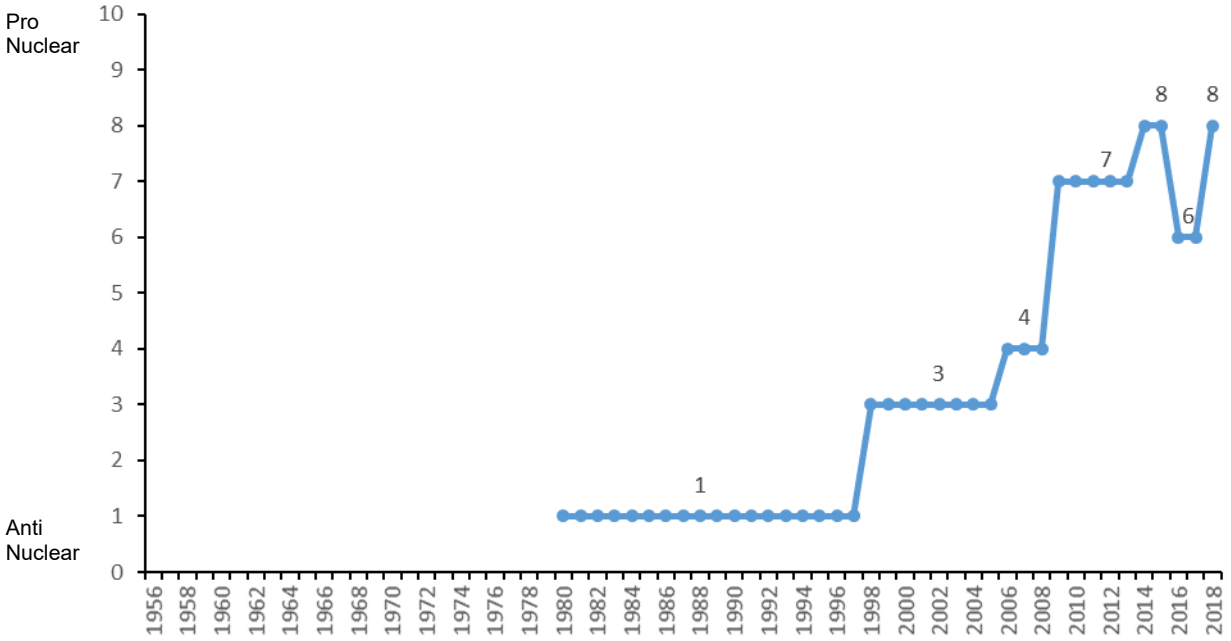
Figure A5 Liberal Party Positioning on Nuclear Power



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.
2011 – 2018	8	No major change. Did not sign on to the five-party Energy agreement. The party do not want to phase-out nuclear power.

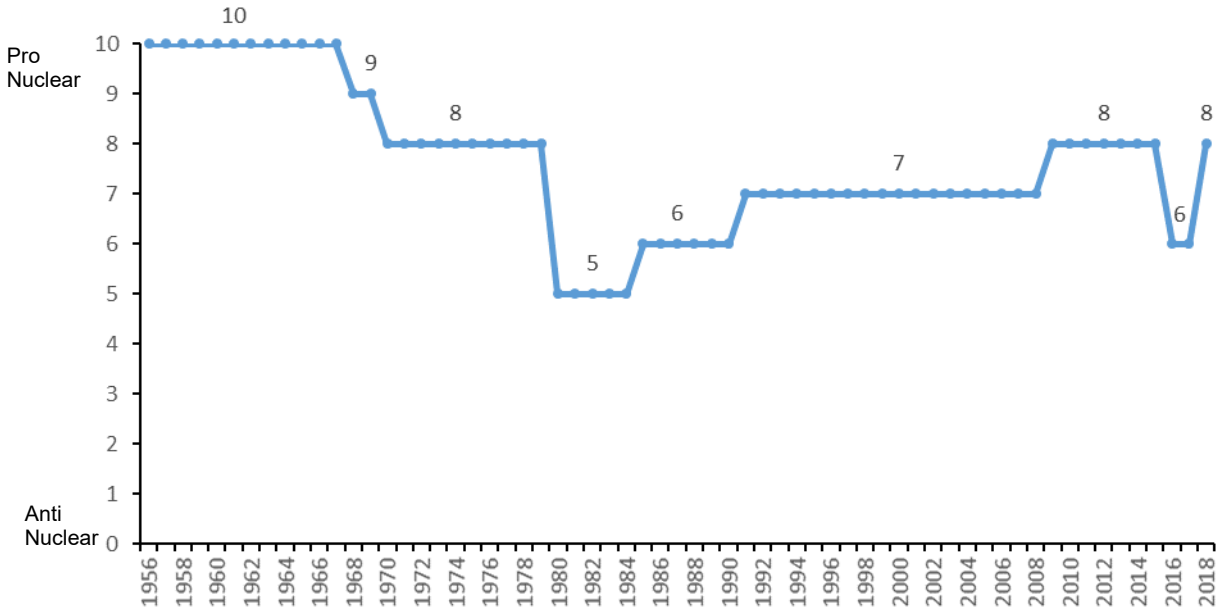
Figure A6 Christian Democratic Positioning on Nuclear Power



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.
2011 – 2013	7	No major change.
2014	8	In favor of using nuclear power in election manifesto.
2015	8	No major change
2016	6	Sign on to the Energy agreement.
2017	6	No major change
2018	8	Strongly argues in favour of nuclear power in the election campaign.

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 *Riksdag* 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 *Riksdag* in favor of the possibility of building a maximum of 10 new reactors in Sweden, replacing the present ones.
2011 - 2015	8	No major change
2016	6	Sign on to the Energy agreement.
2017	6	No major change
2018	8	Argues for continuation of nuclear power in election manifesto.

Figure A8 Sweden Democrat Party Positioning on Nuclear Power

Source: Sweden Democrat's programs. The party was founded 1988. Classification of nuclear power policy on a 0 – 10 scale done by Per Hedberg and Sören Holmberg.

1956 – 1987		No Sweden Democrats party
1988 – 2009		No information; party not in the Riksdag.
2010	9	Argues for new and developed nuclear power in the election manifesto.
2011 – 2018	9	No major change. The party did not sign on to the Energy Agreement, does not want to phase-out nuclear energy.

Table A1 Parallell or Different Changes in Swedish Nuclear Policies and Nuclear Opinions Across Ten Parliamentary Mandate Periods Between 1976 – 79 and 2014 – 18 (Percent)

Change Pattern Between Opinion and Policy	General Public Opinion and Official Policy	Mean for 8 Parties: Opinion of Party Sympathizers and Party Policies
Change in the Same Direction	50	28
Indecisive Change	42	69
Change in Different Direction	8	3
Sum Percent	100	100
Number of cases	12	83

Comments: The analysis is based on inspections of change patterns of official nuclear power policy and public opinion during 12 parliamentary periods starting 1976 – 1979 and ending 2014 – 2018. 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 eight parties involving opinions of party supporters and party policy on nuclear power across twelve mandate periods. The results in the table are means for eight parliamentary parties. The data for official nuclear policy come from Figure 2 and Table 1. Information about nuclear opinions come from Figures 4 and 6.

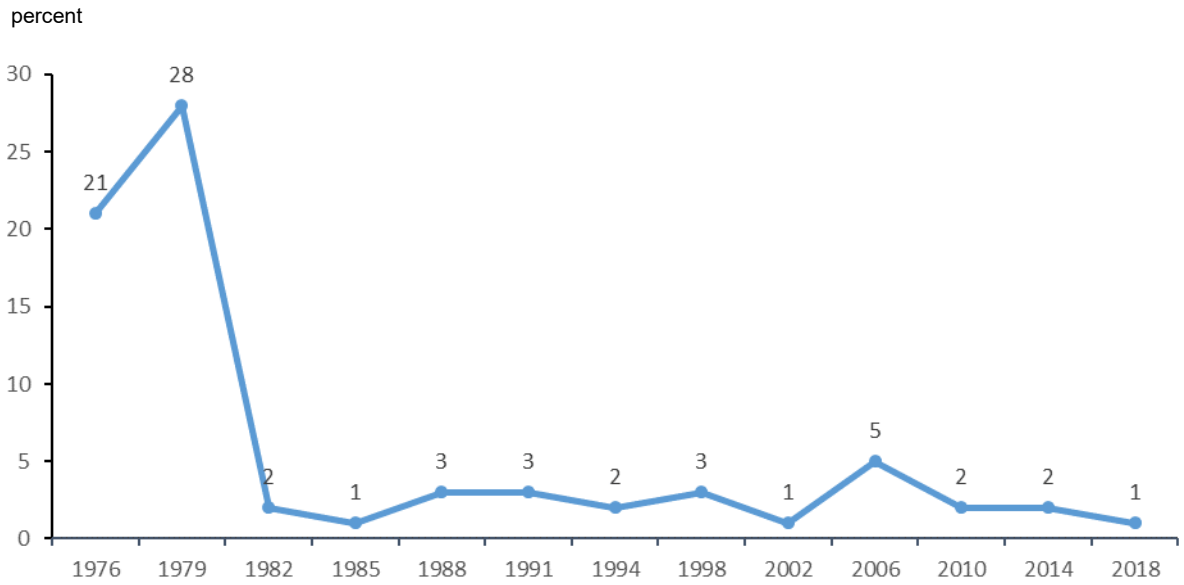
Table A2 Time-Lagged Change Patterns Between Swedish Nuclear Policies and Nuclear Opinions Across Ten Parliamentary Mandate Periods Between 1976 – 79 and 2014 – 18 (Percent)

Time-Lagged Change Pattern Between Opinion (t-1) and Policy (t)	General Public Opinion and Official Policy	General Public Opinion and Official Policy
Change in the Same Direction	18	9
Indecisive Change	55	55
Change in Different Direction	27	36
Sum Percent	100	100
Number of cases	11	11

Comments: See Table 2. The time-lag involves comparing change patterns in a previous mandate period with change patterns in a later period.

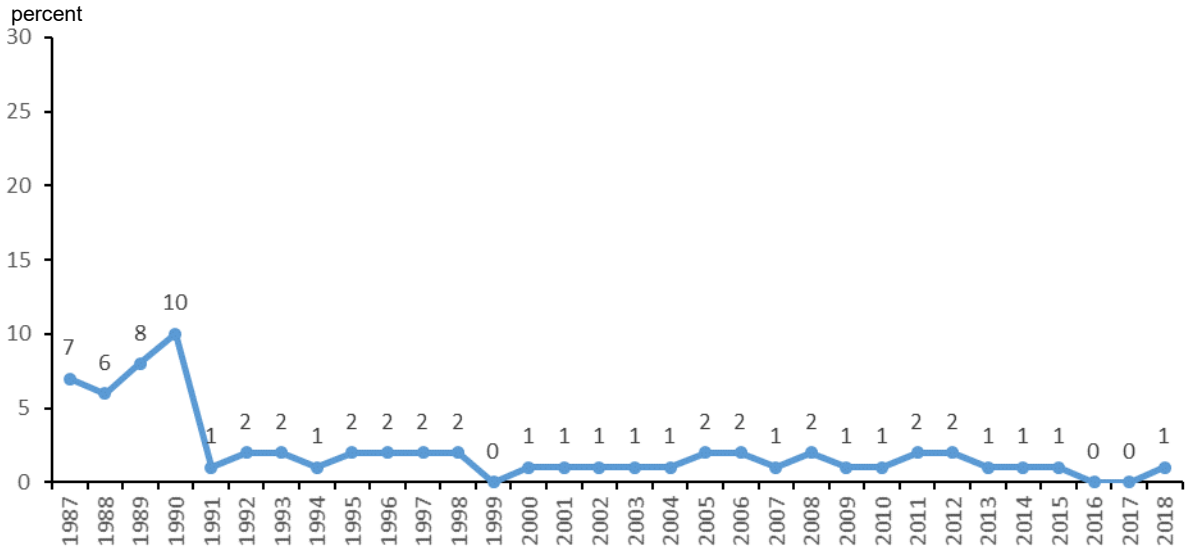
APPENDIX B

Figure B1 Energy/Nuclear Power as an Important Issue for How to Vote 1976 – 2018



Comments: The results in 1979 – 2018 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 – 2018



Comments: The results in 1987 – 2018 come from the annual SOM-studies.

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Chapter 5

Swedish People's Opinion on Sun and Wind

Per Hedberg

Energy issues are at the bottom of the list of the issues that people in Sweden consider important. At the top of the list are healthcare, employment and education. Only one per cent mention energy issues as important.[1] However, this does not mean that the Swedish people do not have opinions when it comes to energy issues. On the contrary, people take a clear stand on the question of what types of energy Sweden should invest more in or abandon in the future. Since 1999 SOM (Society, Opinion and Media) surveys have included a question on what energy sources we should invest in in the future. The question covers eight energy sources: water power, wind power, solar energy, nuclear power, bio fuels, fossil/natural gas, coal and oil. The results of the latest SOM survey and of the five previous surveys are shown in Table 1.[2]

Of the energy sources we are asking about, solar energy and wind energy are without doubt the most popular. The results of the 2004 SOM survey show that 79% of the Swedish population want to invest more in solar energy than is done today. The corresponding figure for wind power was 73%. This is followed by water power and bio fuels in which 47% and 45% respectively want to invest more. For natural gas and nuclear power the figures are 30% and 14% respectively. Increased investment in coal and oil is almost entirely lacking in support among the population. Only 2% want to see increased investment in these two energy sources. 77% think that we should entirely abandon coal or invest less in it than we do today. The corresponding figure for oil is 73%.

The results also point to opinions being stable over the six years that we have asked the question. There have been no dramatic changes. However, small shifts can be seen with regard to nuclear power and wind power. The opinion on nuclear power has become somewhat more positive. The proportion of people who want to invest more in nuclear power increased from 9% in 1999 to 14% in 2004, while the proportion of people who want to entirely abandon nuclear power as an energy source fell from 20% to 16%.[3] Support for increased investment in wind power fell by ten percentage points from 74% to 64% between 1999 and 2003, but the most recent survey points to a recovery, and in 2004 the proportion that wished to invest more in wind power was again in line with the earliest surveys (73%).[4] It is difficult to say what has influenced opinion. It could perhaps be speculated that publicity surrounding local debates on the establishment of wind power caused opinion to waver somewhat in 2002 and 2003. For example, the only referendum so far on the development of wind power in the Municipality of Skurup in 2002 resulted in a close no vote. One reason for the increased support in 2004 could be that, at a time of high prices for electricity and oil and the impending closure of Barsebäck 2, people are increasingly seeking alternatives to the dominant energy sources, and wind power could be one.

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[1] See Holmberg and Weibull (2005a) and Holmberg and Weibull (2005b)

[2] The Survey on Swedish energy opinions is part of the research project *Energiopinionen i Sverige* (Energy Opinions in Sweden) which is financed by the Swedish Energy Agency

[3] See Holmberg (2005) on Swedish opinions on nuclear energy.

[4] The research project *Energiopinionen i Sverige* also includes a question on how the population would view the establishment of wind power in their own municipality. The question is phrased “Hur ställer Du Dig till en etablering av vindkraft i den kommun där Du bor?” (“What is your position on the establishment of wind power in the municipality where you live?”) with the response options of very positive, quite positive, neither positive nor negative, quite negative or very negative. The pattern in the responses to this question is the same as in the question on how much we should invest in wind power, although the recovery in 2004 was somewhat weaker. The proportion of people who were positive towards the establishment of wind power in their own municipality was 74% in 1999, 70% in 2000, 70% in 2001, 66% in 2002, 59% in 2003 and 67% in 2004.

Table 1 What energy sources should Sweden invest in? (per cent)

question: "How much should we in Sweden invest in the following energy sources over the next 5 to 10 years?"

	response options					
energy sources and year of survey	invest more	invest roughly the same as today	invest less than today	entirely abandon the energy source	no opinion	total percent
water power						
1999	41	44	6	1	8	100
2000	39	48	6	1	6	100
2001	40	46	7	1	6	100
2002	44	45	4	1	6	100
2003	44	44	4	1	7	100
2004	47	41	5	1	6	100
wind power						
1999	74	14	3	1	8	100
2000	72	17	4	2	5	100
2001	71	16	5	2	6	100
2002	68	19	5	2	6	100
2003	64	22	5	2	7	100
2004	73	16	3	2	6	100
solar energy						
1999	77	11	2	1	9	100
2000	77	14	2	1	6	100
2001	75	14	3	1	7	100
2002	77	14	2	1	6	100
2003	75	15	1	1	8	100
2004	79	12	2	1	6	100
nuclear power						
1999	9	34	26	20	11	100
2000	11	34	30	19	6	100
2001	11	36	29	18	6	100
2002	12	37	29	16	6	100
2003	16	38	24	15	7	100
2004	14	36	27	16	7	100
bio fuels						
1999	29	27	13	3	28	100
2000	44	28	10	3	15	100
2001	46	29	8	2	15	100
2002	45	32	8	1	14	100
2003	44	29	8	2	17	100
2004	45	30	9	2	14	100
fossil/natural gas						
1999	21	26	17	5	31	100
2000	30	32	17	4	17	100
2001	31	32	16	4	17	100
2002	32	35	14	3	16	100
2003	30	31	15	4	20	100
2004	30	33	17	4	16	100
coal						
1999	1	9	39	34	17	100
2000	2	10	39	37	12	100
2001	2	11	38	38	12	100
2002	2	13	41	33	11	100
2003	2	10	35	38	15	100
2004	2	10	41	36	11	100
oil						
1999	2	17	48	18	15	100
2000	2	20	52	16	10	100
2001	2	19	51	17	11	100
2002	2	22	50	16	10	100
2003	2	20	47	18	13	100
2004	2	15	53	20	10	100

Comments: The results only include respondents who put crosses for a response option. The proportion people who skipped the various sub-questions varies from 6% to 9% over the years.

The planned expansion of wind power therefore has strong support among the Swedish people. But the question is whether the support is equally large among all groups of society or

whether it varies from group to group, and, in that case, whether there have been any changes since measurements began in 1999. Table 2 shows the proportions of people who want to see greater investment in wind power among people in various social groups, among people supporting various parties and among people with different ideologies in the years from 1999 to 2004.

Table 2 Proportion of people positive towards investing more in wind power by social group, party preference and ideology 1999-2004 (per cent)

	1999	2000	2001	2002	2003	2004
gender						
male	72	71	70	66	63	72
female	75	73	73	69	65	73
age						
15-30	69	74	69	67	62	70
31-60	76	73	77	70	70	79
61-85	72	68	63	62	54	63
place of residence						
rural area	80	82	80	72	73	81
small built-up area	77	72	71	70	62	74
town, large built-up area	70	70	70	67	63	69
the three cities	74	65	69	65	61	76
education						
basic level	71	71	67	66	59	66
intermediate level	74	73	71	68	63	75
university/college	74	72	79	68	71	75
party preference						
Left Party	86	81	85	80	75	82
Social Democrats	72	72	70	66	62	70
Centre Party	80	90	80	79	76	82
Liberal Party	84	81	79	70	63	69
Moderate Party	63	59	62	48	54	65
Christian Democrats	72	69	72	69	66	68
Green Party	87	84	87	86	77	92
left-right dimension						
firmly on the left	87	81	76	75	79	83
somewhat on the left	77	79	79	74	69	80
neither left nor right	72	73	69	65	63	69
somewhat on the right	71	69	69	64	60	71
far right	61	54	63	56	57	63
green dimension						
firmly in the green corner	83	82	85	--	--	83
somewhat in the green corner	80	78	75	--	--	78
neither green nor grey	70	71	69	--	--	68
somewhat in the grey corner	70	65	65	--	--	69
firmly in the grey corner	49	52	53	--	--	69
all respondents	74	72	71	68	64	73

Comments: People who did not respond to the question are not included in the percentage base. The wording of the question is shown in Table 1. The measure of the green dimension is based on a question about an environmentally friendly society. The question is phrased as a proposal where the respondent is asked to judge whether the proposal is very good, quite good, neither good not bad, quite bad or very bad. The wording of the question was: "Invest in an environmentally friendly society even if it entails low or zero growth". In the table the scale from "very good proposal" to "very bad proposal" has been translated into points on a green-grey dimension where "very good proposal" corresponds to "firmly in the green corner" and "very bad proposal" corresponds to "firmly in the grey corner". People's left-right ideology was measured through a self-classification question.

In general the link to various social background characteristics is very weak or almost non-existent. Between 1999 and 2004 women were somewhat more positive towards wind power than men, but the differences are small and have never exceeded three percentage points. In the most recent survey the difference was insignificant. People in the 31-60 age group were on each occasion, with the exception of the year 2000, somewhat more positive than people in the youngest and oldest age groups. Throughout the survey period, people who live in wholly

rural areas have been somewhat more positive towards an expansion of wind power than people living in small built-up areas, towns or cities. On the whole, the level of education appears to be of no significance for people's opinions on wind power. However, there is a very weak pattern showing that, over the six years surveyed, people with only basic education were somewhat less positive towards increased investment in wind power than people with a short or long period of further education. The increase in willingness to invest more in wind power which is seen between 2003 and 2004 can be found in all groups. The greatest increase was among those living in the three cities (up 15 percentage points) and the smallest was among people with university or college education (up 4 percentage points).

Support for wind power is large among supporters of all parties. However, there are small differences in degree. In the most recent survey, support is greatest among supporters of the Green Party (92%), the Left Party (82%) and the Centre Party (82%). Among supporters of other parties support for increased investment in wind power lies between 65% among Moderates and 70% among Social Democrats. The pattern of strong support for wind power among supporters of the "green" parties reflects that found in previous surveys. The greatest change since 1999 is among supporters of the Liberal Party. From having been one of the most pro wind power, the proportion who want to invest more in wind power fell from 84% in 1999 to 69% in 2004. The figures for other parties in 2004 are just over or just under the 1999 results. It is also notable that support for wind power among Moderate Party supporters has increased from 48% to 65% over the past three years.

Ideologically there is a weak link to the left-right scale of Swedish politics. People who place themselves on the left are somewhat more positive towards wind power than people who place themselves on the right. In the 2004 survey the proportion who wanted to invest more in wind power was 83% among those who place themselves firmly on the left, compared with 63% among those who place themselves firmly on the right. The pattern is the same throughout the survey period. The question which forms the basis for determining green ideology was not asked in 2002 and 2003. In the years 1999 to 2001 there was a clear link between green ideology and opinions on wind power inasmuch as people who placed themselves firmly in the green corner were more positive than people who placed themselves in the grey corner. The 2004 survey points to a somewhat weaker link. Support is still greatest among people who place themselves firmly in the green corner (83%), but people who place themselves firmly in the grey corner have become more positive than before (69%). If we compare the 1999 figures with the 2004 figures we find them largely identical, with one exception. Among people who place themselves firmly in the "grey" corner the proportion who want to invest more in wind power increased by 20 percentage points from 49% to 69%.[5]

In Autumn 2004 the Swedish Energy Agency (Energimyndigheten) presented 49 locations in 13 counties which are considered suitable for the building of wind farms. The question is whether the residents in different counties have different opinions with regard to investment

[5] See Holmberg (2005) for what factors structure opinion-forming on the nuclear power issue. When it comes to opinions on water power and natural gas there are no clear links with the independent factors in Table 3. The structuring of opinions on the issue of solar energy are mainly reminiscent of the factors which structure opinions on wind power. However, the link with the educational level is somewhat stronger. Among people with only basic education 70% were positive towards increased investment in solar energy, compared with 83% among people with college or university education. Bio fuels are somewhat more popular among men than among women, among people living in rural areas than among people living in towns, among the highly educated than among the less-well educated, among people who place themselves firmly on the left of the left-right scale than among people who place themselves firmly on the right, and among people who place themselves firmly in the green corner than among people who place themselves firmly in the grey corner. Age appears to have an effect on what Swedish people think of coal as an energy source, but is not significant when it comes to people's attitudes towards oil. Older people think more than younger people that we should totally abandon coal as an energy source. When it comes to both coal and oil, the proportion of people who want to abandon them is somewhat higher among men than among women.

in wind power, and what are opinions like in the counties which the Swedish Energy Agency considers suitable for the development of wind power? The SOM surveys are based on a random sample in the country as a whole. When the data is broken down by county, small counties are represented by only a few people, which entails statistical uncertainty. The results in Table 3 are therefore based on all six years' SOM surveys and includes 9 756 people who answered the question of how much they want to invest in wind power. The lowest number of people were in the County of Gotland (49).[6] The results are shown in the form of a net balance where the proportion who want to invest less than today or want to entirely abandon the energy source has been subtracted from the proportion who want to invest more in the energy source.

Table 3 Support for increased investment in eight energy sources among inhabitants of Sweden's counties, consolidated over the period 1999 – 2004 (net balance)

County	wind power		water power	solar energy	nuclear power	bio fuels	natural gas	coal	oil
Stockholm	+59	(1)	+36	+71	-23	+28	+12	-72	-66
Uppsala	+61	(3)	+26	+71	-28	+22	+1	-71	-64
Södermanland	+66	(1)	+28	+76	-29	+23	+2	-71	-64
Östergötland	+64	(1)	+33	+73	-34	+32	+2	-71	-64
Jönköping	+66		+45	+72	-41	+37	+16	-78	-73
Kronoberg	+60		+38	+65	-33	+33	+7	-72	-64
Kalmar	+68	(5)	+40	+72	-33	+30	+7	-75	-64
Gotland	+47	(4)	+27	+81	-48	+23	+7	-71	-63
Blekinge	+63	(2)	+37	+70	-30	+32	+9	-74	-63
Skåne	+52	(7)	+38	+70	-20	+26	+15	-74	-64
Halland	+54	(9)	+40	+76	-27	+27	+8	-79	-67
Västra Götaland	+69	(3)	+42	+78	-37	+34	+13	-73	-67
Värmland	+72	(6)	+43	+79	-41	+33	+1	-74	-63
Örebro	+72		+33	+75	-37	+23	+4	-67	-61
Västmanland	+64		+37	+68	-27	+24	+2	-68	-67
Kopparberg	+75		+36	+83	-50	+35	+13	-74	-69
Gävleborg	+67	(6)	+35	+76	-38	+28	+7	-70	-65
Västernorrland	+70		+38	+79	-42	+33	+5	-72	-66
Jämtland	+73	(1)	+15	+76	-49	+39	-2	-67	-67
Västerbotten	+75		+26	+78	-56	+38	+2	-73	-72
Norrbotten	+73		+25	+76	-48	+32	±0	-71	-69
Stockholm Municipality	+60		+32	+72	-26	+29	+12	-71	-66
Gothenburg Municipality	+70		+44	+76	-36	+29	+19	-66	-61
Malmö Municipality	+48		+37	+63	-22	+19	+12	-73	-66
Whole country	+64		+37	+74	-33	+30	+9	-72	-65

Comments: People who did not respond to the question are not included in the percentage base. The wording of the question is shown in Table 1. The net balance was arrived at by subtracting the proportion of people who responded "invest less than today" or "entirely abandon the energy source" from the proportion of people who responded "invest more than today". The figures in parentheses in the column for wind power show the number of locations the Swedish Energy Agency has judged to be suitable for the establishment of wind power in the county concerned.

Regardless of the region there is a majority who want to invest more in wind power than is the case today. The regional differences are small. The least positive are the populations of Gotland (+47), Skåne (+52) and Halland (+54). The most positive are the populations of Kopparberg County (+75), Västerbotten (+75), Jämtland (+73) and Norrbotten (+73). In simple terms there is a somewhat more positive attitude towards wind power in the north than in the south. The results in Table 3 also show that there are small differences between the

[6] See Swedish Energy Agency (2004) and Dagens Nyheter (2004)

three cities. The people of Malmö (+48) are less positive towards investment in wind power than those of Stockholm (+60) and Gothenburg (+70).

The table shows in parentheses the number of locations in the county which the Swedish Energy Agency considers suitable for wind power. Of the 49 locations considered suitable, 20 are in Halland, Skåne and Gotland, i.e. in the counties where the opinion is the *least* positive. The net balance for the country as a whole is +64. In counties where no wind farms are planned the average net balance is +69; in counties where at least one site for wind farms is planned the average is +63; and in counties where, according to the plans, it is suitable to establish wind power on more than three sites the average is +60.[7] The differences are very small and the overall result is that the attitude towards wind power is positive regardless of where people live in the country, but most positive where the Swedish Energy Agency is *not* recommending that wind farms be located.

The region plays only a very modest role when it comes to the question of the energy sources in which the Swedish people think more or less should be invested in future. Small regional differences do exist, particularly with regard to wind power, but also for nuclear power and water power. People in northern counties are somewhat more negative to further investment in nuclear power than people in, for example, the counties of Skåne, Stockholm and Halland. In the counties of Jämtland, Västerbotten and Norrbotten people are also somewhat less positive towards increased investment in water power than people in many other counties, but the differences are small.

Another factor which could hypothetically affect people's attitudes to various energy sources could be the energy systems they themselves use to heat their own homes. The hypothesis is based on an idea of self-interest which is expressed in a more positive view of the energy source people themselves use to heat their home. Those who use bio fuels to heat the house should be more positive towards bio fuels than others; those who have oil-fired heating should be more positive towards oil as an energy source than others; and those who only use electricity for heating their home should be more positive towards nuclear energy than others.

Table 4 shows views on nuclear energy, oil and bio fuels among people who use only electricity, oil or bio fuels to heat their homes. The analysis only relates to people who live in detached or terraced houses. In addition, it shows attitudes to nuclear power, oil and coal among all people who live in detached or terraced houses and among all people who responded to the question.

People's views on what energy sources we should invest in are affected only to a very small extent by what system they themselves have to heat their own homes, but the weak effects which can be discerned do conform to the hypothesis. People who use only electricity to heat their homes are somewhat less negative towards nuclear energy (-23) than people who use only oil (-34) or bio fuels (-42). Views on oil and bio fuels are hardly affected at all by whether people themselves heat their homes with only oil or bio fuels. But even here the very weak tendencies point in the direction of the hypothesis. People who use only bio fuels for heating are somewhat more positive towards bio fuels as an energy source (+42) than people who use electricity (+33) or oil (+37). People who use only oil to heat their homes are

[7] Previous surveys have shown that, although the Swedish people overall have a positive attitude towards wind power as an energy source, their enthusiasm wanes when it becomes a question of an establishment close to their own home. In the 2000 SOM survey the proportion of people who wanted to invest more in wind power was 72%, while the proportion of people who were positive towards the establishment of a wind farm near to their own home was 41%. The corresponding figures in 2003 were 64% and 33% respectively (see Hedberg, 2004). The question of attitudes towards the establishment of wind power close to one's own home was not asked in the 2004 SOM survey.

somewhat less negative towards oil as an energy source (-68) than people who use bio fuels (-70) or electricity (-76). Above all there is a smaller proportion of those who use oil who want to completely abandon the energy source (5%) than of those who use electricity (22%) or bio fuels (22%).

Table 4 Opinions on which energy sources Sweden should invest in, by how the person's own detached/terraced house is heated (per cent)

energy sources and heating of own home	invest more than today	invest roughly the same as today	invest less than today	entirely abandon the energy source	no opinion	total percent	net balance
nuclear power							
heating only with electricity	17	37	28	12	6	100	-23
heating only with oil	14	32	34	14	6	100	-34
heating only with bio fuels	8	30	32	18	12	100	-42
all people living in detached/ terraced houses	16	36	28	14	6	100	-26
all respondents	14	36	27	16	7	100	-29
oil							
heating only with electricity	2	13	56	22	7	100	-76
heating only with oil	0	21	63	5	11	100	-68
heating only with bio fuels	1	16	49	22	12	100	-70
all people living in detached/ terraced houses	2	14	57	19	8	100	-74
all respondents	2	15	53	20	10	100	-71
bio fuels							
heating only with electricity	46	29	11	2	12	100	+33
heating only with oil	44	29	5	2	20	100	+37
heating only with bio fuels	47	36	4	1	11	100	+42
all people living in detached/ terraced houses	47	31	9	1	12	100	+37
all respondents	45	30	9	2	14	100	+34

Comments: People who did not respond to the question are not included in the percentage base. The wording of the question is shown in Table 1. People living in detached or terraced houses were asked a completely open question about which energy sources were used to heat their own homes. The analysis includes people who responded that their home was heated only by electricity, only by oil or only by bio fuels. In addition, the results are shown for all people living in detached/terraced houses and for all people who responded to the question. The net balance was arrived at by subtracting the proportion of people who responded "invest less than today" or "entirely abandon the energy source" from the proportion of people who responded "invest more than today".

Views on nuclear power are somewhat more positive among people who heat their homes with electricity than among all house owners or among the population as a whole. Views on oil are not as negative among people who have oil-fired heating in their homes as among all house owners or among the population as a whole. Views on bio fuels are also somewhat more positive among those who heat their homes with bio fuels than among all house owners or among the population as a whole. However, the main finding of the analysis is that the heating systems people use for their own homes are almost insignificant when it comes to opinions on what energy sources Sweden should use in future, although the connection between opinions on nuclear power and heating by electricity is perhaps not uninteresting.

The results of the 2004 SOM survey show overall that views on how much Sweden should invest in various energy sources are stable. Only small changes have taken place over the six years surveyed. One of them concerns the opinion on wind power. What appeared to be a slight downward trend in the positive view of wind power between 1999 and 2003 was broken in 2004 and now the Swedish people are as positive towards wind power as they were at the beginning of the measurement series. Whether 2003's "low" figures for wind power were a temporary dip or whether 2004's high figures are only a short-term flourish will be answered by future surveys.

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Chapter 6

Saving Energy

Per Hedberg **Sören Holmberg**

Established politicians say it, authorities say it, and not least the environmental movement says it – we must reduce our energy usage. The reasons can vary: sources of oil are running out; burning for energy adds to the greenhouse effect; burning for energy pollutes and is a risk to human health; the money can be better used than for expensive energy. However, regardless of the reason, the message is the same – save energy. And extensive energy saving campaigns get under way.

Our first question is the obvious one: how are things among the masses? Are they saving energy? And, if so, which of them are saving energy and where are they making savings? Our second question is more theoretical: what factors affect the way people act when it comes to using energy? It is a natural hypothesis that social and financial circumstances play a role. Poor people have a greater need to cut back and save than rich people. They have to count the pennies to make ends meet. People living in houses have more opportunities to save energy than people living in apartments, and perhaps also a greater need since heating is often more expensive in a house than in an apartment. Another hypothesis is that attitude also plays a role. More specifically we imagine that people with an environmentally friendly green ideology are more receptive to calls to save energy than other people without such an ideological outlook.

More specifically it may be said that we are putting a kind of *homo economicus* hypothesis up against an ideology hypothesis. To what extent is people's energy saving controlled by their wallet and to what extent by green ideological ideas? If poor people, regardless of their opinions on green issues, save energy more than rich people, we have an example of financially motivated behaviour. If, on the other hand, people with a green attitude, regardless of their financial circumstances, save energy more than people without a green attitude, we have ideologically motivated behaviour. Our empirical test is going to show to what extent we get either of these two separate outcomes.

The data consists of the 2004 SOM survey and a special list of questions about people's energy use in various contexts. We asked about energy saving in five different cases – heating of the home, use and choice of lighting, use and choice of electrical appliances, hot water consumption and transport/travel. The questionnaire question was worded as follows: "How often do you try to reduce your energy use in the following contexts?"[1]

It is important to bear in mind that we are not measuring behaviour. We are measuring people's reports on their own behaviour. And there can be a big difference. People may, in our case with good reason, suspect that the response to the saving questions is going to have a positive bias. It is more socially acceptable to save than to waste. The proportion of people who say that they are trying to reduce their energy use is therefore highly likely to be somewhat too high compared with the proportion who really *de facto* do something. How large this overestimate may be we do not know. However, the results suggest that it cannot be particularly large, since seen overall the proportion of people who state that they try to save energy is relatively low. But it is clear that if we make the unrealistic assumption that all people who say that they save do not in fact do so, we get an overestimate of no more than 15 to 25 percentage points.

Nor do we know how big the overestimate may be in various social and political groups. However, it is a reasonable assumption that there are no dramatic difference between men and women, between young and old or between Social Democrat and Moderate. If you want to be extra cautious, we can say that the study does not concern savings behaviour, but attitude or inclination towards savings behaviour. People who say they save energy wish or would very much like to really save.

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[1] The Survey on Swedish energy opinions is part of the research project *Energiopinionen i Sverige* (Energy Opinion in Sweden) which is financed by the *Swedish Energy Agency.*

The results in Table 1 show that between 15% and 25% of respondents stated that they *very often* or *always* try to reduce their energy use in the ways indicated. The most popular are to save on lighting and heating, while the least popular is to save energy on travel.

Table 1 Trying to reduce energy use (per cent)

question: "How often to you try to reduce your energy use in the following contexts"

	never	sometimes	quite often	very often	always	total percent	number of respondents
heating the home	15	31	29	16	9	100	1656
use and choice of lighting	8	30	37	18	7	100	1664
use and choice of electrical appliances/tools/equipment	19	35	29	12	5	100	1658
hot water consumption	16	30	33	14	7	100	1663
transport/travel	20	41	24	11	4	100	1641

Comments: People who did not respond to the question are not included in the percentage base. The proportion of people who did not respond to the various saving questions varied around 6% to 7%.

The proportion of people who pay absolutely no attention to energy saving, and say that they never try to reduce their energy use, is roughly equally large. Between 8% and 20% of Swedes state that they never save energy, with the highest proportion in relation to travel and the lowest in relation to lighting. The lukewarm, middle responses that the respondent *sometimes* or *quite often* tries to reduce energy use were by far the most common responses, given by around 60% of people.

The various forms of saving overlap to a large extent among the respondents. People who tend to save energy in one context also tend to save energy in other contexts. All the correlations are clearly positive. The correlation(s) between people's use of the various methods of saving are clear and fall between a maximum of +.68 and a minimum of +.39.[2] The correlation is sufficiently clear to make it possible to construct an index covering all five different forms of saving. In Table 2 we have divided such an index into three and classified the respondents into three groups – people who tend to save energy *a little*, *moderately* or *a lot*. The results show to what extent people save energy in various social and political groups.

The pattern is relatively clear. Energy savers tend to be women, older, people living in rural areas, people with a low level of education, people with a low income, people living in houses, workers and farmers, Centre Party and Green Party supporters, people on the left politically and people with green ideology. The differences are sometimes small between the different groups – for example between women and men – but far more substantial between other groups – for example between young and old or between people living in houses and people living in apartments.

Of course, the various groups overlap with each other. People living in houses are more common in rural areas than in towns. People with low education tend to be older and have lower incomes. People on the left politically tend to be in the green ideological corner. We must hold the various factors constant in multivariate analyses before we can say anything about the extent to which we can speak of independent effects. It transpires that the left-right dimension has no independent effect. The same applies to gender, family social class, level of

[2] The correlation between forms of energy saving is highest when it comes to lighting and choice of electrical appliances(+.69). The correlation is lowest when it comes to trying to reduce energy use through heating of the home and transport/travel (+.39).

Table 2 Energy saving in various social and political groups (per cent)

	Energy saving				
	save a little	save moderately	save a lot	total per cent	number of respondents
gender					
male	33	35	32	100	845
female	29	36	35	100	835
age					
15-30	48	34	18	100	324
31-60	31	35	34	100	883
61-85	20	37	43	100	473
place of residence					
rural area	20	35	45	100	249
small built-up area	26	34	40	100	366
town, large built-up area	34	37	29	100	785
the three big cities	39	33	28	100	259
education					
basic level	26	34	40	100	424
intermediate level	32	36	32	100	756
university	35	34	31	100	483
income					
very low	31	30	39	100	327
quite low	29	33	38	100	338
medium	33	36	31	100	288
quite high	31	38	31	100	280
very high	32	39	29	100	356
housing					
house	23	38	39	100	959
apartment	43	32	25	100	659
family social class					
blue collar	30	34	36	100	722
farmer	25	35	40	100	52
white collar	30	37	33	100	443
managerial	35	35	30	100	248
entrepreneur	36	37	27	100	142
party preference					
Left Party	28	38	34	100	143
Social Democrats	28	37	35	100	540
Centre Party	30	31	39	100	108
Liberal Party	33	39	28	100	160
Moderate Party	37	32	31	100	337
Christian Democrats	29	34	37	100	76
Green Party	27	35	38	100	89
left-right dimension					
firmly on the left	27	33	40	100	129
somewhat on the left	25	42	33	100	413
neither left nor right	30	34	36	100	530
somewhat on the right	36	35	29	100	405
firmly on the right	41	31	28	100	135
green dimension					
firmly greenr	20	41	39	100	215
somewhat igreen	30	32	38	100	451
neither green nor grey	31	37	32	100	503
somewhat grey	32	39	29	100	326
firmly grey	50	22	28	100	113
all respondents	31	35	34	100	1680

Comments: The figures for whether respondents save a lot or a little electricity have been derived through an additive index covering the sub-questions in Table 1. The few people who skipped some of the individual sub-questions have been attributed the value 1 for that saving, i.e. never save. People who did not respond to any of the sub-questions have been excluded from the analysis. The underlying index varies from 5 (never save) to 25 (save very often). The index values from 5 to 25 have then been divided into three. The income variable relates to household income. Households with incomes between SEK 0 and SEK 200 000 have been categorised as very low, between SEK 201 000 and SEK 300 000 as quite low, between SEK 301 000 and SEK 400 000 as medium, between SEK 401 00 and SEK 500 000 as quite high and household incomes of SEK 501 000 or above as very high. The measure of the green dimension is based on a question about an environmentally friendly society. The question is phrased as a proposal where the respondent is asked to judge whether the proposal is very good, quite good, neither good nor bad, quite bad or very bad. The wording of the question was: “Invest in an environmentally friendly society, even if it entails low or zero growth”. In the table the scale from “very good proposal” to “very bad proposal” has been translated into points on a green-grey dimension where “very good proposal” corresponds to “firmly green” and “very bad proposal” corresponds to “firmly grey”. The position on the left-right dimension is based on a self-classification question.

education and party preference. Other factors all have independent effects to varying degrees on the extent to which people try to save energy.

Table 3 Different types of energy saving in different social and political groups (per cent)

	proportion of people who very often or always try to reduce energy use				
	heating of the home	choice of lighting	choice of electrical appliances	hot water consumption	transport/ travel
gender					
male	27	24	15	20	14
female	23	26	18	22	17
age					
15 – 30	13	17	10	10	10
31 – 60	26	25	16	20	13
61 – 85	31	30	22	31	24
place of residence					
rural area	42	36	23	27	20
small built-up area	30	24	17	27	14
town, large built-up area	21	22	15	18	14
the three big cities	16	25	14	16	16
education					
basic level	26	27	20	26	20
intermediate level	27	24	15	20	13
university	22	25	17	19	16
income					
very low	25	30	25	24	23
quite low	25	28	16	24	20
medium	20	23	14	20	14
quite high	29	23	18	17	10
very high	25	21	12	18	10
housing					
house	32	27	17	24	14
apartment	14	22	15	16	17
party preference					
Left Party	25	24	20	20	20
Social Democrats	24	23	17	23	15
Green Party	23	27	21	18	25
Centre Party	27	31	12	23	18
Liberal Party	24	22	10	18	13
Christian Democrats	24	22	12	22	16
Moderate Party	26	28	17	21	11
green dimension					
firmly green	27	34	26	27	25
somewhat green	25	26	17	22	18
neither green nor grey	24	23	14	19	12
somewhat grey	23	21	13	19	12
firmly grey	30	25	16	21	13
all respondents	25	25	17	21	15

Comments: See Tables 1 and 2 for the wording of questions and delimitations.

The results in Table 4 show the outcome of a series of regression analyses with some of the social and political groups as independent variables to the dependent variable of energy saving. The analysis has not been limited to studying only the variation in the energy saving index. We have also analysed the correlation for each and every one of the various forms of energy saving. It transpires, in fact, that the patterns look somewhat different, depending on which form of saving we are talking about. For the sake of clarity, Table 3 shows the proportion of respondents in the various social and political groups who state that they very often or always try to reduce energy use when it comes to the areas of saving we are studying, i.e. heating, lighting, choice of electrical appliances, hot water usage and travel.

Table 4 What explains energy saving? (β coefficients)

	dependent variables					
independent variables	heating of home	choice of lighting	choice of electrical appliances	hot water consumption	transport; travel	energy saving index
age	+.14	+.11	+.10	+.18	+.06	+.12
town/country	-.10	-.02*	-.02*	-.06	-.02*	-.05
level of education	+.01*	+.02*	+.01*	-.01*	+.01*	+.01*
household income	-.01*	-.05	-.07	-.03*	-.09	-.05
house/ apartment	-.15	-.05	-.03	-.08	-.03*	-.07
green/grey ideology	-.04*	-.07	-.10	-.07	-.15	-.08
adj. R^2	.14	.04	.04	.10	.05	.10

Comments: The results show β coefficients in multiple regression analyses (OLS) with various forms of energy saving as dependent variables. All variables are coded between 1 and 5. High values represent a high level of energy saving, high age, city, high income, living in apartments and grey ideology. Coefficients marked with an asterisk (*) are not significant at the .05 level.

One factor has a manifest and independent effect, regardless of which form of saving we are speaking of. That factor is age. Older people save energy more than younger people in all situations; a somewhat disturbing result if it is due to the fact that an old-fashioned thrifty mentality may have been replaced by a more modern extravagant mentality among young people. The financial income variable has an independent effect – poor people save energy more than rich people – but not in all contexts. When it comes to heating the home and hot water usage, the income effect is not significant – in this case the housing factor takes over. People living in houses save most on heating and hot water, regardless of income. People living in houses have more opportunities to save energy than people living in apartments and perhaps also a greater incentive. The fact that opportunity plays a major role is shown by the fact that people living in rural areas who usually live in their own house show a particularly strong tendency to save energy when it comes to heating the home, but less when it comes to other forms of energy saving. The independent effects of income and housing show that there are support for the *Homo Economicus* hypothesis. People's financial self-interest affects the degree of energy saving. This means that financial incentives can be used if we want to bring about more energy economising.

But the results also show that green ideology has an independent effect on energy saving. And this is true regardless of what form of saving we are speaking of, with, however, one exception. The exception is heating of the home, where the effect measured is not statistically significant. People living in houses tend to save on heating costs regardless of whether they have a green or a grey attitude to the environment. No extra saving effort is made in this regard by people with a green ideology. However, when it comes to the other forms of saving, there is an independent effect of green ideology, which is especially clear in the choice of transport/travel. People's energy economising can be influenced by ideological arguments, perhaps also by idealistic arguments.

Our main finding is that both wallet and ideology play an independent role when Swedes save energy. In addition, the analysis has pointed to the importance of the opportunity to be able to save energy. It is more difficult to influence your energy use if you live in an apartment than if you live in a house. It is therefore not surprising that people who live in houses save energy far more than people who live in apartments. The most surprising result is, rather, that age has such a strong independent correlation with energy saving. The older retired generation economise far more on all forms of energy than middle-aged and young people. This may be due to the fact that the older people read about the characters Spara (to save) and Slösa (to waste) in the journal *Lyckoslanten* (The Lucky Penny) when they were young – and learned something?

Chapter 7

Swedes' Thoughts about Wind Power?

Per Hedberg

In the 1970s, energy production was politicized in the industrialized world. The birth of the environmental movement, the oil crises in 1973/74 and the beginning conflict surrounding civilian nuclear power, put energy issues center stage on the political agenda. Energy policies – especially related to the development of nuclear power – came to dominate election campaigns, like in Sweden in 1976 or be the subject of referendums, like in Austria in 1978 or in Sweden in 1980.

Fueled by the nuclear accidents in Harrisburg in 1979, Chernobyl in 1986 and in Fukushima in 2011 and supplemented by conflicts over how to reduce the use of oil and coal, how to sensibly exploit the waste gas reserves, and how to develop renewable energy sources based on sun, wind and waves – have made all kinds of energy issues the focal point of political contentions ever since the early 1970s. In Sweden, as in many other countries, energy issues have been one of the most fought-over policy areas during the last thirty-forty years. And the contentious character of energy policies is not limited to the elite level of politics. Energy issues are highly polarizing among the Swedish people as well.

Given this background, starting in the 1970s, it was rather natural that energy questions – featuring most prominently questions related to nuclear power – would be important parts of the voter surveys performed by the Swedish National Elections Studies (SNES) at the University of Gothenburg. The first book-length studies of Swedish mass attitudes toward nuclear power appeared already in the late 1970-ies (Holmberg, Westerståhl and Branzén 1977). Since then all SNES surveys have included measurements of Swedish opinions on various energy issues. A special election study was done in 1980 covering the nuclear power referendum (Holmberg and Asp 1984).

Beginning in 1986, SNES´s election year measurements were supplemented by annual studies done by the newly founded SOM Institute at University of Gothenburg. These annual measurements were from the start designed and coordinated by the research project Energy Opinion in Sweden, originally financially supported by the now non-existent National Board for Spent Fuel, but since 1999 financed by The Swedish Energy Agency. Since 1999 the research project measures the Swedish opinion on several energy sources, among them attitudes to wind power. (Holmberg and Hedberg 2012).

The world's wind-powered generation of electricity is dominated by a few countries. Last year, ten countries accounted for 86 per cent of the total wind power capacity. China topped the list at 26 per cent, followed by USA at 20 per cent. Germany and Spain stood out in a European perspective, together producing as much electricity from wind power as USA. In 2011, the German and Spanish wind power sectors generated 29 000 and 22 000 MW, respectively. Sweden produced 3 000 MW in the same year. China, USA, Germany and Spain accounted for 67 per cent of the global wind power capacity (Global Wind Energy Council 2012). Looking at wind power capacity per capita, Denmark comes in first followed by Spain, Portugal, Germany, the Falkland Islands, Ireland and Sweden. Denmark also tops the list for wind power capacity per square kilometer, followed by Germany, the Netherlands, Spain, Portugal and Belgium. Sweden places 17th on the list, with China immediately ahead and USA immediately behind (World Wind Energy Association 2011).

Despite the intensified expansion of Swedish wind power in recent years, its proportion of the total Swedish energy system remains modest. The Swedish Parliament's aim for the year 2020 implies a dramatic expansion. More exactly, Sweden will have to increase its current wind power capacity fivefold in order to reach the target (Helker Lundström 2012).

Below, we explore how Swedes feel about further expansion of wind power. Does the Parliament's positive attitude reflect public opinion, and are differences in opinion related to demographic groups and political sympathies? In the last 2-3 years, the national wind power capacity has increased rapidly in a Swedish perspective, from 1161 wind power stations in 2008 to 2047 in 2011 (Swedish Energy Agency 2012). An interesting question is whether the increased number of stations in the Swedish landscape has affected people's attitudes to wind power.

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Swedes' thoughts about wind power

All SOM surveys since 1999 have included a question on the expansion of wind power in Sweden.[1] More exactly, the respondents are asked how much should be invested in wind power as an energy source in the next 5-10 years – more than today, roughly the same as today, less than today or wind power should be abandoned as an energy source. There is also a 'no opinion' alternative. Figure 1 shows the results 1999-2011.[2]

An overwhelming majority of the Swedish public support wind power as an energy source. The same conclusion has been reached ever since the question was first asked in 1999. In the 2011 survey, 70 per cent wanted to increase investments in wind power, and 18 per cent were happy with the current level. Only 6 per cent wanted to reduce investments or abandon wind power completely. The size of the most enthusiastic group has varied from 64 per cent in 2003 to 80 per cent in 2008, implying a range of 16 percentage points.

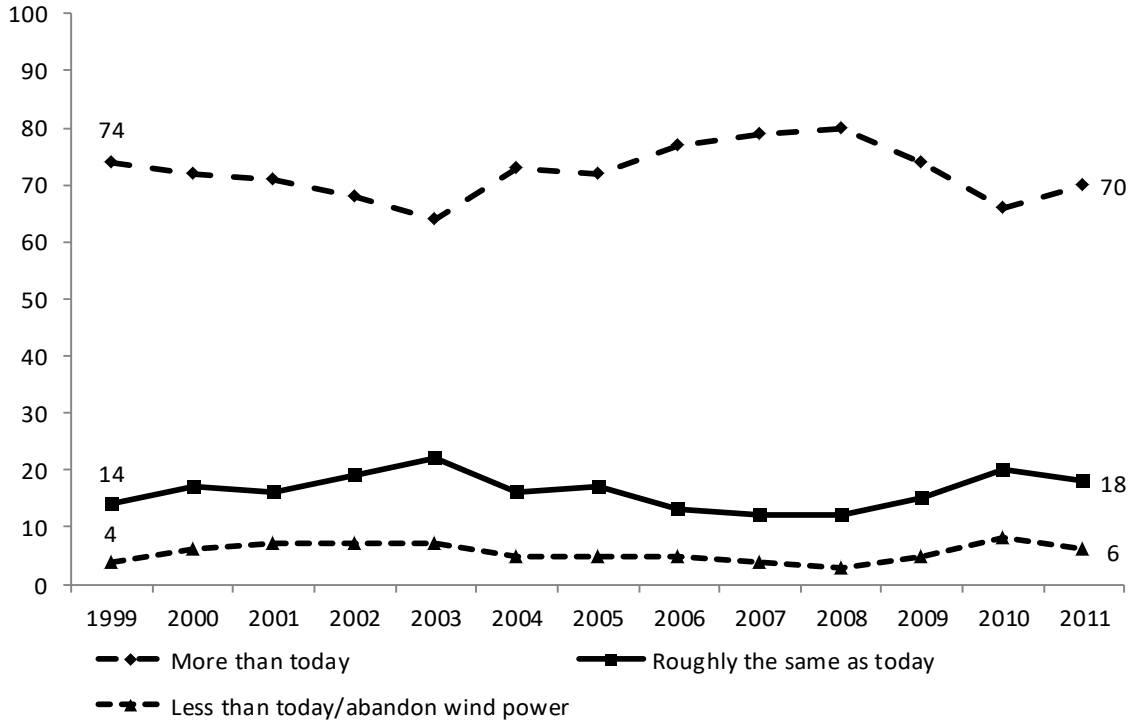
Figure 1 show that the variations can be attributed to the two 'positive' response alternatives – invest more and keep investing at the current level – while the numbers for the two 'negative' response alternatives have remained fairly constant. When the most enthusiastic group grows, the status quo group shrinks and vice versa. Adding these two groups together, we find that the share of respondents who want to increase investments in wind power or keep the current level reached a low in 2003 with 86 per cent and reached a high in 2008 with 92 per cent, implying a range of 6 percentage points. The share who wants to reduce investments in wind power has varied from 2 per cent in 2008 to 7 per cent in 2010, whereas the share who want to abandon wind power altogether remained stable at 1-2 per cent throughout the period.

[1] The surveying of the attitudes of the Swedish public to different energy sources is part of the research project Energiopinionen i Sverige (Energy Opinion in Sweden), funded by the Swedish Energy Agency. For the latest results from the SOM-study 2012 see: Hedberg 2013, Holmberg 2013 and Hedberg and Holmberg 3013.

[2] For the latest results from the SOM-study 2012 see: Hedberg 2013, Holmberg 2013 and Hedberg and Holmberg 3013.

Figure 1. Shares who want increased, the same and reduced investments in wind power as an energy source in Sweden 1999-2011 (per cent)

Question: *'How much should we in Sweden invest in the following energy sources in the next 5-10 years? /wind power'*



Comment: The response alternatives are 'more than today', 'roughly the same as today', 'less than today', 'completely abandon the energy source' and 'no opinion'. The share responding 'no opinion' has varied between 5 and 8 per cent. This group is not reported separately in the figure. For further details, see Hedberg and Holmberg 2012.

From 2008 to 2010, the size of the most enthusiastic group decreased from 80 per cent to 66 per cent, implying a reduction by 14 percentage points. Yet this falling trend was broken in 2011 when the number climbed to 70 per cent. However, this is still 10 percentage points below the peak in 2008. It is not unreasonable to assume that the size of the most enthusiastic group will go down over time as the wind power capacity is expanded. We might in fact already have seen the largest number for this group. It is also possible that the increased support in 2011 is a result of the Fukushima nuclear disaster. Sören Holmberg points to a clear Fukushima effect when it comes to people's attitudes to nuclear power (see Holmberg 2012a). It could be that the reduced support for nuclear power in 2011 implied increased support for wind power.

So what does the support for increased wind power capacity look like across different demographic and political groups? Can differences in opinion be related to factors such as gender, age, education and political sympathies? Table 1 gives some information.

Opinions about wind power and social background

The results show that social background variables such as gender, age, education and whether one resides in an urban or rural area have been very weakly linked to people's attitudes to wind power. Women have been somewhat more positive than men, although the difference

has never been larger than a few percentage points. In 2011, 71 per cent of the female respondents indicated that they wanted to increase the investments in wind power; the corresponding number for men was 69 per cent. As regards age, people in the 31-60 age group are on average somewhat more positive than both younger and older individuals; in 2011, the difference was 4 and 7 percentage points, respectively. When it comes to education, in most years, those with a high level of education have been more positive to wind power than those with low and intermediate levels of education. In the survey 2011, 74 per cent of the highly educated wanted to increase the investments in wind power; the number for those with low and medium levels of education was 66%, respectively.

Table 1. Share of respondents in different demographic groups and with different political sympathies who are positive to increased investments in wind power, 1999-2011 (in per cent)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Gender													
Man	72	71	70	65	63	72	71	76	79	81	72	64	69
Woman	75	73	73	70	65	73	73	79	80	79	76	67	71
Age													
15-30	69	75	69	67	62	70	69	70	78	76	73	65	69
31-60	76	73	77	70	70	79	75	81	83	84	79	71	73
61-85	72	68	63	62	54	63	68	74	75	76	66	57	66
Education													
Basic level/compulsory	71	71	67	67	59	66	67	74	74	75	67	57	69
Intermediate level	74	73	71	68	64	75	72	76	79	79	71	67	69
University/college	74	72	77	68	71	76	76	82	84	85	80	70	74
Place of residence													
Rural	80	83	80	72	73	81	77	83	83	83	72	68	75
Small community	77	72	71	70	62	74	74	77	79	78	72	60	67
Town, large community	70	70	70	67	63	69	72	77	79	80	75	66	71
The three largest cities	74	65	69	65	61	76	64	72	81	81	76	70	69
Political party sympathies													
Left Party	86	81	85	80	75	82	74	82	88	86	82	84	69
Social Democrats	72	72	70	66	62	70	73	78	78	81	76	62	71
Green Party	87	84	87	86	77	92	90	89	94	88	79	84	86
Centre Party	80	90	80	79	76	82	82	89	85	93	79	71	82
Liberal Party	84	81	78	70	63	69	72	67	81	77	78	64	67
Christian Democrats	72	69	72	70	66	68	68	83	80	77	77	71	64
Moderates/Conservatives	63	59	62	48	54	65	67	70	78	77	68	62	67
Sweden Democrats	--	--	--	--	--	--	--	68	68	68	66	51	65
Feminist Initiative	--	--	--	--	--	--	--	--	--	--	77	58	--
Pirate Party	--	--	--	--	--	--	--	--	--	--	69	68	--
Other	72	86	73	64	67	75	61	72	74	73	78	60	58
Left-right dimension													
Clearly left	87	81	76	75	79	83	77	84	86	83	82	77	82
Somewhat left	77	79	79	74	69	80	79	85	83	86	80	70	71
Neither left nor right	72	73	69	65	63	69	70	73	77	79	70	64	66
Somewhat right	71	68	69	64	59	71	72	77	80	78	74	66	72
Clearly right	61	54	63	56	57	63	59	68	75	72	66	57	63
Political interest													
Very interested	75	68	68	68	70	72	77	80	82	80	75	66	75
Fairly interested	76	73	75	67	65	76	74	80	82	83	76	67	72
Not very interested	73	74	70	71	64	71	71	75	78	76	75	66	69
Not at all interested	57	64	61	57	49	66	61	58	69	75	64	55	61
Opinion about nuclear power													
Phase out nuclear power	84	87	84	81	83	86	88	88	91	86	85	81	83
Use nuclear power	63	59	64	59	56	67	66	74	76	79	72	60	65
All	74	72	71	68	64	73	72	77	79	80	74	66	70

Comment: For the wording of the question asked, see Figure 1. Persons who did not respond to the question are not included in the calculation of percentages. The question used to assess attitudes to nuclear power differs somewhat between the years 2000 – 2004 and 1996–1999. In 2005, the response alternative 'phase out nuclear power by 2010' was changed to 'phase out nuclear power as soon as possible'. No results are reported for Feminist Initiative and the Pirate Party in 2011 since too few respondents supported these parties (5 and 6 persons, respectively). Instead, these individuals are included under 'Other'.

In all years except 2009 and 2010, the strongest support for increased investments in wind power was found among people in rural areas. In 2011, 75 per cent of the respondents in this group showed this preference; the numbers for larger communities, the three largest cities and smaller communities were 71 per cent, 69 per cent and 67 per cent, respectively. We can also conclude that the support for increased investments increased in all demographic groups from 2010 to 2011, with the exception of people living in the country's three largest cities Stockholm, Gothenburg and Malmö.

The main finding concerning the relationships between demographic characteristics and attitudes regarding future investments in wind power is that they are very weak. Or put differently: People's opinions about investments in wind power have very little to do with demographic profile.

Opinions about wind power and political sympathies

The correlations are weak also for political sympathies, yet not quite as weak as for demographic characteristics. Those sympathizing with the 'green' parties – the Left Party, the Centre Party and the Green Party – have been more positive to wind power than others, at least in ten of the thirteen surveys since the start in 1999. The exceptions are 1999 when supporters of the Liberal party were somewhat more positive than supporters of the Centre Party, 2010 when supporters of the Christian Democrats were as positive as supporters of the Centre Party, and 2011 when supporters of the Social Democrats were somewhat more positive than supporters of the Left Party. The supporters of most political parties (not supporters of the Left Party, the Christian Democrats and 'Other'[3]) were more positive to wind power in 2011 than in 2010.

Looking at left-right ideology, we find that people who place themselves to the left are more positive to wind power than people to the right on the political scale. This pattern has been found every year since the first time the question was asked in 1999. Yet the results from 2011 are a bit of an exception in the sense that people who place themselves somewhat to the right were as positive (72 per cent) as those who placed themselves somewhat to the left (71 per cent). Table 1 also shows that people who are very interested or fairly interested in politics are more positive to increased investments in wind power than people who are not very interested or not at all interested in politics.

The results also show that there is a link between attitudes to wind power and attitudes to nuclear power. In every survey since 1999, respondents who have wanted to abolish nuclear power have been more positive to increased investments in wind power than people who have supported the use of nuclear power. In 2011, 83 per cent of the nuclear power opponents supported increased investments in wind power. The corresponding figure for nuclear power supporters was 65 per cent.

When looking at how people from different demographic and political groups feel about wind power, it is worth noting that in all groups, a strong majority support increased investments in wind power compared with the current levels.[4]

3 Among the supporters of the Left Party, 69 per cent responded that they want to invest more than today in wind power. This is a surprisingly low value and should be interpreted with caution since it may simply be due to chance. In previous years, the number was over 80 per cent. Compared with the 2010 results, 69 per cent implies a reduction by 15 percentage points.

4 Compared with the groups of respondents who want to increase investments in wind power or keep the investments at the current level, we find that men, older individuals, right wing persons, individuals with a strong interest in politics and nuclear power supporters are over-represented among those who want to reduce investments in wind power or abandon it altogether.

Opinions about wind power and other energy sources

As in previous years, the results for 2011 show that wind power is a popular energy source. But how do people feel about other sources, which ones should be prioritised in the future and which ones do people want less of or not at all?[5]

The results from the SOM surveys show that, among the different energy sources, only solar power attracts stronger support than wind power. Although solar power was not included in the 2011 survey, it was somewhat more popular than wind power in all other years. Among the energy sources included in the 2011 national SOM survey, wind power was the most popular in terms of the proportion of respondents who wanted to see increased investments in it. After wind power at 70 per cent came wave power at 60 per cent, biofuels at 48 per cent, hydropower at 46 per cent, natural gas at 22 per cent, nuclear power at 12 per cent and coal power at 2 per cent.[6] The most unpopular energy source is coal, as 52 per cent responded that Sweden should stop using it completely. Nuclear power came in second at 21 per cent (Hedberg and Holmberg 2012).[7]

Opinions about wind power in areas with rapid expansion of wind power capacity

Although wind power is a very popular energy source, we know that it is subject to local protests in some places. Opponents are often concerned with how wind power stations affect the landscape and the environment, especially in connection with the planning and construction of large wind parks. The resistance may increase every time new wind power stations are built. One example is the Swedish association for landscape protection, Föreningen Svenskt Landskapsskydd. The organisation is growing, and its website declares: 'We want a discussion that acknowledges that wind power is not just "an infinite and clean energy source", but also a source of negative emotions for those who are affected by it'. [8]

The question is whether we can identify the growing local resistance in our national SOM surveys. The responses to the question about how much we should invest in the different energy sources is made up of several components – one concerning attitude to the energy sources, one concerning already available capacity from the energy sources and one concerning the need for further expansion. In other words, the question concerns how much we have, how much we need and what one's attitude to a certain energy source is. The assumption in what follows is that in areas with relatively high wind power capacity, we will find a larger proportion of respondents who feel that we should *not* increase investments in wind power. Such a reduction can be interpreted in many ways with respect to the different components of the question. It can be due to changes in attitudes when a wind power station or park is actually built or it can be interpreted in terms of 'saturation effects' related to assessments of what is needed and what has been installed.

The Swedish Energy Agency's statistics indicate in which counties and municipalities wind power has been expanded the most since 2003 (Swedish Energy Agency 2012). Figure 2 shows the development in the two counties with the most wind power stations in 2011 and at aggregate level for the 16 municipalities that had more than 30 wind power stations in 2011.

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5 See Holmberg 2012b for an analysis of how the patterns in opinion are related when it comes to people's views of the different energy sources.

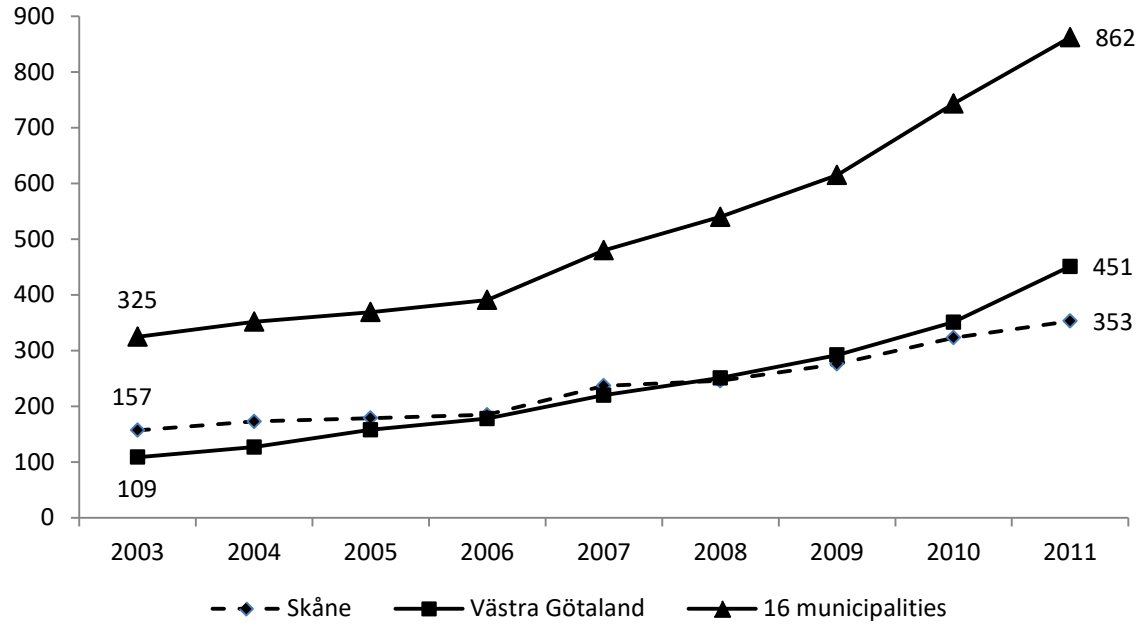
6 The questions about solar power and oil were not used in 2011, yet the results for these two energy sources were 81 and 2 per cent, respectively, in 2010.

7 The results of the 2010 SOM survey indicate that 22 per cent want to abandon oil as an energy source completely.

8 http://www.landskapsskydd.se/artikel/vindkraft. See also Ny Teknik 2012.

From 2003 to 2011, the number of wind power stations increased from 675 to 2 047. Thus, 1 372 new wind power stations were built. The two counties with the most wind power stations in 2011 were Västra Götaland with 451 and Skåne with 353, each with an increase of 342 and 196 wind power stations during the period.

Figure 2. Number of wind power stations in Skåne, Västra Götaland and the 16 municipalities with more than 30 wind power stations in 2011.



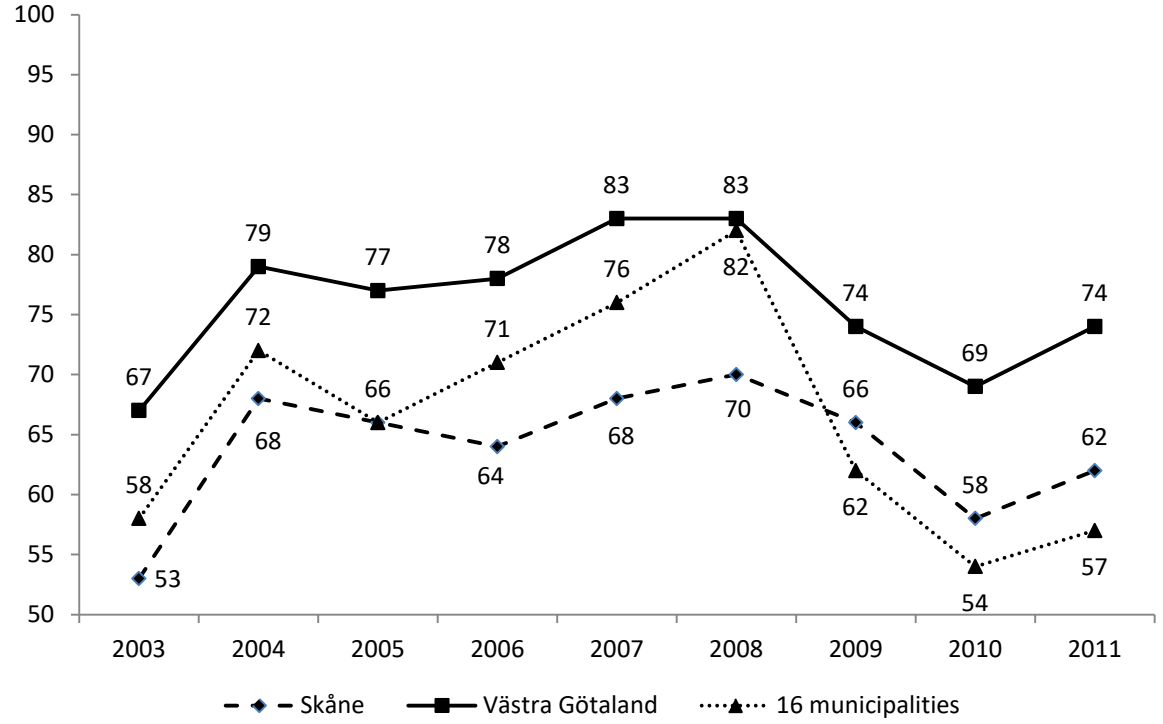
Comment: The 16 municipalities with most wind power stations in 2011 were Gotland, Laholm, Strömsund,Mjölby, Malmö, Falkenberg, Eslöv, Åsele, Vara, Falköping, Mellerud, Mörbylånga, Borgholm, Tanum,Kristianstad and Dorotea. ***Source***: Swedish Energy Agency 2012.

Figure 2 also shows the number of wind power stations in the municipalities that had more than 30 wind power stations in use in 2011. From 2003 and 2011, their total number of wind power stations increased from 325 to 862. According to Figure 2, the expansion was a bit faster during the latter part of the period.

Figure 3 shows the share of respondents who want to increase investments in wind power in the counties of Skåne and Västra Götaland and the 16 municipalities that had more than 30 wind power station in 2011.[9] The results shows a previously known phenomenon – that people in Skåne are not as positive to expansion of wind power as people in the rest of the country.

[9] In 2011, the 16 municipalities with the highest numbers of wind power stations were Gotland, Laholm, Strömsund, Mjölby, Malmö, Falkenberg, Eslöv, Åsele, Vara, Falköping, Mellerud, Mörbylånga,Borgholm, Tanum, Kristianstad and Dorotea. Source: Swedish Energy Agency.

Figure 3. Share of respondents who support increased investments in wind power in Skåne, Västra Götaland and the 16 municipalities with more than 30 wind power stations in 2011 (per cent)



Comment: In counties with relatively few wind power stations (fewer than 30 in 2011), the share of respondents who wanted to increase investments in wind power was 63 per cent in 2003, 70 per cent in 2004, 70 per cent in 2005, 76 per cent in 2006, 82 per cent in 2007, 81 per cent in 2008, 74 per cent in 2009, 67 per cent in 2010 and 71 per cent in 2011. The counties with fewer than 30 wind power stations in 2011 were Stockholm, Uppsala, Södermanland, Kronoborg, Värmland,Västmanland, Gävleborg and Västernorrland. Overall in the country, the share of respondents who wanted to increase investments in wind power was 64 per cent in 2003, 73 per cent in 2004, 72 per cent in 2005, 77 per cent in 2006, 79 per cent in 2007, 80 per cent in 2008, 74 per cent in 2009, 66 per cent in 2010 and 70 per cent in 2011.

For our assumption to be correct, the willingness to invest more in wind power should fall with the expansion rate in the counties. However, this does not seem to be the case. Instead, the curves for Västra Götaland and Skåne follow the corresponding curve for the whole country. The share of Swedes' who want to invest more in wind power has decreased by 10 percentage points since 2008. For Västra Götaland and Skåne, the corresponding numbers are 9 and 8 percentage points, respectively. Hence, our SOM material based on a national sample does not provide any evidence of the proposed relationship, at least not at country level.[10] Yet if we look at the results for the municipalities with the most wind power stations in 2011, we find some possible support for our assumption: 82 per cent of the respondents in the 16 municipalities with the most wind power stations supported increased investments in wind power in 2008. In 2011, the number was 57 per cent, implying a drop of 25 percentage points. This reduction in support is 15 per cent larger than the corresponding reduction at the national level. It seems reasonable that wind power capacity at some point reaches a threshold where people stop supporting further expansion. This could be what we sense in the analysis of the 16 municipalities with the most wind power stations in the country.

[10] If we instead of comparing Skåne and Västra Götaland with the entire country compare them with areas where the expansion of wind power is still slow, we still do not find any major differences. In the counties with fewer than 30 wind power stations in 2011, 81 per cent wanted to boost investments in wind power in 2008. This number fell to 71 per cent in 2011 (-10 percentage points).

The Swedish public strongly supports the Swedish Parliament's decision to expand the country's wind power capacity. Wind power is a very popular energy source. In fact, only solar power is more popular. In the 2011 SOM survey, 88 per cent supported the current level of investment in wind power or wanted to increase it. Today, a full 70 per cent of the Swedish population supports a higher investment level. A question for the future is how the public opinion will react when the extensive expansion plans are implemented. We can already see a tendency of reduced support in municipalities with a large number of wind power stations. Nevertheless, in 2011, a vast majority of respondents in these municipalities supported increased investments in wind power.

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Chapter 8

Energy Opinion in an International Perspective

Sören Holmberg Per Hedberg

Given that energy and especially nuclear power have been very prominent on the political agenda in many countries and over many years, it is somewhat surprising that there are not more systematic opinion studies done across countries or across time. The number of well executed surveys comparing energy opinions across different political systems or over time is actually quite limited. This is especially true for recent years after the Fukushima accident in 2011.That goes for worldwide studies as well as for European comparisons.

Results from some of the best studies we have found are presented on the following pages. Many of them are done before as well as after the catastrophe in Fukushima, making it possible to assess the effects of the accident on public opinion. Studies pertaining to nuclear power dominate, but there are also some comparative surveys focusing on opinions on other energy sources like wind and solar power.

Complementing the comparative across-country surveys, time series data on attitudes toward nuclear power are presented for seven nations – Germany, France, Great Britain, USA, Japan, Finland and Sweden. The periods covered varies from a few years after 2011 in Japan to over forty years for Sweden. All time series cover the Fukushima accident, giving us an opportunity to identify eventual opinion effects of the melt down.

Question wordings differ and the exact time periods vary somewhat, but in all cases there is a sizeable short term Fukushima effect on the support for nuclear power. The effect is of about the same magnitude across all of our countries. Between the last pre- and immediate post-Fukushima measurements support for nuclear power drops around -5 to -15 percentage points. The loss of support is largest in Japan (and in Finland!) and smallest in Sweden and the United States.

In five countries there is comparative data available from opinion polls taken in 2012 or 2013, making it possible to see to what extent the Fukushima effect was short lived or more durable. In France, all of the negative effect on the support for nuclear power was gone already in 2012. In Great Britain, Finland, and Sweden, nuclear support rebounded somewhat as well but only partly, and not back to pre-Fukushima levels. In the U.S., no rebound can be found. Support for nuclear power has not increased back again after Fukushima. Only 49 per cent favor the use of nuclear power in 2019 compared to 62 per cent in 2010.

In Japan, the results are quite different, with no rebound during five-six years after the accident, and instead a rather dramatic increase in the opposition to nuclear power as the catastrophe unfolds during 2011 and 2012. Japanese public opinion in 2013 and 2017 is more opposed to nuclear power than immediately after the accident in 2011. However, recent polls from 2018 indicate a small uptick in support for using nuclear production in Japan. But a clear majority of Japanese is still in favor of phasing out nuclear power. Available data for Germany is strangely scarce, but no rebound can be detected, and clear majorities are supporting the phase out plan.

However, an important difference between German and Japanese as well as American opinion on nuclear power is that pre-Fukushima there was already in Germany a decisive overweight against nuclear power while in the United States and Japan the opposite was the case – a majority in favor of using nuclear power.

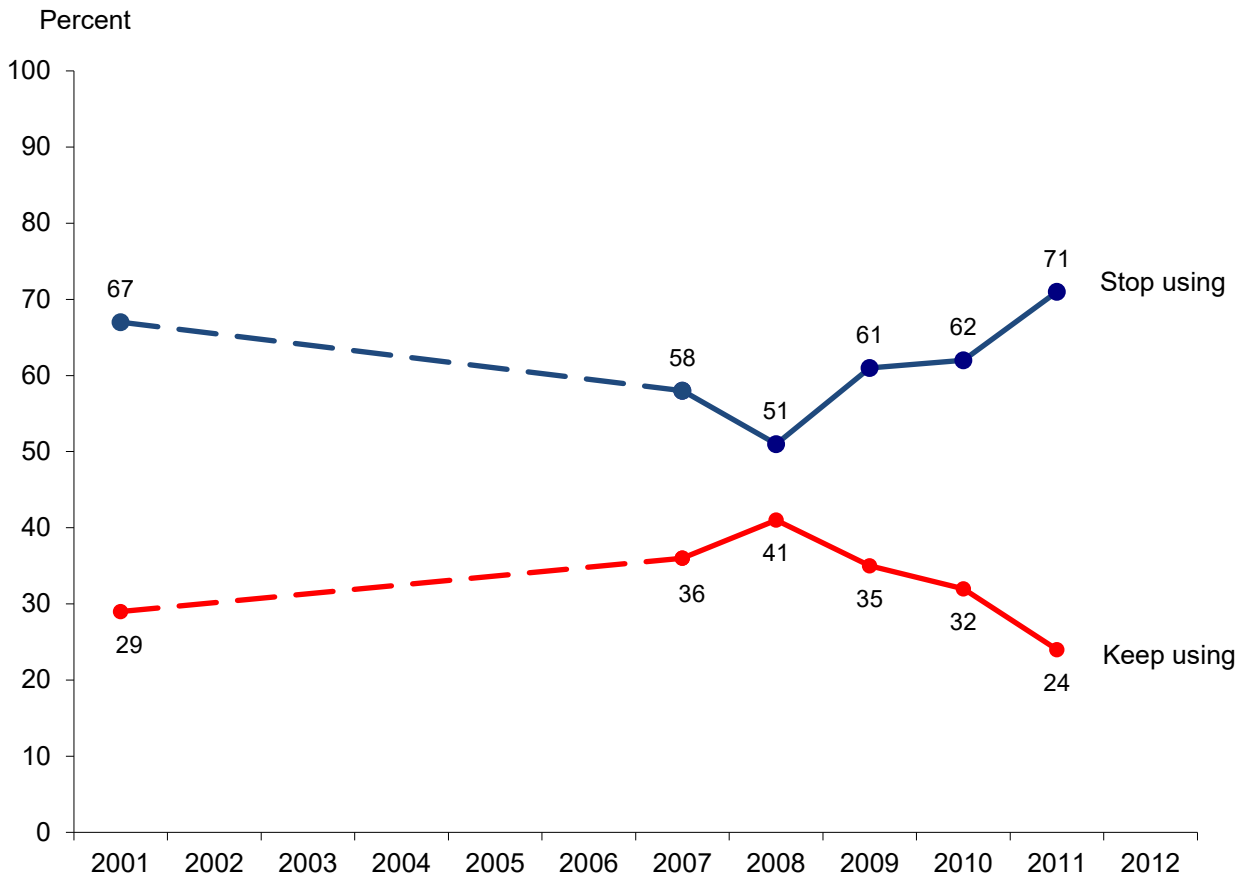
This distinct difference between German and American public opinion on nuclear power is also very noticeable in the across-country rankings of support for nuclear energy. USA tends to always be ranked high while Germany all the time is lower ranked and close to the bottom. Japan tends to be placed low as well, although not as low as Germany. Western countries which like United States tend to rank high on support for nuclear power is Great Britain, Sweden and Finland. Perhaps somewhat surprising, France is usually ranked a little lower. Non-Western countries with a strong public support for nuclear power, and consequently with high rankings are for example China, India and many East- and Central European countries like Russia, Czech Republic, Lithuania, and Hungary.[1]

The country rankings clearly demonstrate that the world´s four leading economies have very different public opinions on the future of nuclear power. Support for nuclear production of electricity is strongest in China and clearly weakest in Japan and Germany. The opinion in USA is more divided. Nuclear power does not enjoy a clear majority support in America anymore.

[1] Observe that Russia ranked in the middle or a little below in polls taken after Fukushima in 2011. In the ESS European study in 2016 Russia ranks number two after Czechia in support for nuclear power.

Germany

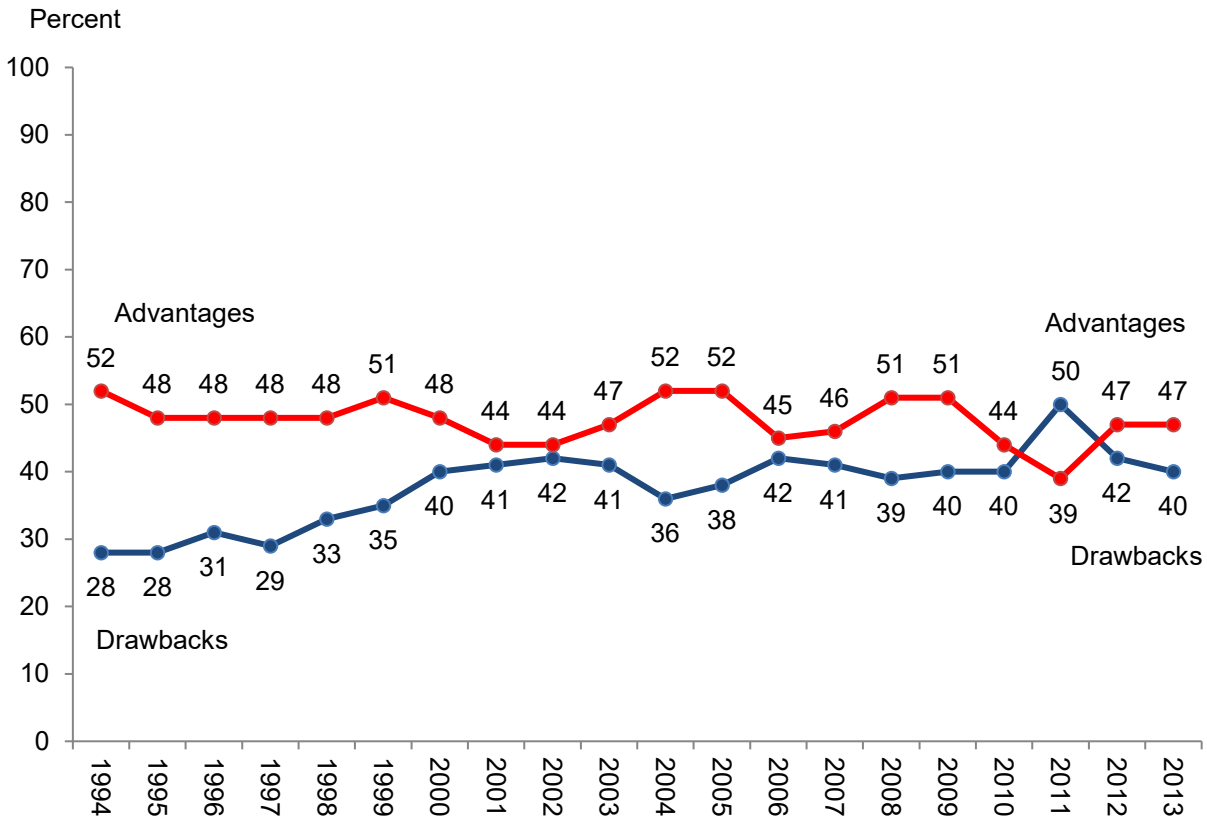
Question: "According to your view, should Germany stop using nuclear power or not?"



Source: Infratest Dimap; the survey in 2011 was done in March after the Fukushima accident; Don't knows in the percentage base vary between 4-8 percent over the years.

France

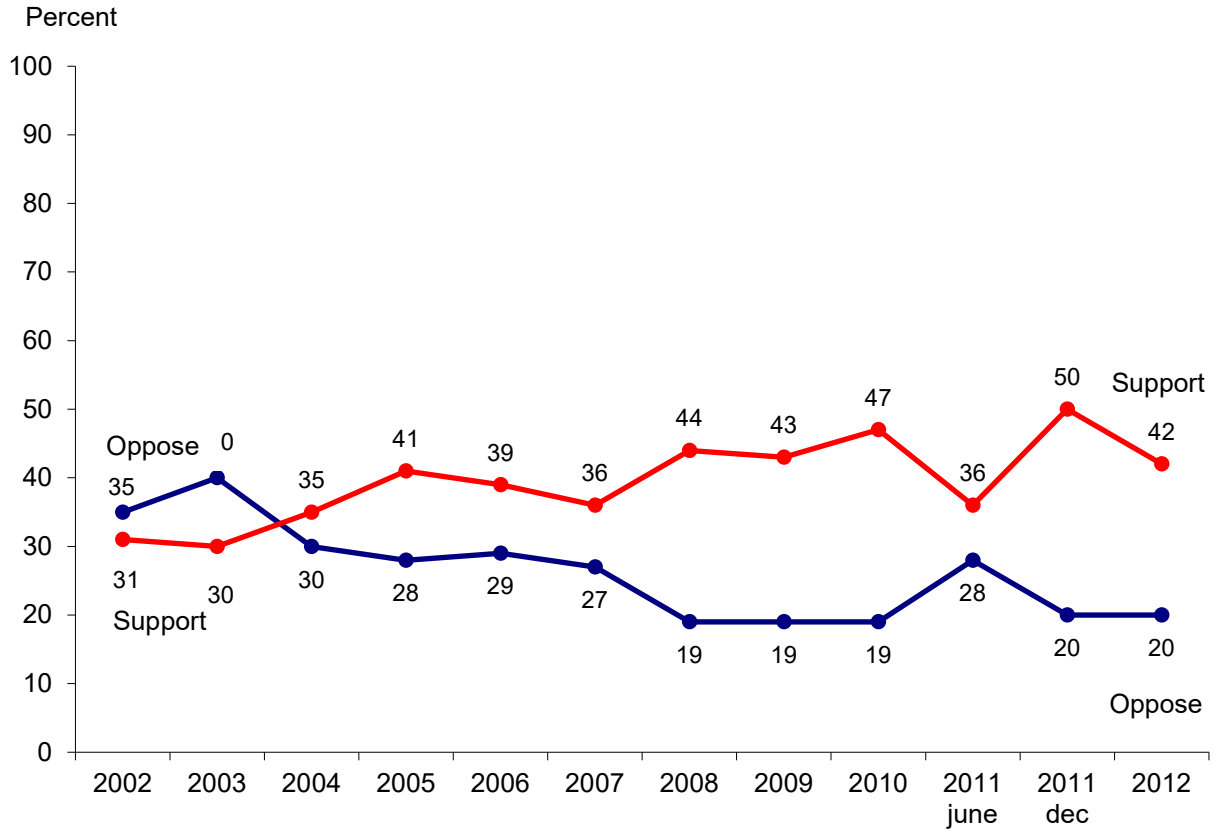
Question: "In your mind, the decision to produce three quarters of the French electricity production with nuclear power results in rather advantages or drawbacks?"



Source: CREDOC. Don't knows in the percentage base vary between 9-22 percent over the years. The survey in 2011 is done after the Fukushima accident. Another opinion poll in 2011 by BVA/Win-Gallup International after the Fukushima accident showed a majority of French citizens still in favour of nuclear power (58 percent); down, however, from 66 percent pre-Fukushima.

Great Britain

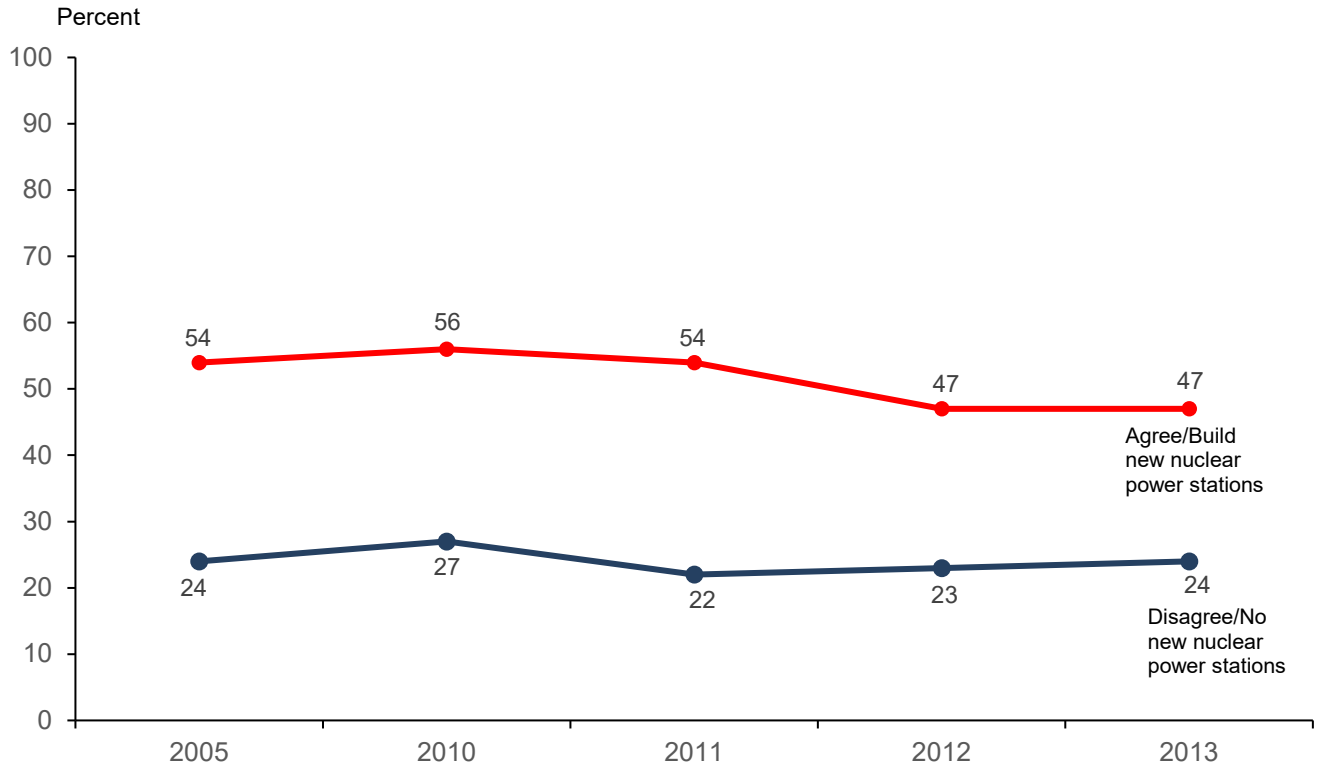
Question: "To what extent would you support or oppose the building of new nuclear power stations in Britain to replace those that are being phased out over the next years? This would ensure the same proportion of nuclear energy is retained"



Source: Ipsos Mori; Don't knows in the percentage base very between 30-39 percent over the years. The polls in 2011 were done in June and December, respectively.

Great Britain

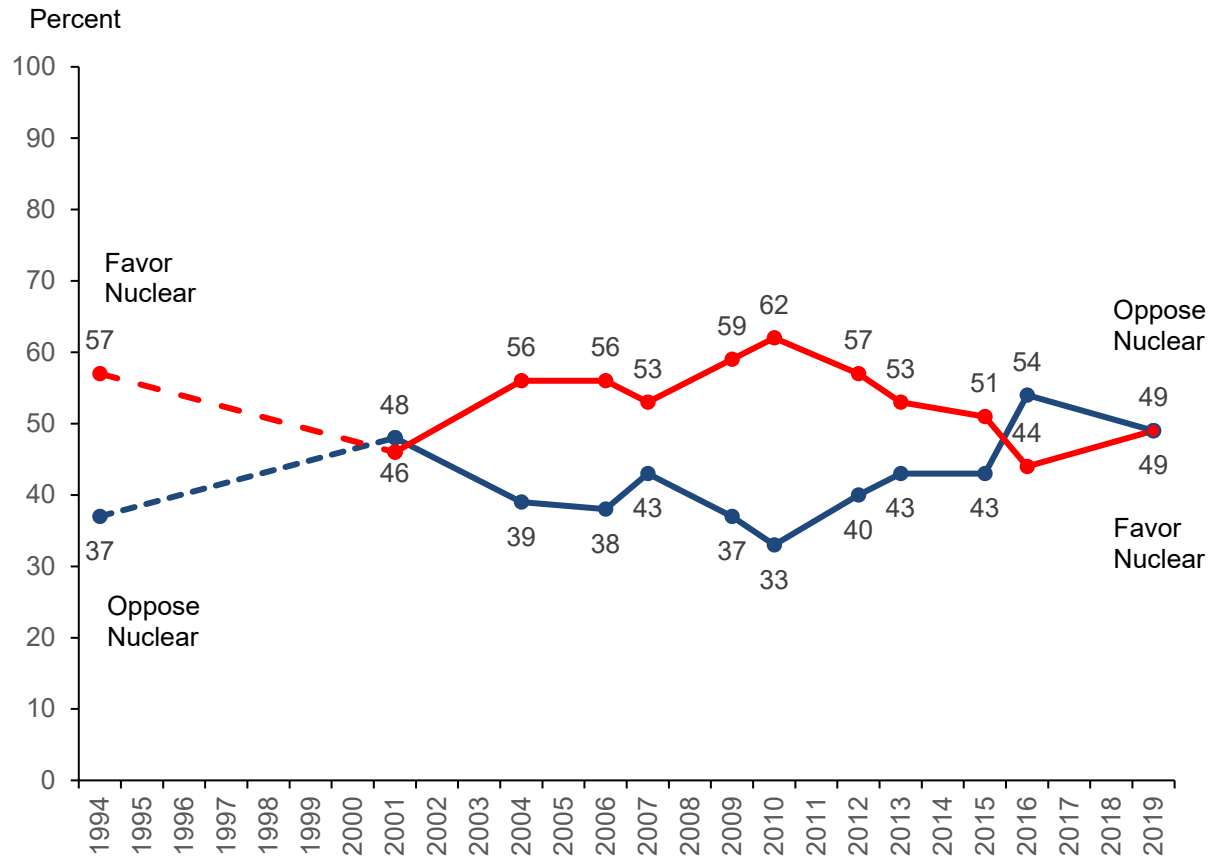
British Opinions on Willingness to Accept Building of New Nuclear Power Stations if it Would Help to Tackle Climate Change (Percent)



Source: Data from UKERC Research Report (2014).Don't knows vary between 4-9 percent, and neither nor between 14-24 percent over the years.

USA

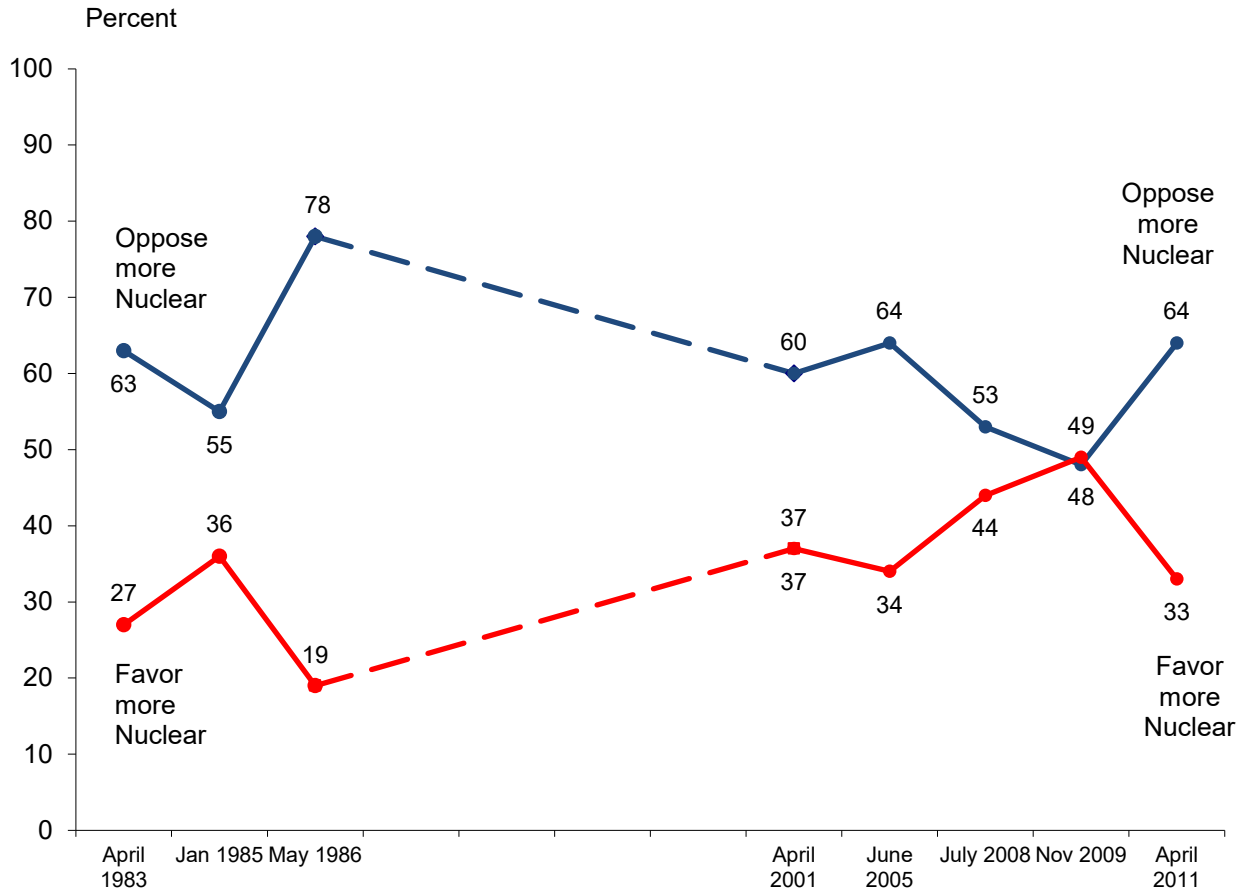
Question: "Overall, do you strongly favor, somewhat favor, somewhat oppose, or strongly oppose the use of nuclear energy as one of the ways to provide electricity for the U.S.?"



Source: Gallup Environment survey; Don't knows in the percentage base vary between 3-6 percent over the years.

USA

Question: "In general, would you favor or oppose building more nuclear power plants at this time?"



Source: ABC/Washington Post. Don't knows are included in the percentage base and vary between 2-9 percent over the years.

USA

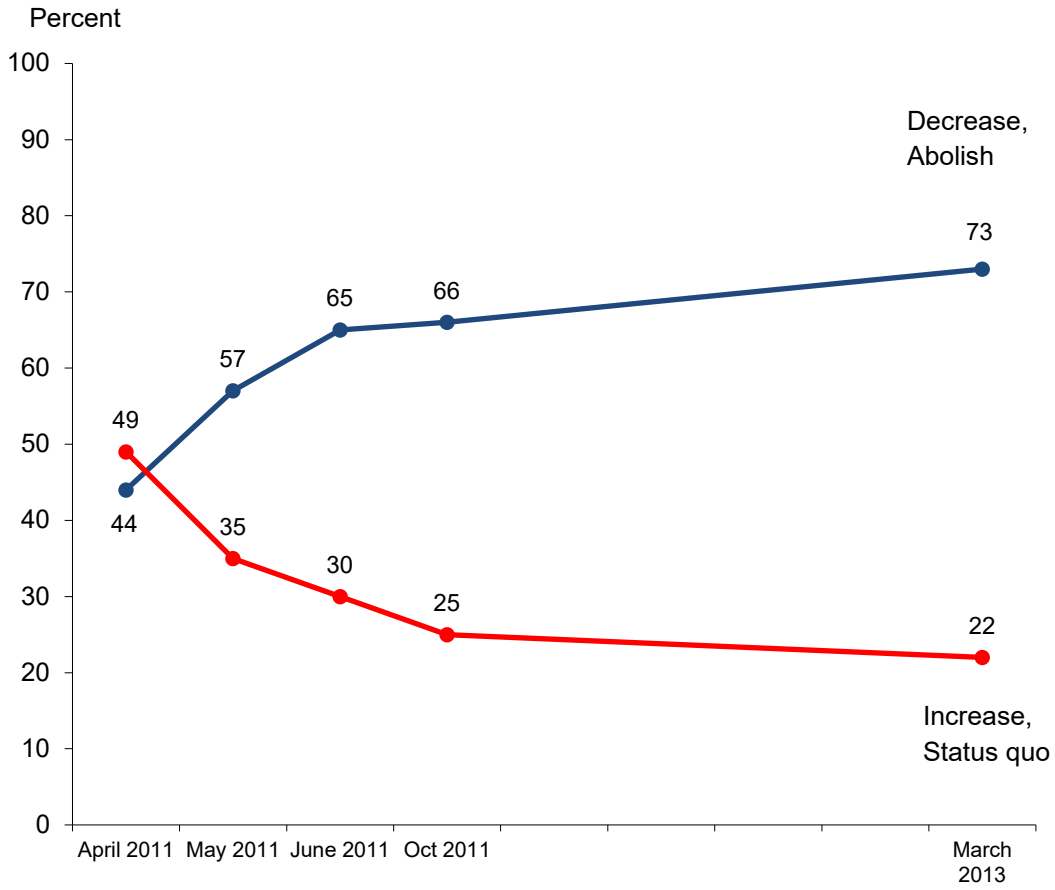
USA Opinions on More or Less Emphasis Should Be Put on Producing Domestic Energy from Different Energy Sources (Percent)

	More	Some	Less
Coal			
2013	31	25	41
2019	22	25	50
Oil			
2013	46	21	32
2019	28	29	43
Natural gas			
2013	65	24	10
2019	46	33	19
Wind			
2013	71	16	12
2019	70	18	11
Solar			
2013	76	12	10
2019	80	12	7
Nuclear			
2013	37	28	32
2019	32	31	35

Source: Data from Gallup/Energy. Don't knows vary between 1-4 percent.

Japan

Question: "What should be the future of Japan's nuclear power generation?"

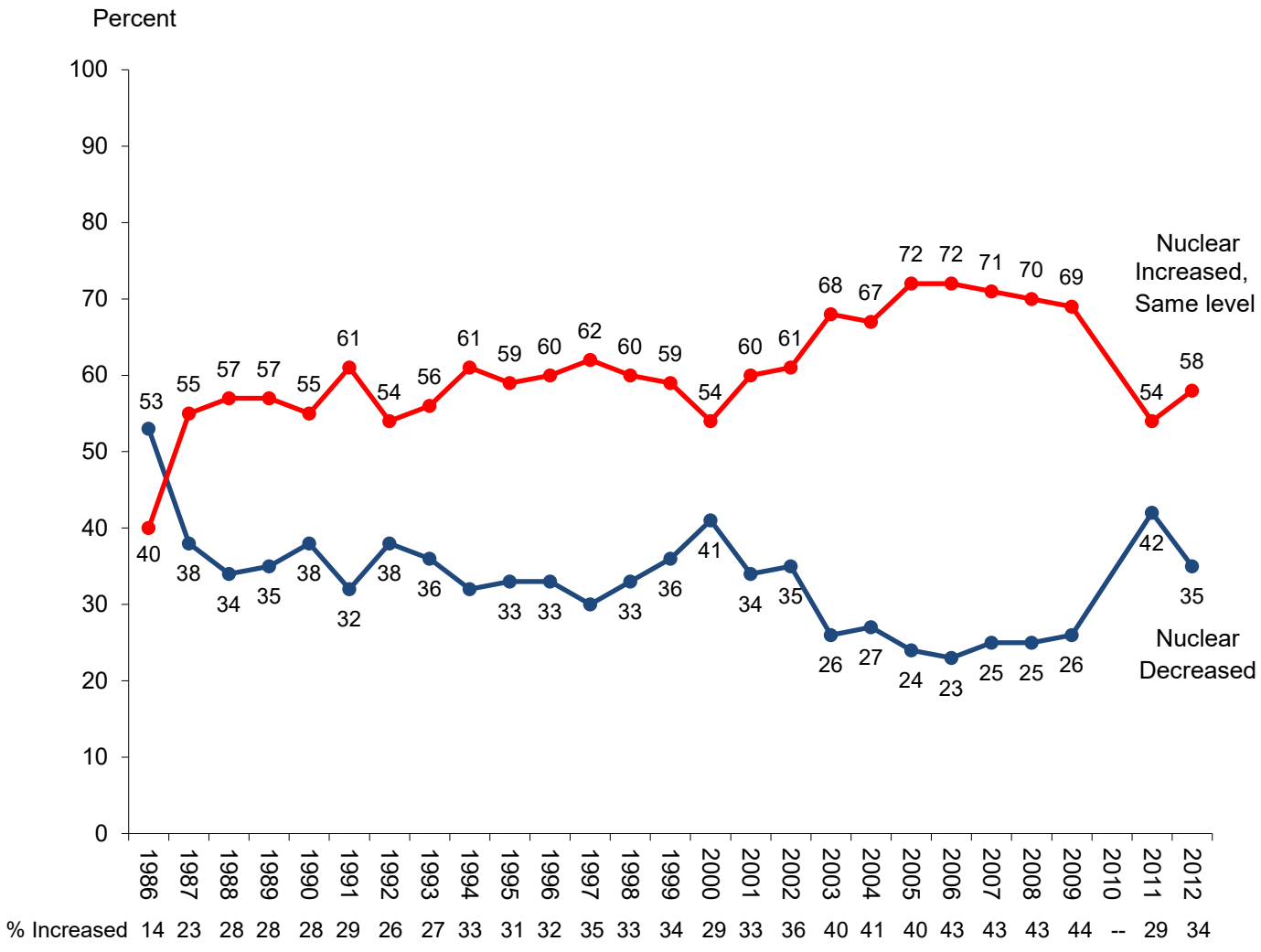


% Increase	7	3	1	2	4
% Status quo	42	32	29	23	18
% Decrease	32	43	47	42	53
% Abolish	12	14	18	24	20
% Other	7	8	4	9	5

Source: NHK (2011); Yomiuri (2013).
Comment: An opinion poll published in Asahi Shimbun shows Japanese support for nuclear power decreasing by 10 percentage points between 2007 and 2012. Polls by Japan Atomic Energy Relations Organization (JAERO) show that the percentage of Japanese citizens who do not trust nuclear power increased from 10 percent in 2010 to 24 percent in 2011 and to 30 percent in 2017. A JAERO poll in 2018 shows support for restarting power plants in Japan increasing to 27 percent, up from 19 percent 2017.

Finland

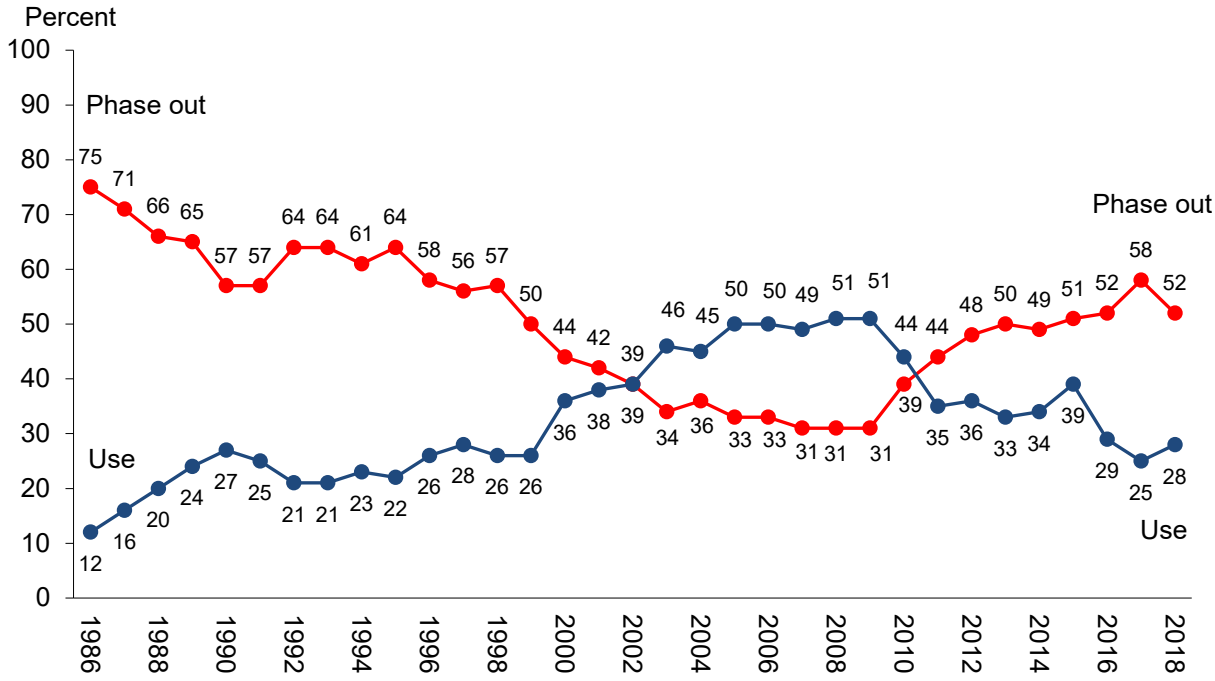
Question: "The share of nuclear power should be increased, stay on current level or be decreased?"



Source: Finnish Energy Industries. The percentage base include a don't know figure of between 4-9 percent over the years; 7 percent in 2012; Number of interviews is 967 in 2012; no study was published in 2010. The results for 2011 were collected after the Fukushima accident.

Sweden

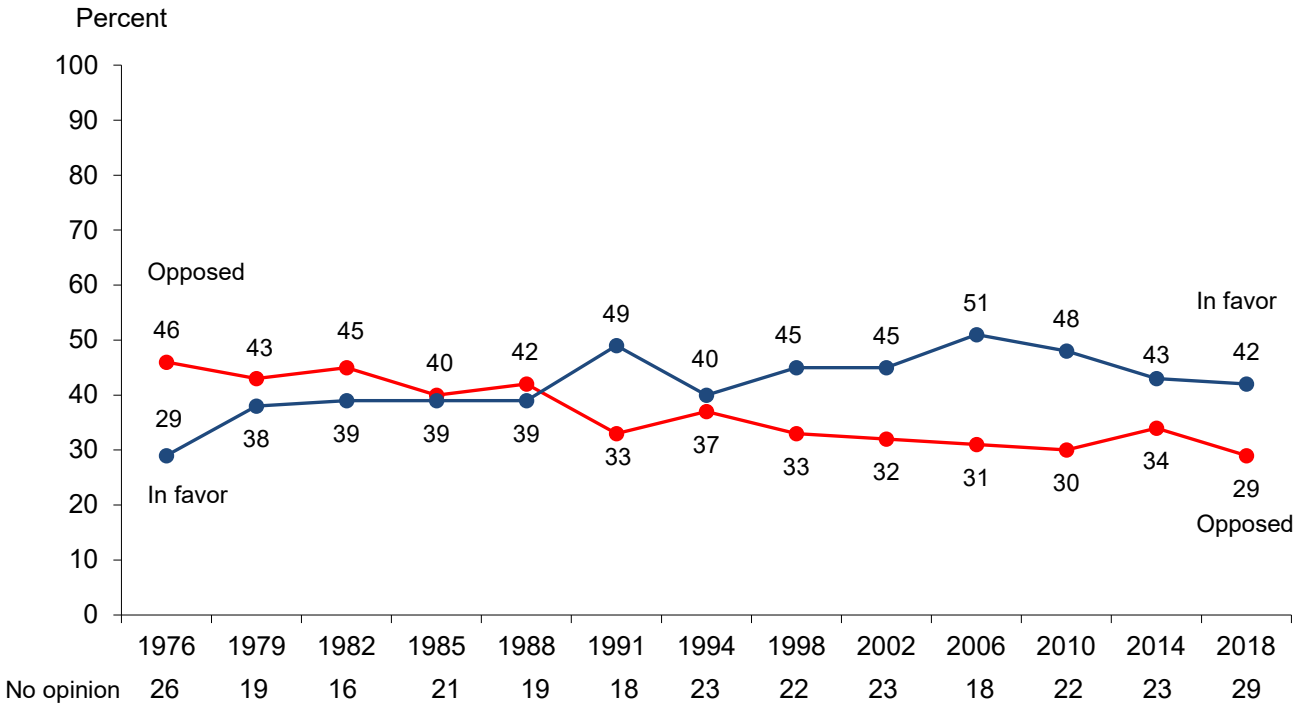
Question A: "After the 1980 Referendum, Parliament decided that nuclear power should be phased out in Sweden by 2010. What is your opinion on the use of nuclear power in Sweden?" (1986-1997)
Question B: "What is your opinion on the long term use of nuclear power as an energy source in Sweden?" (1996-2012)



Source: The SOM Institute, University of Gothenburg; Annual nationwide surveys carried out in the fall; Sample size 3 000 persons 16–85 years old; Mail questionnaires with an average response rate of 60 percent. The survey question asks about Swedes' opinion on the use/long term use of nuclear power as an energy source in Sweden. Response alternatives, including a "no opinion" alternative, are phrased as fairly concrete policy proposals and have varied some over the years. In the figure, the old five response alternative question is used up until 1997 and after that a new four response alternative-question starting in 1998, and revised in 2010 (see Chapter 10). 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 calculations.

Sweden

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?”



Comment: The results for 1976 come from Holmberg et al *Väljarna och kärnkraften* (1977). The results in 1979 – 2018 come from The Swedish National Election Studies (SNES). Percentages are computed among all respondents.

European Attitudes on Nuclear Power. Results from Comparative EU-studies in 2005 and 2008.

Question: "Are you totally in favor, fairly in favor, fairly opposed or totally opposed to energy produced by nuclear power stations?"

		% In favor		% Opposed		% Don't know	
		2005	2008	2005	2008	2005	2008
1.	Lithuania	60	64	27	26	13	10
2.	Czech Republic	61	64	37	32	2	4
3.	Bulgaria	--	63	--	13	--	24
4.	Hungary	65	63	31	32	5	5
5.	Sweden	64	62	33	35	3	3
6.	Finland	58	61	38	36	4	3
7.	Slovakia	56	60	40	31	4	9
8.	Netherlands	52	55	44	42	5	3
9.	France	52	52	41	40	7	8
10.	Slovenia	44	51	54	46	3	3
11.	United Kingdom	44	50	41	36	16	14
12.	Belgium	50	50	48	47	2	3
13.	Germany	38	46	59	47	4	7
14.	Italy	30	43	66	46	5	11
15.	Estonia	40	41	50	53	10	6
16.	Poland	26	39	66	46	8	15
17.	Denmark	29	36	66	62	5	2
18.	Romania	--	35	--	38	--	27
19.	Latvia	39	35	49	57	12	8
20.	Luxembourg	31	35	65	59	4	7
21.	Spain	16	24	71	57	13	19
22.	Ireland	13	24	70	54	17	22
23.	Portugal	21	23	53	55	26	22
24.	Greece	9	18	86	79	5	3
25.	Malta	17	15	62	62	21	23
26.	Austria	8	14	88	83	4	3
27.	Cyprus	10	7	81	80	10	13
	EU25/EU27	37	44	55	45	8	11

Source: Special Eurobarometer 2005 and 2008, Radioactive Waste; Fieldwork in February-March 2005 and 2008. Countries are ranked according to percent in favour in 2008.

Citizens' Views: Effect of Nuclear Energy Production on our Way of Life in the Next 20 Years. Results from a Comparative EU-study in 2010.

Question: "I am going to read out a list of areas where new technologies are currently developing. For each of these , do you think it will have a positive, a negative or no effect on our way of life in the next 20 years – nuclear energy ?"

		% Positive effect	% No effect	% Negative effect	% Don't know	% Positive minus % Negative
1.	Czech republic	58	10	27	5	+31
2.	Slovakia	56	8	30	6	+26
3.	Sweden	54	14	25	7	+29
4.	Estonia	54	8	30	8	+24
5.	United Kingdom	52	8	27	13	+25
6.	Bulgaria	49	3	25	23	+24
7.	Finland	48	17	29	6	+19
8.	Poland	46	6	32	16	+14
9.	Hungary	44	18	28	10	+16
10.	Latvia	42	9	38	11	+4
11.	Cyprus	41	7	40	12	+1
12.	Lithuania	40	8	33	19	+7
13.	Turkey	40	9	22	30	+18
14.	France	39	13	38	10	+1
15.	Slovenia	38	10	45	7	-7
16.	Spain	37	6	43	14	-6
17.	Belgium	37	18	41	4	-4
18.	Ireland	36	10	32	22	+4
19.	Netherlands	35	19	40	6	-5
20.	Romania	35	6	37	22	-2
21.	Norway	35	13	38	14	-3
22.	Italy	34	10	40	16	-6
23.	Switzerland	33	18	40	9	-7
24.	Denmark	31	24	40	5	-9
25.	Germany	30	9	50	11	-20
26.	Malta	28	9	36	27	-8
27.	Croatia	28	9	51	12	-23
28.	Portugal	28	10	39	23	-11
29.	Luxembourg	26	11	56	7	-30
30.	Greece	23	5	66	6	-43
31.	Iceland	20	46	31	3	-11
32.	Austria	17	13	61	9	-44
	EU27	39	10	39	12	±0

Source: Special Eurobarometer 2010: Biotechnology.

Post-Fukushima.
Global Opinions on Nuclear Power.
Results from a Poll in 24 Countries in May 2011.

Question: "Please indicate whether you strongly support, somewhat support, somewhat oppose, or strongly oppose each way of producing electricity – nuclear power"

		% support	% oppose
1.	India	61	39
2.	Poland	57	43
3.	USA	51	48
4.	Sweden	50	51
5.	Great Britain	48	51
6.	Saudi Arabia	42	58
7.	China	42	58
8.	Hungary	41	59
9.	Japan	41	58
10.	South Africa	40	60
11.	Spain	40	60
12.	South Korea	40	61
13.	Russia	39	62
14.	Belgium	39	60
15.	Canada	36	63
16.	France	34	67
17.	Australia	34	66
18.	Indonesia	33	67
19.	Brazil	32	69
20.	Turkey	29	71
21.	Argentina	28	72
22.	Germany	21	79
23.	Italy	18	81
24.	Mexico	18	81

Source: Ipsos, Global@dvisor. Approximately 500 or 1000 citizens aged 16-64 years were interviewed in each country via Ipsos Online Panel.

Post-Fukushima.
Opinion on Nuclear Power in 23 Countries.
Results from a Poll in July-September 2011.

Question: "Views on Use of Nuclear Energy for Electricity Generation……"

		Nuclear Power is relatively safe and an important source of electricity, and we should build new power plants.	We should use the nuclear power plants that we already have, but we should not build new ones.	Nuclear power is dangerous and we should close down all operating nuclear power plants as soon as possible	Don't know
1.	China	42	35	13	10
2.	Nigeria	41	25	23	11
3.	USA	39	44	14	3
4.	Pakistan	39	22	21	18
5.	Great Britain	37	44	15	4
6.	Ghana	33	15	17	35
7.	Egypt	31	30	36	3
8.	Kenya	29	15	39	17
9.	India	23	18	21	38
10.	Philippines	21	36	41	2
11.	Turkey	21	32	41	6
12.	Mexico	18	39	43	0
13.	Brazil	16	44	35	5
14.	France	15	58	25	2
15.	Peru	15	23	30	32
16.	Indonesia	12	39	34	15
17.	Panama	11	33	38	18
18.	Russia	9	37	43	11
19.	Spain	8	32	55	5
20.	Germany	7	38	52	3
21.	Japan	6	57	27	10
22.	Ecuador	6	12	53	29
23.	Chile	3	26	55	16

Source: BBC/World Service/Globescan. About 1000 interviews per country. Urban samples only in some countries. Face-to-face interviews in most countries, Telephone interviews in others.

Post-Fukushima: Results from a Global Snap Poll in 47 Countries in March-April 2011.

Question: "As of today, what is your view: Do you strongly favor, somewhat favor, somewhat oppose or strongly oppose the use of nuclear energy as one of the ways to provide electricity for the world? "

		% Favor	% Oppose	% Don't know	% Favor minus % Oppose
1.	China	70	30	0	+40
2.	Bulgaria	62	23	16	+39
3.	Czech republic	61	34	5	+27
4.	France	58	41	1	+17
5.	Latvia	53	42	6	+11
6.	Finland	52	44	4	+8
7.	Russia	52	27	21	+25
8.	India	49	35	16	+14
9.	USA	46	44	9	+2
10.	Netherlands	44	50	6	-6
11.	Canada	43	50	7	-7
12.	Romania	41	53	6	-12
13.	Turkey	41	57	3	-16
14.	Japan	40	46	14	-6
15.	Spain	40	45	15	-5
16.	Belgium	34	57	9	-23
17.	Switzerland	34	62	4	-28
18.	Brazil	32	54	14	-22
19.	Iceland	32	67	1	-35
20.	Poland	30	50	29	-20
21.	Ireland	29	67	4	-38
22.	Germany	27	72	1	-45
23.	Italy	23	74	1	-51
24.	Serbia	17	75	8	-58
25.	Bonien/herzegovinia	17	75	8	-58
26.	Greece	9	89	1	-80
27.	Austria	9	90	1	-81

Source: Global Snap Poll by WIN-Gallup International. Results for a selected number of countries – mainly European countries.

Post-Fukushima: The Future of Nuclear Power Generation. Results from a Poll in 7 Countries in May 2011

Question: "What should be done about nuclear power generation in your country… ?"

	% Increased	% Maintained current level	% Reduced	% Stopped	% Don't know
1. China	32	37	22	7	2
2. USA	32	37	18	9	4
3. South Korea	13	52	22	8	5
4. France	8	42	38	11	1
5. Russia	7	41	29	13	10
6. Japan	4	41	36	16	3
7. Germany	3	15	28	52	2

Source: Asahi Shimbun; http://fukushimanewsresearch.wordpress.com.

European Attitudes Toward the future of Three Energy Sources. Results from a Comparative EU-Study in 2005.

Question: "To reduce our dependency on imported energy resources, Governments have to choose from a list of alternatives, sometimes costly solutions. Which of the following should the (NATIONALITY) Government mainly focus on for the years to come? (MAX. 2 ANSWERS)?"

	Nuclear Power	%
1.	Sweden	32
2.	Finland	27
3.	Bulgaria	24
4.	Lithuania	21
5.	Slovakia	19
6.	United Kingdom	18
7.	Germany	17
8.	Czech Republic	17
9.	Romania	15
10.	Turkey	15
11.	Netherlands	14
12.	Italy	13
13.	Belgium	11
14.	Poland	10
15.	Turkish Cyprus	10
16.	Hungary	9
17.	France	8
18.	Estonia	8
19.	Latvia	8
20.	Luxembourg	7
21.	Ireland	7
22.	Slovenia	5
23.	Portugal	5
24.	Croatia	5
25.	Austria	5
26.	Denmark	4
27.	Spain	4
28.	Cyprus	2
29.	Malta	2
30.	Greece	2
	EU25	12

	Wind Power	%
1.	Denmark	59
2.	Estonia	54
3.	Ireland	52
4.	Belgium	49
5.	Greece	44
6.	Netherlands	42
7.	Sweden	41
8.	Finland	41
9.	Croatia	40
10.	United kingdom	39
11.	Latvia	39
12.	Slovenia	39
13.	France	38
14.	Hungary	37
15.	Luxembourg	36
16.	Austral	35
17.	Portugal	34
18.	Malta	32
19.	Poland	30
20.	Spain	28
21.	Germany	26
22.	Czech republic	25
23.	Slovakia	23
24.	Cyprus	22
25.	Lithuania	22
26.	Romania	18
27.	Bulgaria	16
28.	Italy	15
29.	Turkish Cyprus	11
30.	Turkey	9
	EU25	31

	Solar Power	%
1.	Cyprus	76
2.	Greece	70
3.	France	63
4.	Luxembourg	62
5.	Croatia	60
6.	Slovenia	60
7.	Malta	58
8.	Germany	55
9.	Austria	54
10.	Belgium	51
11.	Turkish Cyprus	50
12.	Spain	50
13.	Netherlands	47
14.	Denmark	45
15.	Slovakia	44
16.	Hungary	43
17.	United kingdom	43
18.	Italy	41
19.	Czech Republic	41
20.	Finland	38
21.	Bulgaria	38
22.	Portugal	37
23.	Poland	37
24.	Estonia	35
25.	Ireland	32
26.	Sweden	31
27.	Romania	29
28.	Turkey	27
29.	Latvia	25
30.	Lithuania	16
	EU25	48

Source: The figures are percentages. Source: Special Eurobarometer: Attitudes towards Energy 2006; fieldwork October-November 2005.The interview question included two more response alternatives besides nuclear, solar and wind – Promote advanced research for new energy technologies (hydrogen, clear coal, etc.) and Regulate in order to reduce our dependence of oil. In EU25 the research alternative was supported by 41 percent and the reduce oil alternative by 23 percent. The comparable results for Sweden were 55 percent and 25 percent, respectively.

Citizens' Thoughts about the Use of Renewable Energy Sources such as Wind and Solar Power in 2050.
Results From an EU-Study in June 2011.

Question: "Do you think that in 2050 people will be using renewable energy sources such as wind and solar power more than they do now?"

		% Yes, definitely
1.	Denmark	82
2.	Sweden	79
3.	Germany	74
4.	Netherlands	70
5.	Cyprus	68
6.	Luxemburg	65
7.	Ireland	63
8.	Finland	61
9.	Slovenia	59
10.	Belgium	56
11.	Estonia	56
12.	United Kingdom	54
13.	Slovakia	52
14.	Latvia	51
15.	Greece	50
16.	Czech Republic	49
17.	Malta	49
18.	Austria	47
19.	Spain	44
20.	France	42
21.	Hungary	40
22.	Bulgaria	40
23.	Lithuania	40
24.	Italy	36
25.	Romania	34
26.	Poland	34
27.	Portugal	32
	EU27	50

Source: Special Eurobarometer: Climate Change, fieldwork in June 2011; response alternatives were: Yes, definitely, Yes, probably, No, probably not, No, definitely not, Don't know; Results for EU27 in the indicated order were 50%, 38%, 4%, 1% and 7%.

European Opinions on the Use of Nuclear Power, Wind Power, and Solar Power. Results from an ESS Study in 2016.

Percentage of Citizens Who Think a Large or Very Large Amount of Electricity in Their Country Should Be Generated From Nuclear Power, Wind Power or Solar Power (Percent)

Nuclear	%	Wind	%	Solar	%
Czechia	48	Spain	93	Spain	94
Russia	38	Portugal	91	Hungary	93
Hungary	35	Belgium	86	Portugal	92
Lithuania	32	Hungary	86	Netherlands	90
Israel	28	Slovenia	83	Austria	89
Poland	23	Netherlands	83	Italy	89
Finland	19	Austria	83	Slovenia	88
Sweden	18	Poland	82	Germany	87
United	17	Italy	81	Poland	87
Slovenia	17	Ireland	79	Switzerland	86
France	16	Iceland	77	Belgium	84
Italy	12	Germany	76	France	83
Belgium	11	France	73	Sweden	80
Switzerland	9	Lithuania	73	Israel	78
Estonia	9	United	72	Ireland	77
Spain	9	Sweden	71	United	76
Ireland	9	Switzerland	69	Norway	67
Portugal	8	Israel	67	Lithuania	64
Netherlands	6	Norway	66	Estonia	61
Austria	5	Estonia	63	Finland	61
Norway	4	Finland	53	Iceland	61
Germany	3	Russia	49	Russia	53
Iceland	1	Czechia	48	Czechia	52
Average	16		74		78

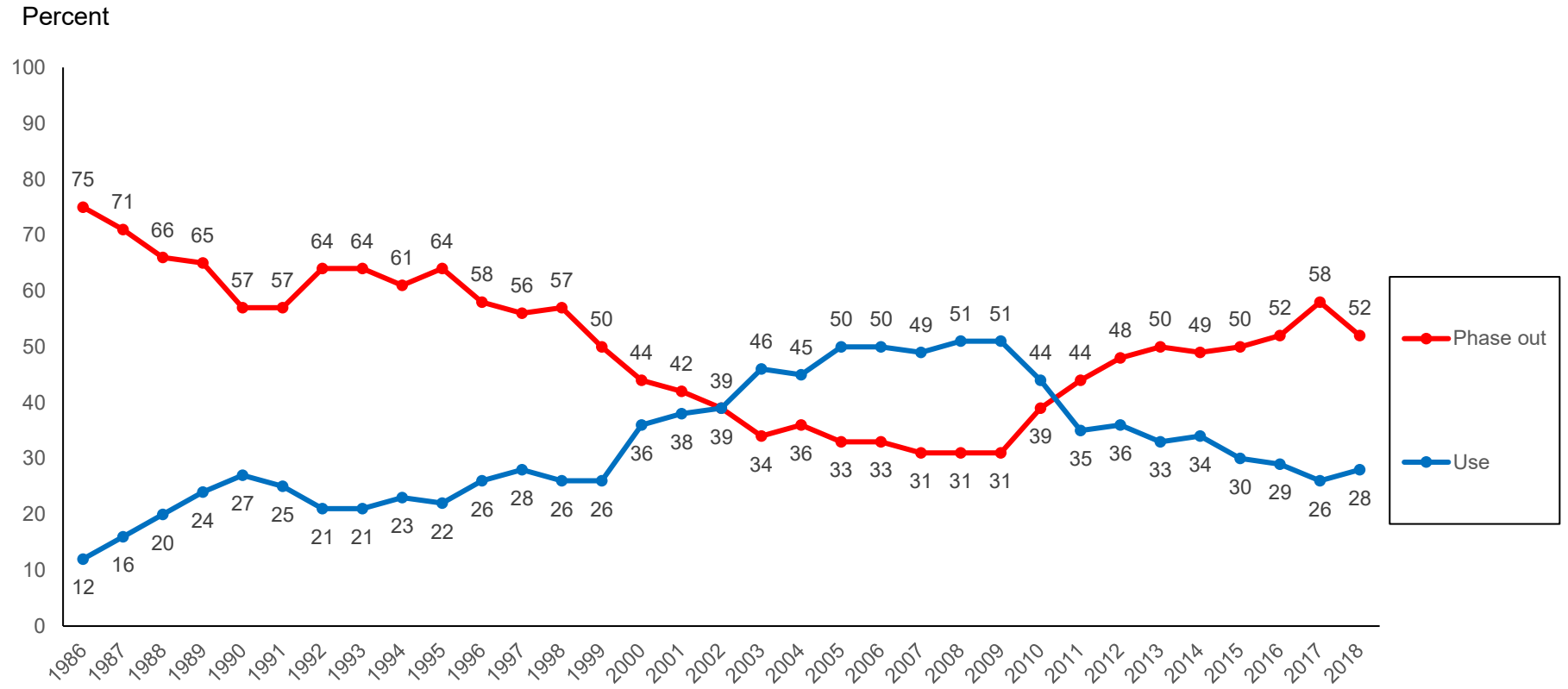
Source: Data from European Social Survey 2016, Round 8. PAWCER, November 2018.

Chapter 9

Swedish Opinion on Nuclear Power 1986 – 2018.

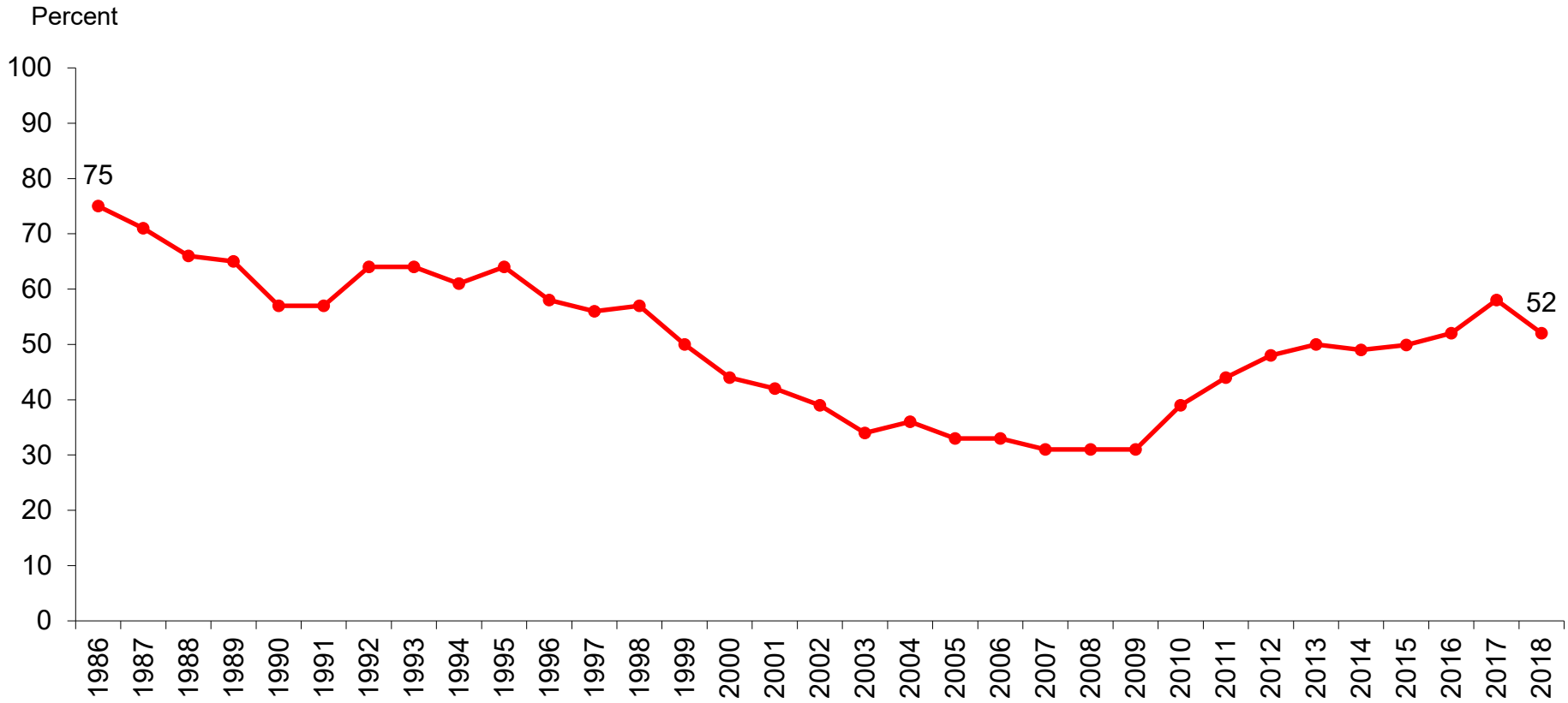
Sören Holmberg

Swedes on the Use of Nuclear Power as an Energy Source



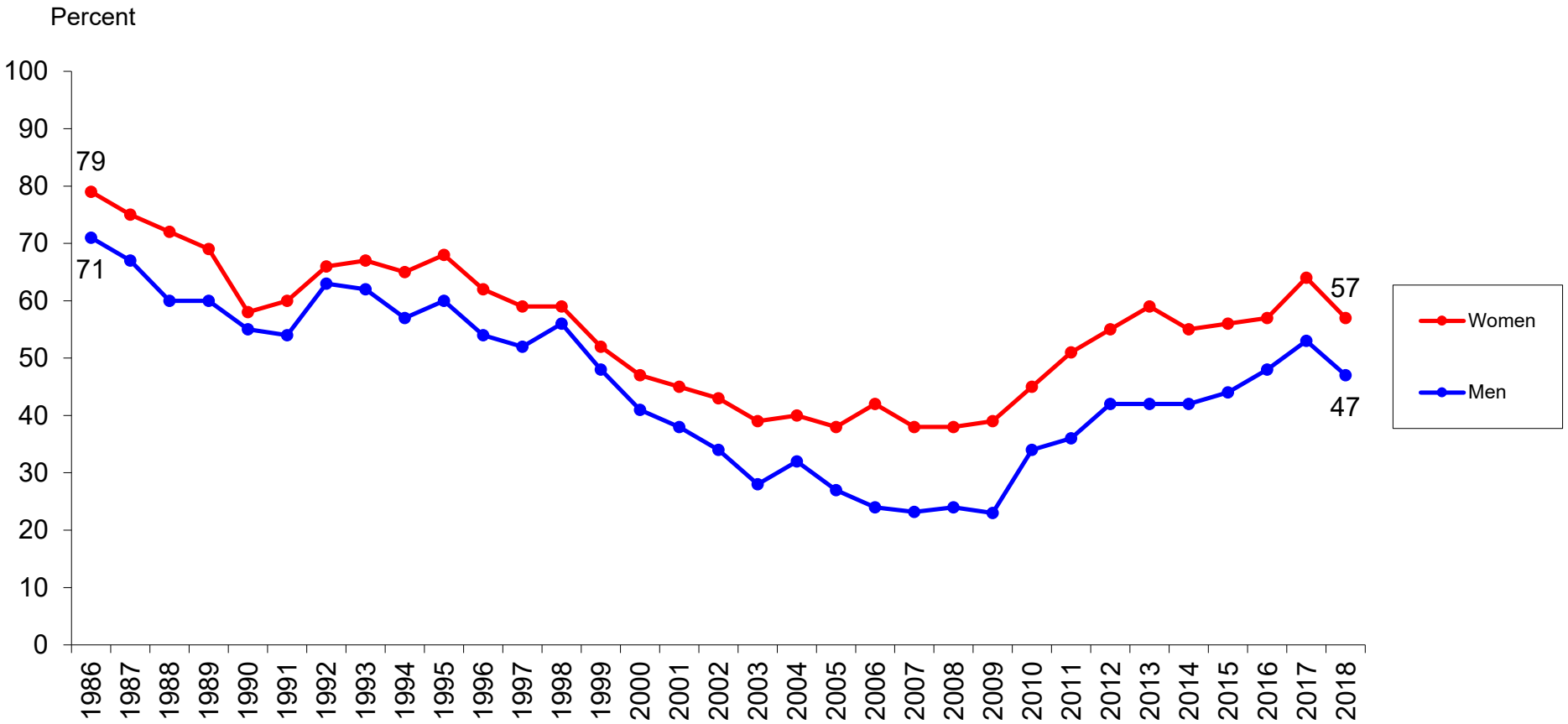
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden; Sample size 3 000 persons 16–85 years old; Mail questionnaires with an average response rate of 60 percent. The survey question asks about Swedes' opinion on the use/long term use of nuclear power as an energy source in Sweden. Response alternatives, including a "no opinion" alternative, are phrased as fairly concrete policy proposals and have varied some over the years (see Chapter 10). The number of substantial response alternatives was five up until 1996/97, but there after reduced to four. The words "use nuclear power" and "phase out nuclear power" has all the time been used in the response phrasings, making it possible to distinguish between people in favour of using nuclear power versus people in favour of phasing out nuclear power. Changes in question wording occurred between the years 1986-1987 (to question A), 1997-1998 (from question A to B), 1999-2000 (from question B to C), 2004-2005 (from question C to D) and 2009-2010 (from question D to E). See the Chapter 10 for further details. In the figure, the old five substantial response alternative- question is used up until 1997 and after that the new four substantial response alternative-question starting in 1998. 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.
Comment: All respondents are included in the percent calculations.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Percent Swedes in Favour of Phasing Out Nuclear Power



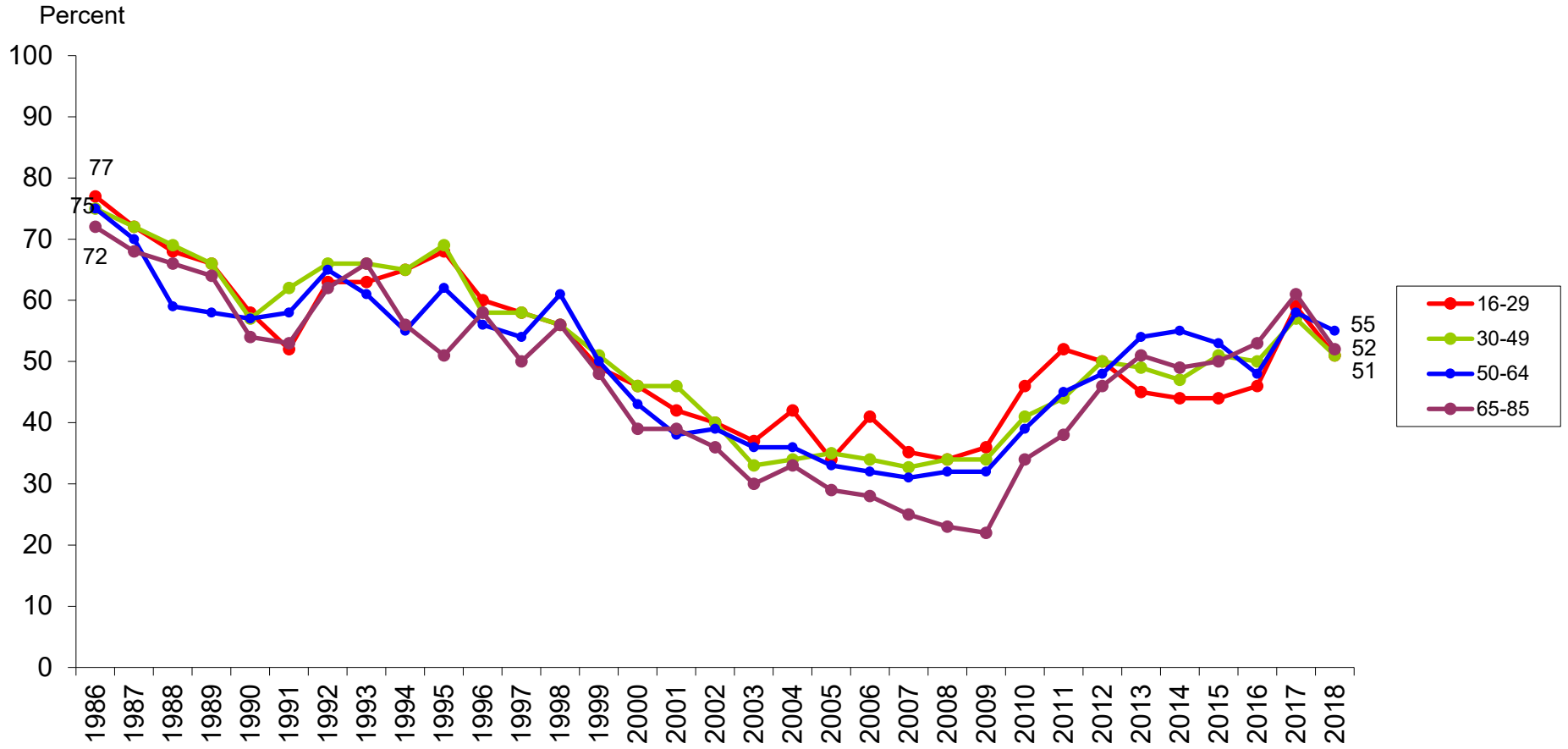
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: All respondents are included in the percent calculations.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Percent in Favour of Phasing Out Nuclear Power among Swedish Women and Men



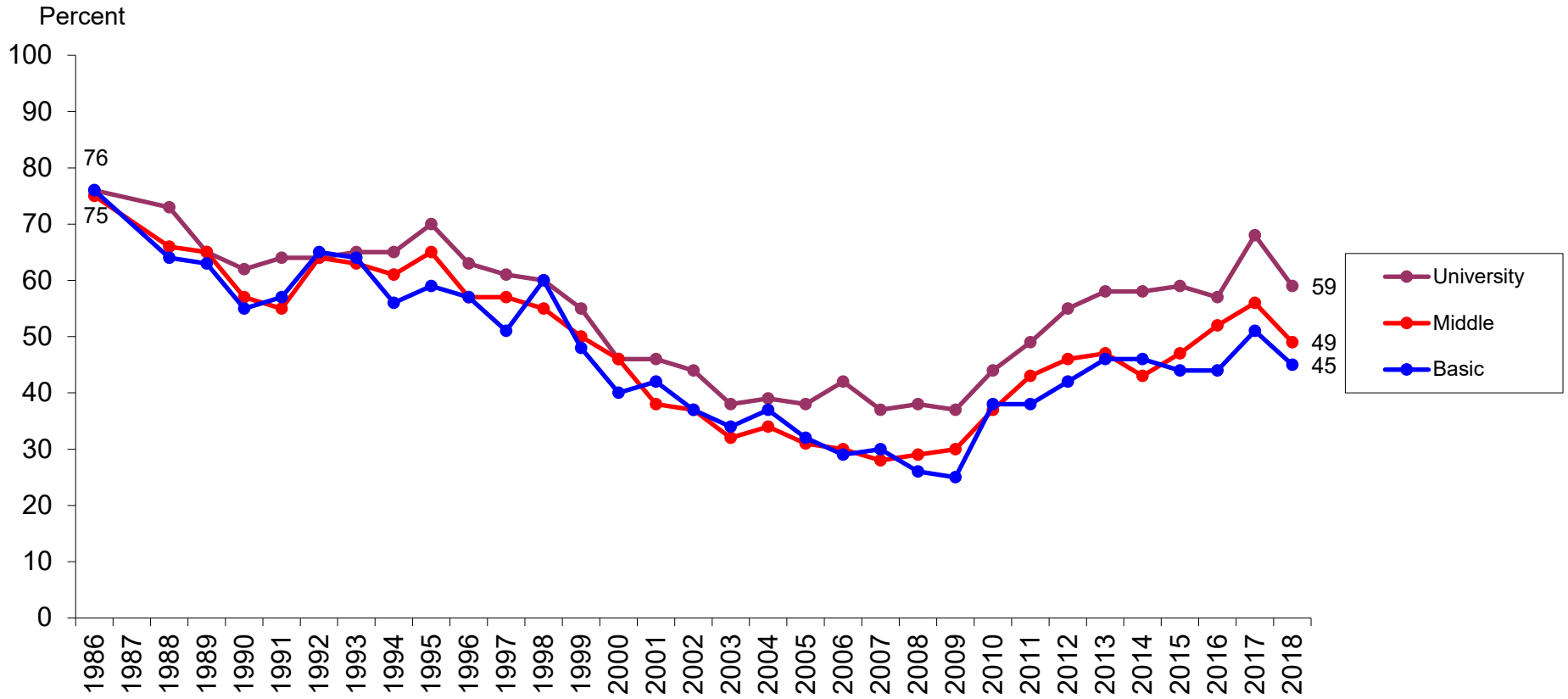
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: All respondents are included in the percent calculations.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Percent in Favour of Phasing Out Nuclear Power among Swedes in Different Age Groups



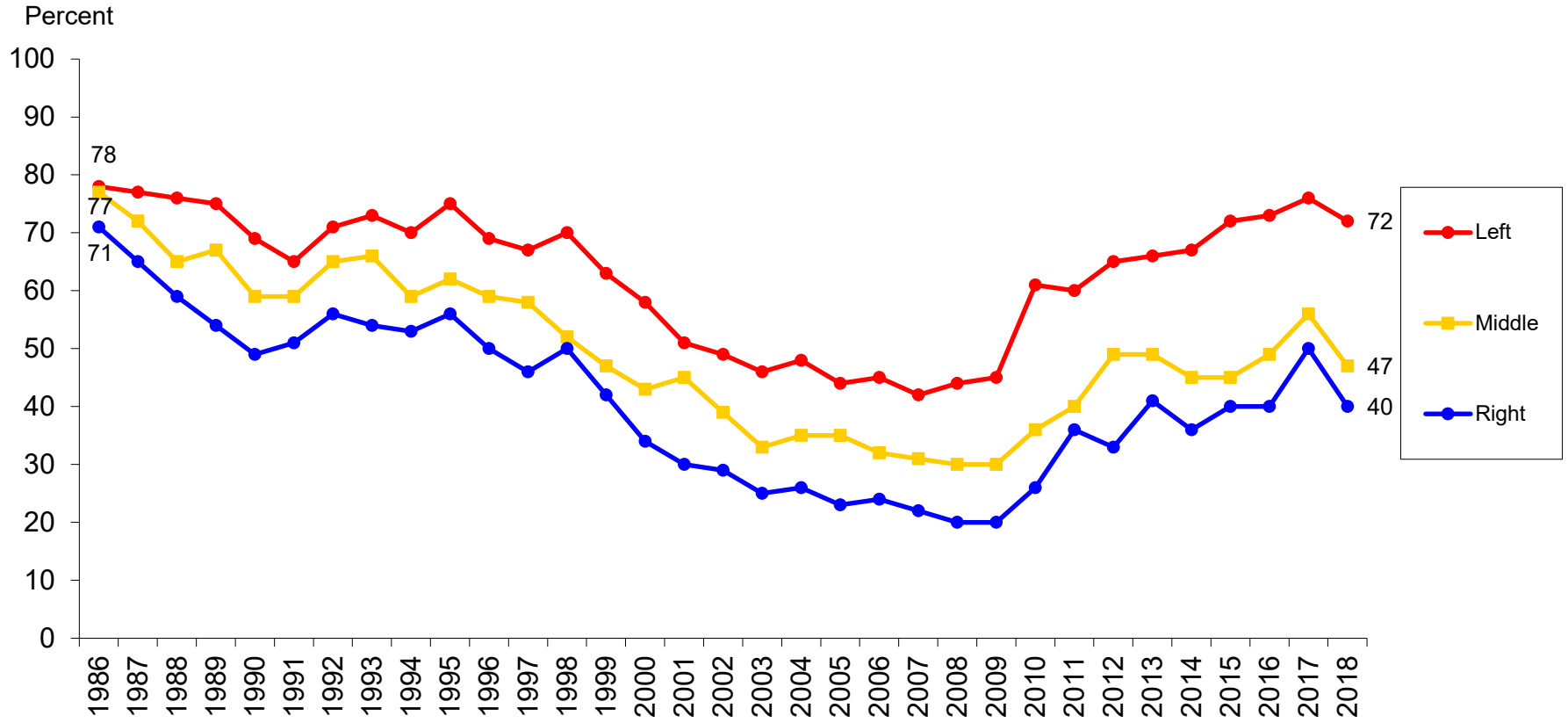
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: All respondents are included in the percent calculations.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Percent in Favour of Phasing Nuclear Power among Swedes in Different Educational Groups



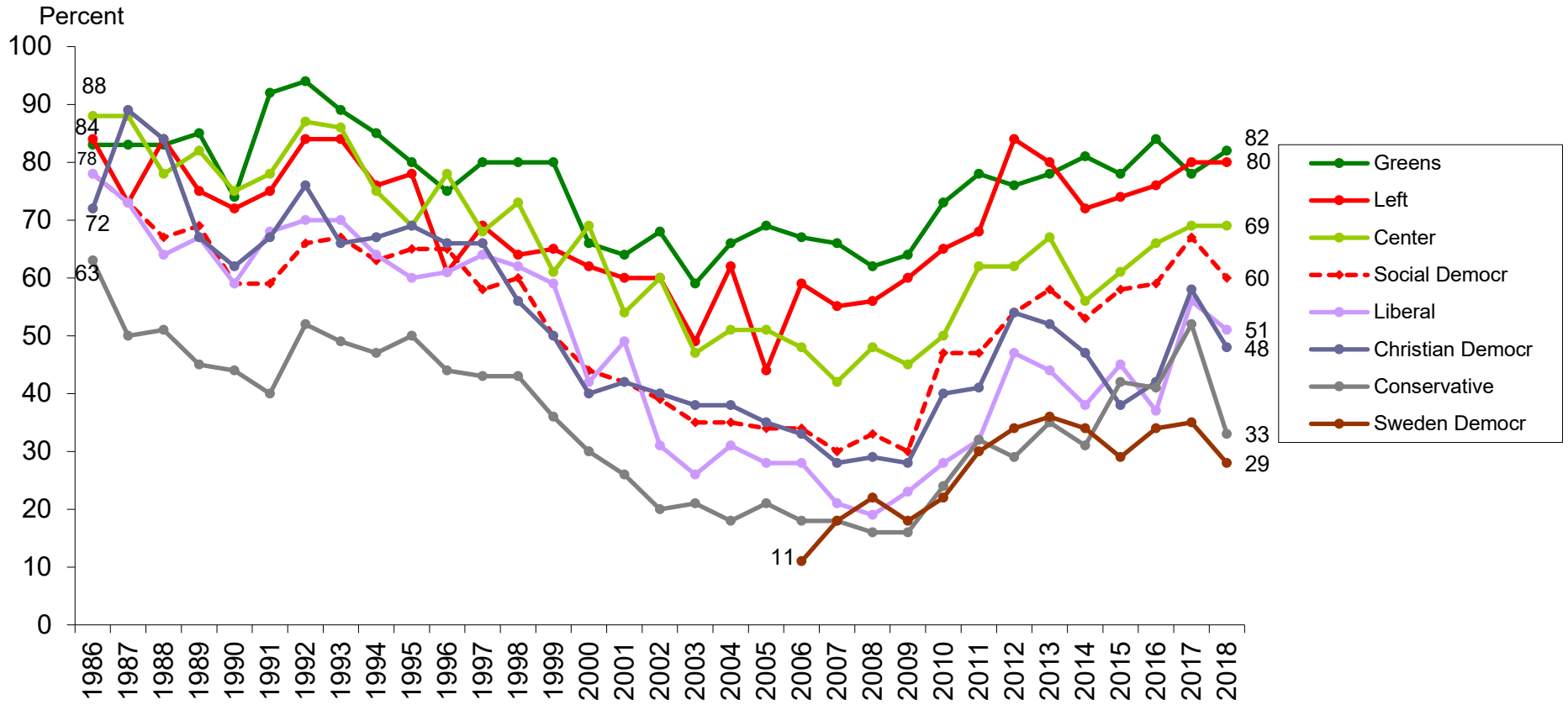
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: All respondents are included in the percent calculations.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Percent in Favour of Phasing Out Nuclear Power among Swedes with Different Ideological Self-Placements



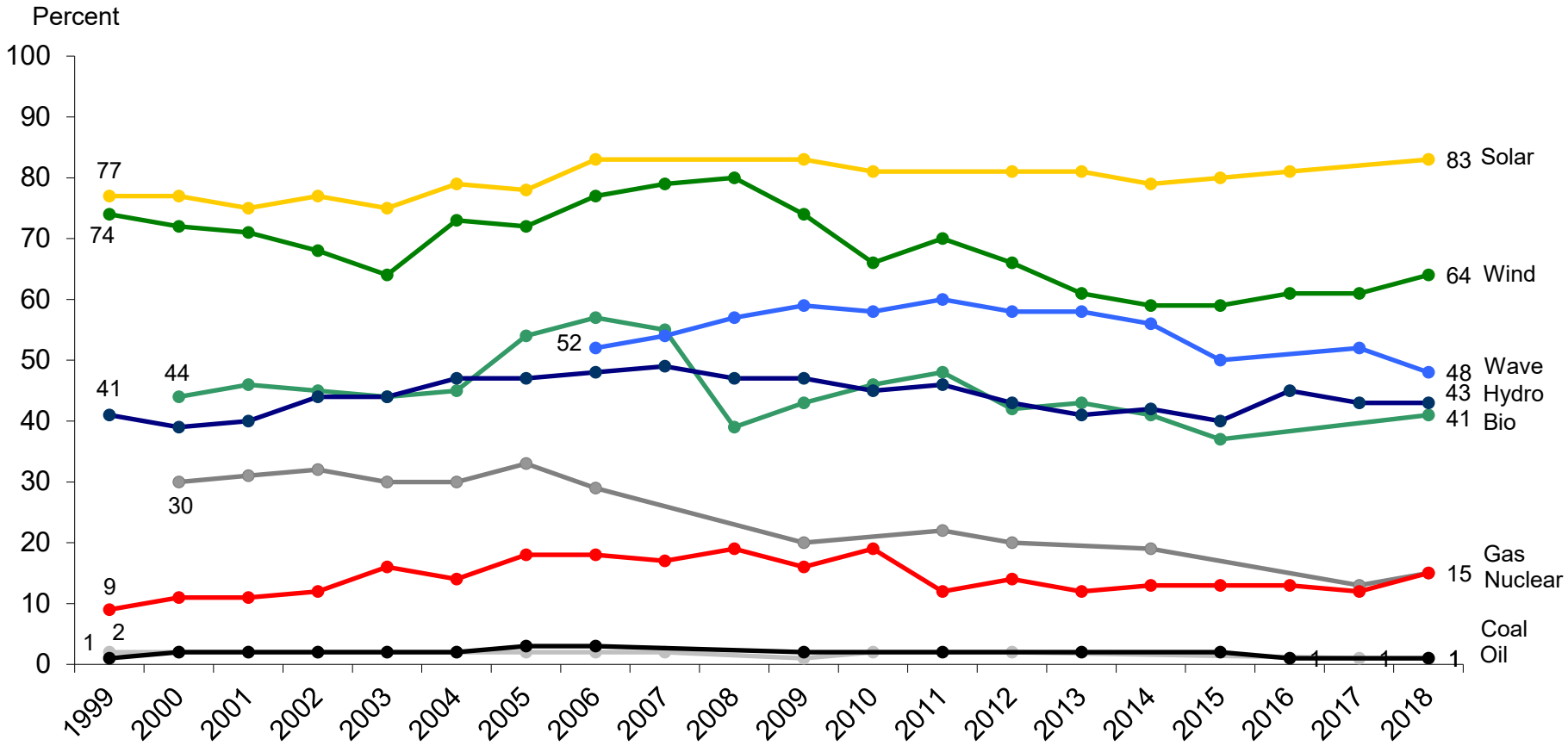
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: All respondents are included in the percent calculations.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Percent in Favour of Phasing Out Nuclear Power among Swedes with Different Party Sympathies



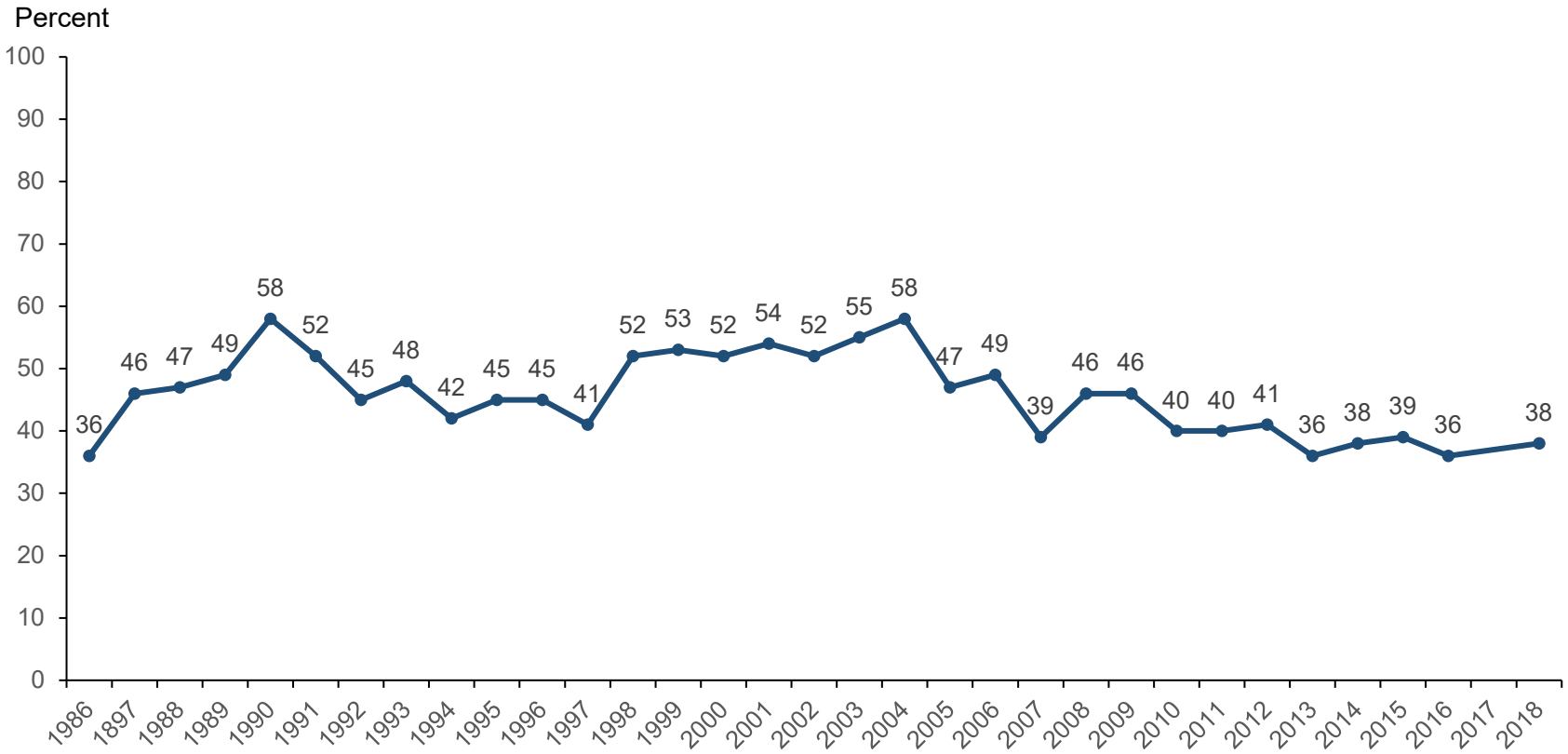
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: All respondents are included in the percent calculations. The results for Feminist Initiative are 82 percent in 2014, 77 percent in 2015, 82 percent in 2016, 85 percent 2017 and 78 percent 2018.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Percent Swedes Who Think Sweden - More than Today - Should Go For Different Energy Sources



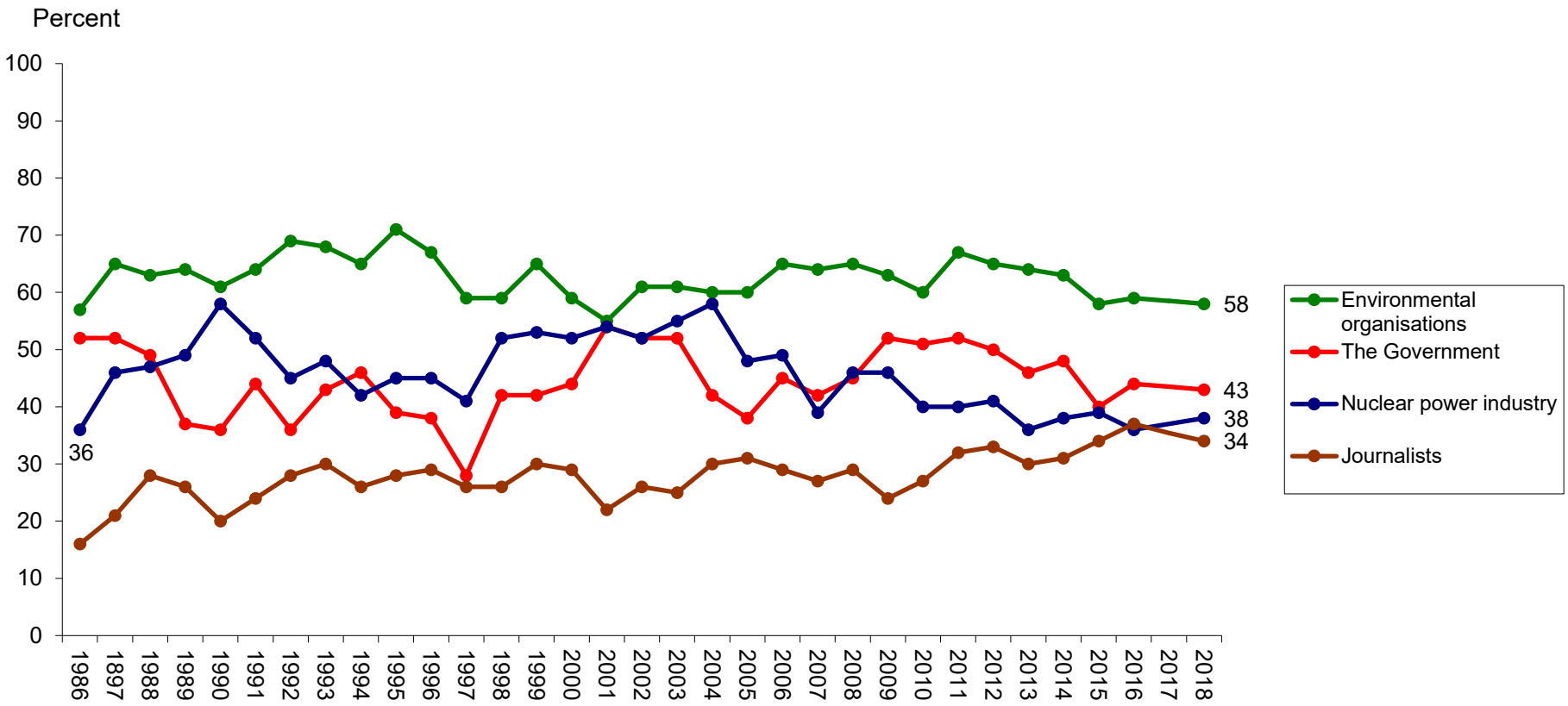
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: See question H in Appendix. Percentages are calculated among respondents who answered the question for the different energy sources. The results for biofuel and gas in 1999 were 29 and 21 percent, respectively. Due to a suspected context effect in the questionnaire, the results are not presented in the figure.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Swedish Trust in Information about Energy and Nuclear Power from the Nuclear Power Industry



Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Question: "To what extent do you trust information about energy and nuclear power provided by the following groups?" Four response alternatives: "very much; fairly much; fairly little; very little". The results show percent people answering very or fairly much when asked about the Nuclear Power Industry. The percentage base is defined as persons who answered the question. The question was not included in the SOM-study 2017.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. All data processed by Per Hedberg.

Swedish Trust in Information about Energy and Nuclear Power Provided by Different Groups



Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Question: "To what extent do you trust information about energy and nuclear power provided by the following groups?" Four response alternatives: "very much; fairly much; fairly little; very little". The results show percentage of people answering very or fairly much. The percentage base is defined as persons who answered the different trust questions. The question was not included in the SOM-study 2017.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Chapter 10

Measuring Opinion on Nuclear Power

The SOM Institute's Question Wordings and Results 1986-2018

Per Hedberg

Swedish Opinion on Nuclear Power 1986-2018

Question A: *After the 1980 Referendum, Parliament decided that nuclear power should be phased out in Sweden by 2010. What is your opinion on the use of nuclear power in Sweden?*

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Stop nuclear power immediately	15	8	7	6	5	5	5	7	6	5	5	4
Phase out nuclear power faster than by 2010	27	18	16	12	7	10	12	12	10	8	6	6
Phase out nuclear power by 2010	28	27	21	23	17	20	24	24	24	23	20	16
Phase out nuclear power but not as fast as by 2010	17	20	24	25	29	24	25	23	23	30	31	32
Use nuclear power, do not phase out	13	17	21	25	28	26	21	21	24	23	27	30
No definite opinion	--	10	11	9	14	15	13	13	13	11	11	12
Sum percent	100	100	100	100	100	100	100	100	100	100	100	100
Number of respondents	1624	1625	1594	1535	1535	1520	1858	1827	1657	1716	1681	1678
Percent no answer	3	3	3	3	3	3	2	2	3	3	5	4
Number of respondents with no answer	54	47	49	43	47	53	31	30	45	61	98	76

Question A: *After the 1980 Referendum, Parliament decided that nuclear power should be phased out in Sweden by 2010. What is your opinion on the use of nuclear power in Sweden?*

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Stop nuclear power immediately	15	8	6	6	5	5	5	6	6	5	5	4
Phase out nuclear power faster than by 2010	26	17	15	12	7	9	12	12	10	8	5	6
Phase out nuclear power by 2010	27	27	21	23	17	19	23	23	23	22	19	16
Phase out nuclear power but not as fast as by 2010	16	19	24	24	28	24	24	23	22	29	29	30
Use nuclear power, do not phase out	13	16	20	24	27	25	21	21	23	22	26	28
No definite opinion/ no answer	3	13	14	11	16	18	15	15	16	14	16	16
Sum percent	100	100	100	100	100	100	100	100	100	100	100	100
Number of respondents	1624	1673	1643	1578	1582	1520	1889	1857	1702	1777	1779	1764

Question B: *What is your opinion on the long term use of nuclear power as an energy source in Sweden?*

	1996	1997	1998	1999
Phase out nuclear power by 2010	24	20	17	17
Phase out nuclear power but use the 12 reactors we have until they are worn out	32	34	42	37
Use nuclear power and renew the 12 reactors we have when they are worn out, making sure that we have 12 operational reactors in the future	19	21	21	21
Use nuclear power and go for more than 12 reactors in the future	6	7	5	7
No definite opinion	19	18	15	18
Sum percent	100	100	100	100
Number of respondents	1682	1649	1692	1587
Percent no answer	5	6	3	7
Number of respondents with no answer	97	105	48	116

Question B: *What is your opinion on the long term use of nuclear power as an energy source in Sweden?*

	1996	1997	1998	1999
Phase out nuclear power by 2010	22	19	17	16
Phase out nuclear power but use the 12 reactors we have until they are worn out	31	32	40	34
Use nuclear power and renew the 12 reactors we have when they are worn out, making sure that we have 12 operational reactors in the future	18	19	21	19
Use nuclear power and go for more than 12 reactors in the future	6	7	5	7
No definite opinion/no answer	23	23	17	24
Sum percent	100	100	100	100
Number of respondents	1779	1754	1740	1703

Question C: *What is your opinion on the long term use of nuclear power as an energy source in Sweden?*

	2000	2001	2002	2003	2004
Phase out nuclear power by 2010	15	14	13	12	12
Phase out nuclear power but use the reactors we have until they are worn out	31	30	28	23	26
Use nuclear power and renew the reactors we have when they are worn out, but do not build additional reactors	27	31	30	32	32
Use nuclear power and go for additional reactors in the future	11	10	11	16	16
No definite opinion	16	15	18	17	14
Sum percent	100	100	100	100	100
Number of respondents	1616	1625	1689	1746	1680
Percent no answer	5	7	5	4	5
Number of respondents with no answer	88	114	88	70	94

Question C: *What is your opinion on the long term use of nuclear power as an energy source in Sweden?*

	2000	2001	2002	2003	2004
Phase out nuclear power by 2010	15	14	12	12	11
Phase out nuclear power but use the reactors we have until they are worn out	29	28	27	22	25
Use nuclear power and renew the reactors we have when they are worn out, but do not build additional reactors	26	29	28	31	30
Use nuclear power and go for additional reactors in the future	10	9	11	15	15
No definite opinion/no answer	20	20	22	20	19
Sum percent	100	100	100	100	100
Number of respondents	1704	1739	1777	1818	1774

Question D: *What is your opinion on the long term use of nuclear power as an energy source in Sweden?*

	2005	2006	2007	2008	2009	2010	2011
Phase out nuclear power very soon	10	10	9	9	9	9	11
Phase out nuclear power but use the reactors we have until they are worn out	25	24	24	23	23	23	26
Use nuclear power and renew the reactors we have when they are worn out, but do not build additional reactors	35	34	32	31	33	33	33
Use nuclear power and go for additional reactors in the future	17	17	19	21	19	21	15
No definite opinion	13	15	16	16	16	14	15
Sum percent	100	100	100	100	100	100	100
Number of respondents	1655	1591	3290	3180	4824	1584	1479
Percent no answer	4	2	4	2	2	4	3
Number of respondents with no answer	69	38	145	79	102	68	52

Question D: *What is your opinion on the long term use of nuclear power as an energy source in Sweden?*

	2005	2006	2007	2008	2009	2010	2011
Phase out nuclear power very soon	9	10	8	9	9	8	10
Phase out nuclear power but use the reactors we have until they are worn out	24	23	23	22	22	22	26
Use nuclear power and renew the reactors we have when they are worn out, but do not build additional reactors	33	33	31	30	32	32	32
Use nuclear power and go for additional reactors in the future	17	17	18	21	19	20	14
No definite opinion/no answer	17	17	20	18	18	18	18
Sum percent	100	100	100	100	100	100	100
Number of respodents	1724	1629	3435	3259	4926	1652	1531

Question E: *What is your opinion on the long term use of nuclear power as an energy source in Sweden?*

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Phase out nuclear power very soon	8	11	12	12	11	13	12	15	12
Phase out nuclear power, but make use of the 10 reactors we have until they are worn out	32	35	39	41	39	40	42	45	41
Use nuclear power and replace the present reactors with a maximum of 10 new reactors	28	25	26	24	26	22	20	17	18
Use nuclear power and build more reactors than the present 10 in the future	17	12	11	10	9	8	10	9	11
No opinion	15	17	12	13	15	17	16	14	18
Sum percent	100	100	100	100	100	100	100	100	100
Number of respondents	1608	1528	1464	1572	1658	1666	1605	1779	1752
Percent no answer	3	4	4	4	3	4	3	3	2
Number of respondents with no answer	45	69	60	72	51	73	45	48	45

Question E: *What is your opinion on the long term use of nuclear power as an energy source in Sweden?*

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Phase out nuclear power very soon	8	10	11	11	11	12	12	14	12
Phase out nuclear power, but make use of the 10 reactors we have until they are worn out	31	34	37	39	38	38	40	44	40
Use nuclear power and replace the present reactors with a maximum of 10 new reactors	27	24	25	23	25	22	19	17	17
Use nuclear power and build more reactors than the present 10 in the future	17	11	11	10	9	8	10	8	11
No opinion/no answer	17	21	16	17	17	20	19	17	20
Sum percent	100	100	100	100	100	100	100	100	100
Number of respondents	1653	1597	1524	1644	1709	1739	1650	1827	1797

Question F: *Keep nuclear power, even after 2010*

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Very good proposal	11	17	23	27	34	24	20	19	20	24	26	--
Fairly good proposal	12	16	17	19	21	23	23	20	21	22	23	--
Neither good or bad	17	20	22	18	20	22	22	22	22	19	21	--
Fairly bad proposal	18	17	15	13	11	13	14	16	16	14	13	--
Very bad proposal	42	30	23	23	14	18	21	23	21	21	17	--
Sum percent	100	100	100	100	100	100	100	100	100	100	100	--
Number of respondents	1562	1612	1567	1515	1512	1498	1821	1784	1641	1715	1687	--
Percent no answer	4	4	5	4	4	5	4	4	4	3	5	--
Number of respondents with no answer	62	60	76	63	70	75	68	73	61	62	92	--

Question F: *Keep nuclear power, even after 2010*

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Very good proposal	11	16	22	26	33	22	19	18	19	23	25	--
Fairly good proposal	12	15	16	18	21	22	22	20	21	21	22	--
Neither good or bad	16	19	21	18	19	21	21	21	21	19	20	--
Fairly bad proposal	17	17	14	12	10	13	14	15	15	13	12	--
Very bad proposal	40	29	22	22	13	17	20	22	20	20	16	--
No answer	4	4	5	4	4	5	4	4	4	4	5	
Sum percent	100	100	100	100	100	100	100	100	100	100	100	--
Number of respondents	1624	1672	1643	1578	1582	1573	1889	1857	1702	1777	1779	--

Question G: *Long term, Sweden should phase out nuclear power*

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Very good proposal	23	22	23	20	18	15	15	14	16	18	17	20	20	21	19	23	20	21	21	25	22
Fairly good proposal	26	24	23	22	24	20	20	21	23	23	24	19	19	22	25	23	24	23	24	24	24
Neither good or bad	21	23	22	25	25	24	24	21	25	26	21	26	28	29	29	26	26	25	26	25	21
Fairly bad proposal	17	17	19	18	18	21	21	23	19	18	23	19	17	17	16	16	18	16	17	15	18
Very bad proposal	13	14	13	15	15	20	20	21	17	16	15	16	16	11	11	12	12	15	12	11	15
Sum percent	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Number of respondents	3446	3341	1748	3428	3396	3487	3398	1610	1541	1576	1540	1515	1587	1463	1459	3239	3284	1627	3049	3275	1725
Percent no answer	3	4	5	6	6	5	6	7	5	5	4	4	4	4	4	3	3	6	6	10	4
Number of respondents with no answer	115	70	94	210	210	188	214	114	88	90	58	67	65	68	65	111	116	112	192	380	72

Question G: *Long term, Sweden should phase out nuclear power*

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Very good proposal	22	21	22	19	17	14	14	13	15	17	16	19	20	20	18	23	19	20	19	22	21
Fairly good proposal	25	23	22	21	23	19	19	20	22	22	24	18	18	21	24	22	23	21	23	22	23
Neither good or bad	21	22	21	23	23	23	23	20	23	24	20	25	27	28	28	25	25	24	25	22	21
Fairly bad proposal	16	16	18	17	17	20	20	21	18	17	22	18	16	16	15	16	18	15	16	14	17
Very bad proposal	13	13	12	14	14	19	18	19	16	15	15	16	15	10	11	11	12	14	11	10	14
No answer	3	5	5	6	6	5	6	7	5	5	4	4	4	5	4	3	3	6	6	10	4
Sum percent	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Number of respondents	3561	3503	1842	3638	3606	3675	3612	1724	1629	1666	1598	1582	1652	1531	1524	3350	3398	1739	3241	3655	1797

Question H: *During the upcoming 5-10 years, how much should we go for (nuclear power)?*

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
More than to-day	9	11	11	12	16	14	18	18	17	19	16	19	12	14	13	13	13	13	12	15
About as to-day	34	34	36	37	38	36	36	35	33	31	34	32	30	31	29	29	27	25	23	26
Less than to-day	26	30	29	29	24	27	24	25	28	26	26	27	29	30	29	29	28	27	30	27
Completely give up (nuclear power)	20	19	18	16	15	16	15	15	15	16	16	14	21	18	20	18	20	23	23	19
No opinion	11	6	6	6	7	7	7	7	7	8	8	8	8	7	9	11	12	12	12	13
Sum percent	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Number of respondents	1592	1573	1611	1624	1713	1634	1633	1544	1559	1517	1524	1568	1431	1437	1540	1603	1593	1541	1696	1708
Percent no answer	7	8	6	9	6	8	5	5	6	5	4	5	7	6	6	6	8	7	7	5
Number of respondents with no answer	111	131	101	153	103	140	91	85	107	81	58	84	100	87	104	103	146	109	131	89

Question H: *During the upcoming 5-10 years, how much should we go for (nuclear power)?*

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
More than to-day	9	10	10	11	15	13	17	17	16	18	15	18	12	13	12	12	12	13	11	14
About as to-day	31	31	33	34	36	33	34	33	31	29	33	30	28	29	27	28	25	23	21	24
Less than to-day	25	28	27	26	23	25	23	24	26	25	25	25	27	29	27	27	26	25	28	26
Completely give up (nuclear power)	19	18	17	15	14	15	14	14	14	15	15	14	19	17	19	16	18	21	22	18
No opinion/no answer	16	13	13	14	12	14	12	12	13	13	12	13	14	12	15	17	19	18	18	18
Sum percent	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Number of respondents	1703	1704	1739	1777	1816	1774	1774	1629	1666	1598	1582	1652	1531	1524	1644	1706	1739	1650	1827	1797

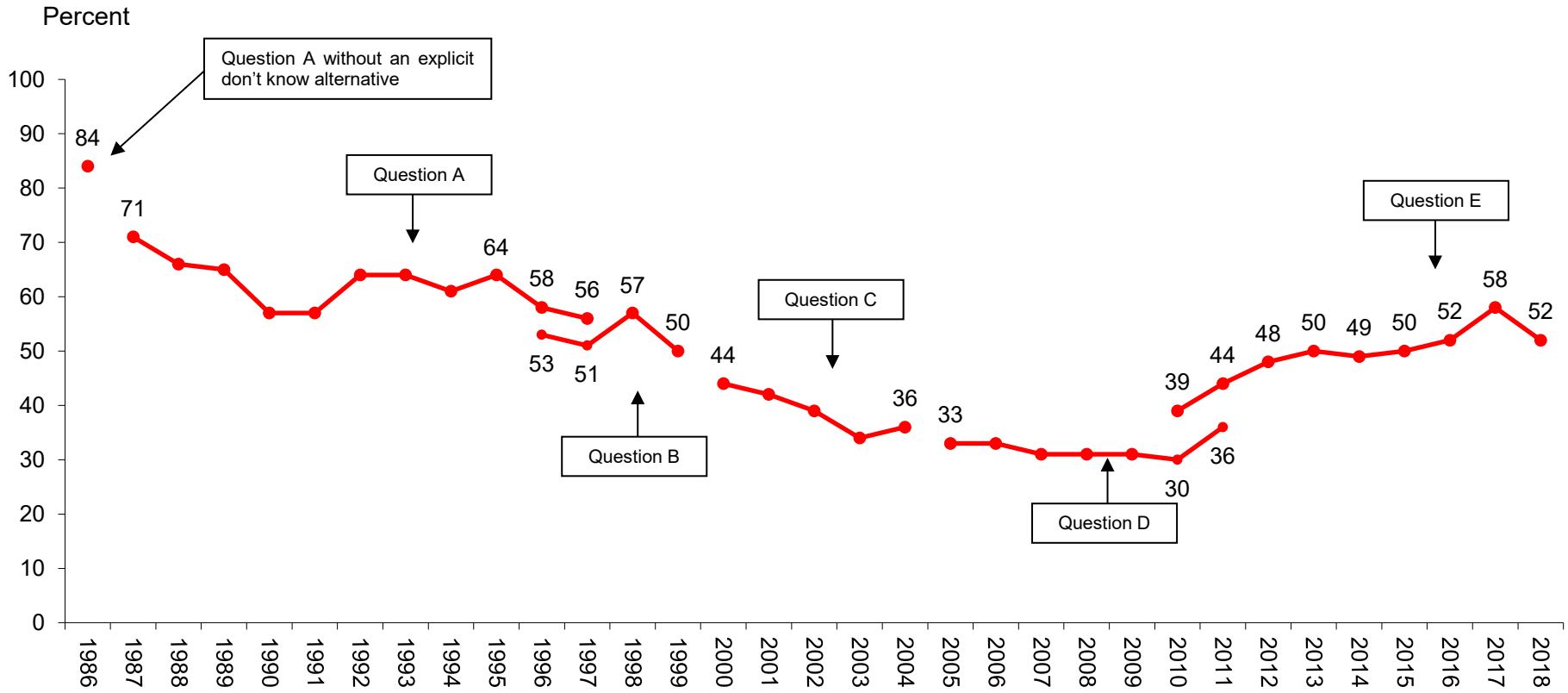
Question I: *In general, which opinion do you have on the following energy sources? /Nuclear power/*

	2012	2013	2014	2015	2016	2017	2018
Very positive	12	11	12	11	12	10	12
Fairly positive	22	21	19	19	18	17	19
Neither positive or negative	24	20	24	23	21	21	21
Fairly negative	20	22	21	19	20	23	20
Very negative	18	20	17	21	21	21	19
No opinion	4	6	7	7	8	8	9
Sum percent	100	100	100	100	100	100	100
Number of respondents	1452	1560	1634	1633	1575	1749	1741
Positive	34	32	31	30	30	27	31
Negative	38	42	38	40	41	44	39
Difference positive minus negative	-4	-10	-7	-10	-11	-17	-8
Percent no answer	5	5	4	6	5	4	3
Number of respondents with no answer	72	84	75	106	75	78	56

Question I: *In general, which opinion do you have on the following energy sources? /Nuclear power/*

	2012	2013	2014	2015	2016	2017	2018
Very positive	11	10	11	11	11	10	11
Fairly positive	21	20	19	17	18	16	19
Neither positive or negative	22	19	23	22	20	20	20
Fairly negative	19	21	20	18	19	21	19
Very negative	18	19	16	19	20	21	19
No opinion/no answer	9	11	11	13	12	12	12
Sum percent	100	100	100	100	100	100	100
Number of respondents	1524	1644	1709	1739	1650	1827	1797
Positive	32	30	30	28	29	26	30
Negative	37	40	36	37	39	42	38
Difference positive minus negative	-5	-10	-6	-9	-10	-16	-8

Percent Swedes in Favour of Phasing Out Nuclear Power



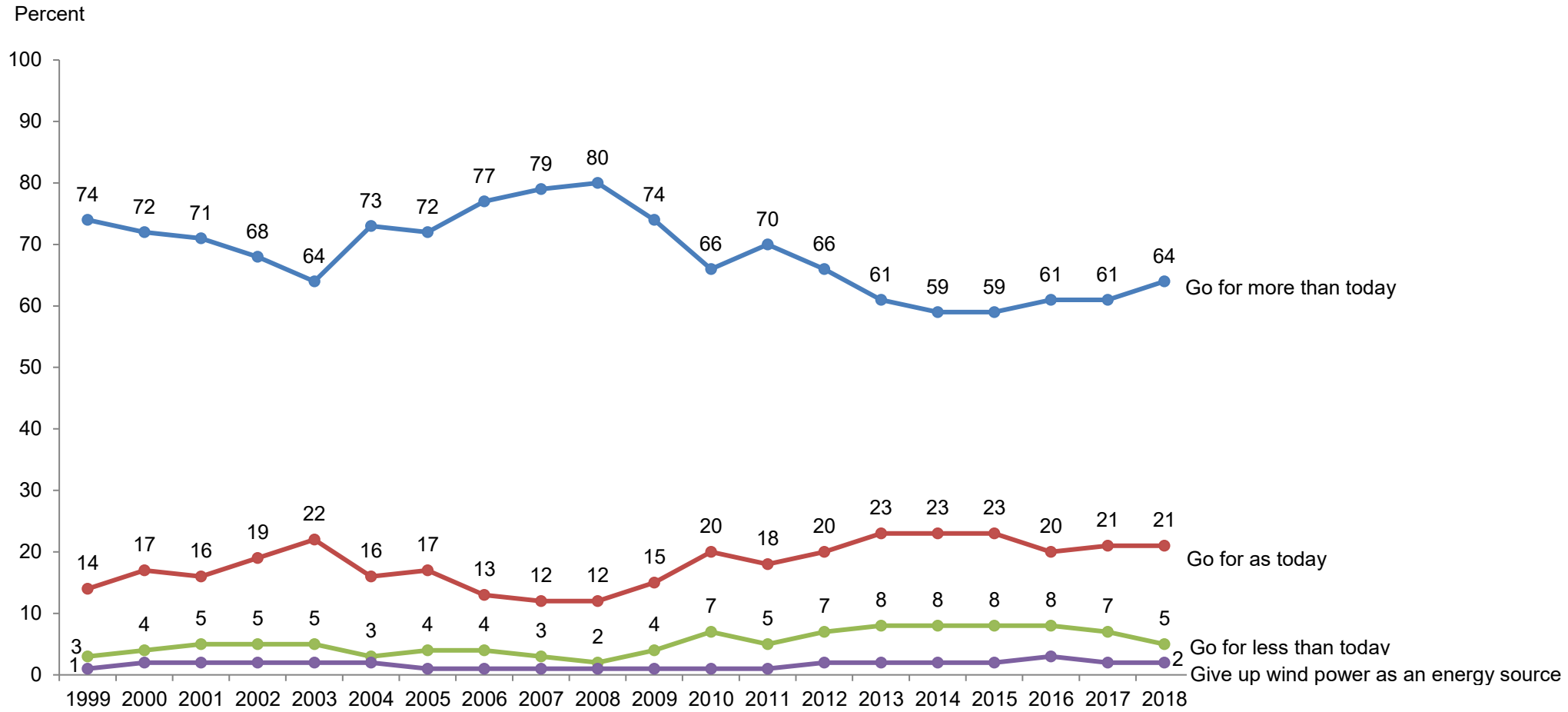
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: All respondents are included in the percent calculations. For question wording see the Appendix. Changes in question wording have been done in 1987 (in question A; in 1986 the question did not have an explicit don't know alternative), in 1996-98 from question A to B, in 2000 from question B to C, in 2005 from question C to D, and in 2010-11 from question D to E.
Principal investigator: Sören Holmberg, phone +4631 786 1227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Chapter 11

Swedish Opinion on Wind Power 1999 – 2018.

Per Hedberg

Percent in Favour of Go for More or Less Wind Power than Today among all Swedes



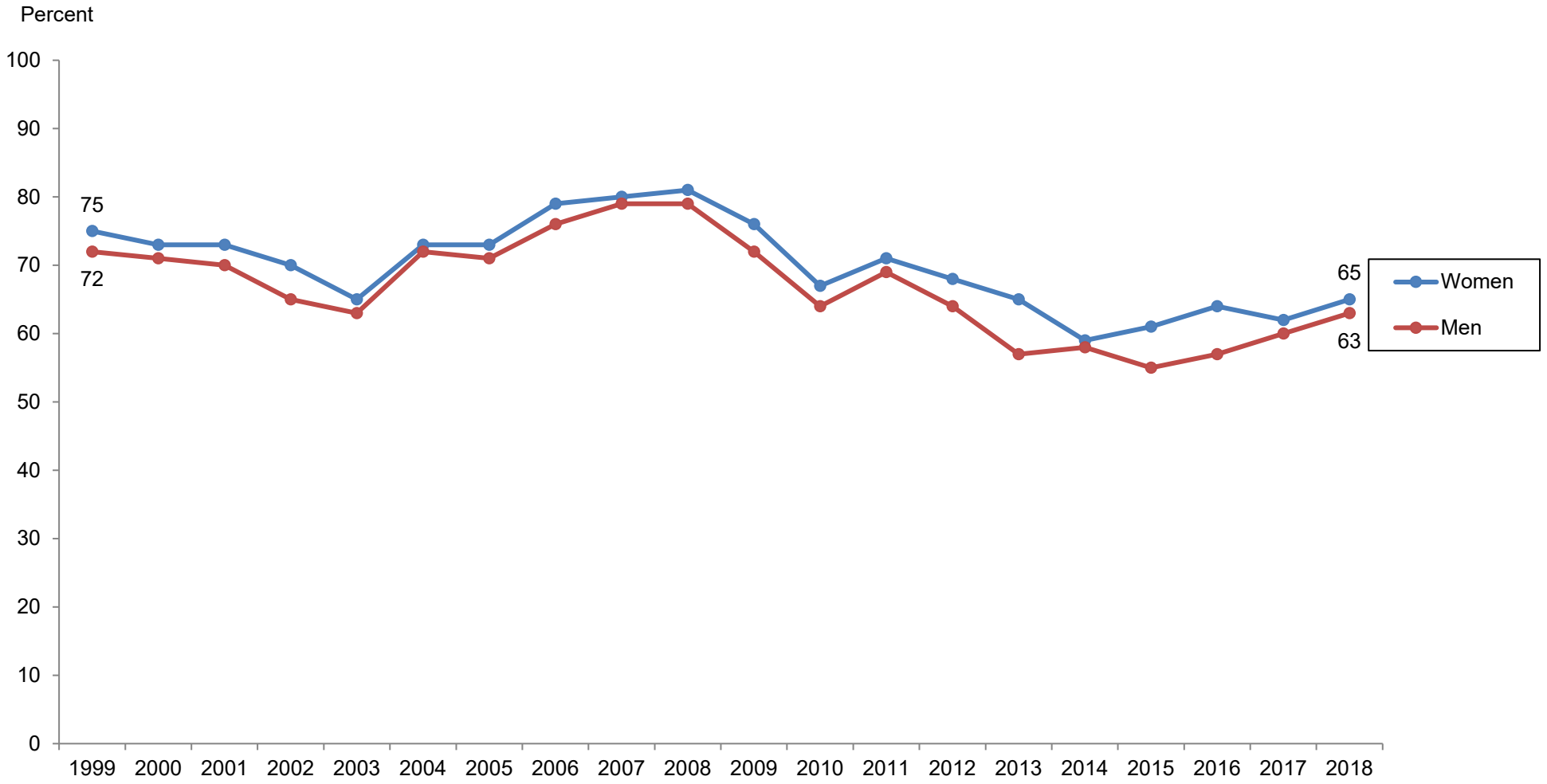
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden; Sample size 3 400 persons 16–85 years old; Mail questionnaires with an average response rate of 60 percent. The response alternatives also include a "no opinion" alternative, which have varied from 5-8 percent over the years (2018, 8 percent).

Question: "During the upcoming 5-10 years, how much should we go for wind power?" Five response alternatives: "go for more than today", "go for as today", "go for less than today", "give up wind power as an energy source" and "no opinion".

Comment: No answers are not included in the percent calculations.

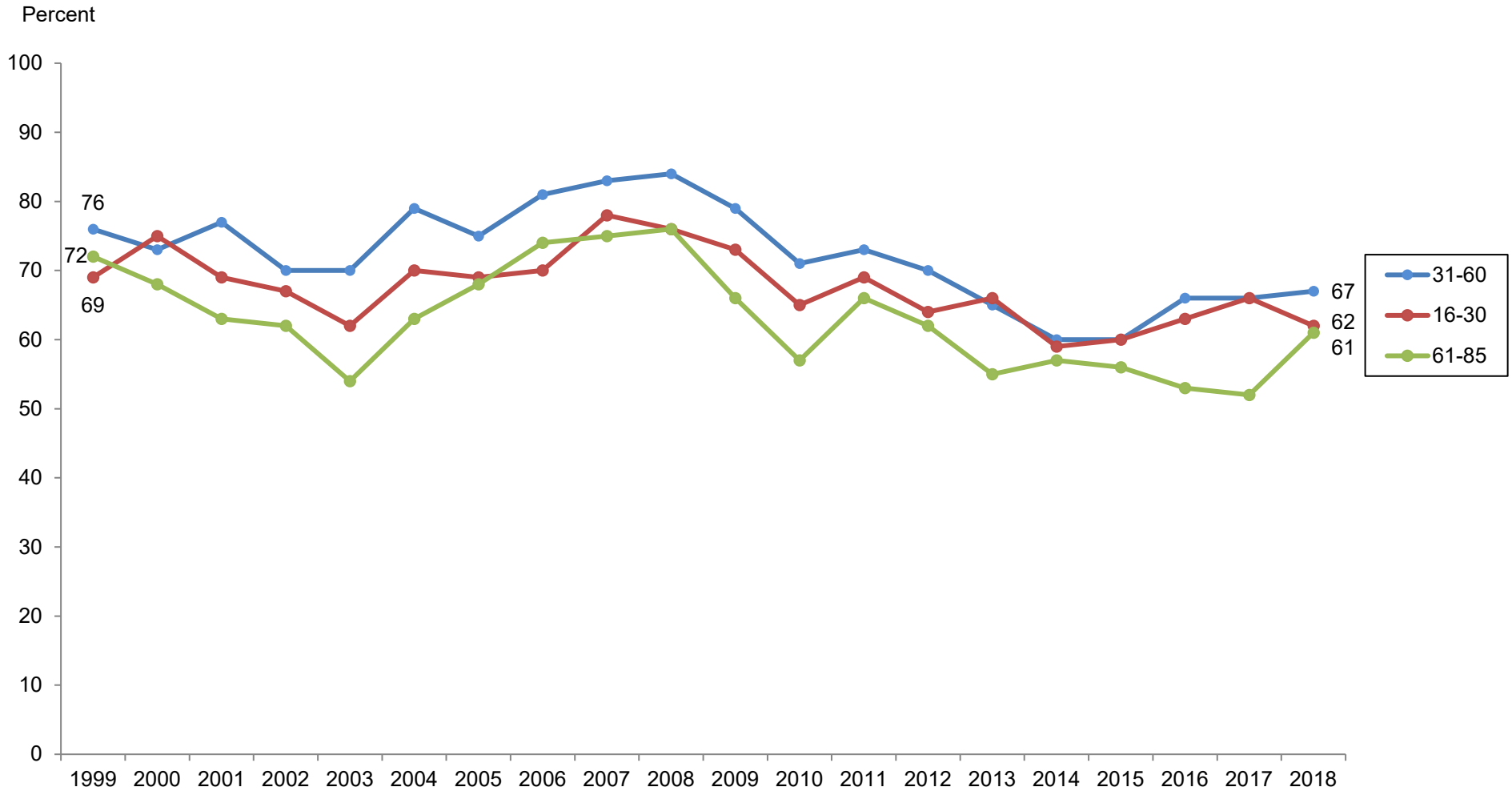
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se.

Percent in Favour of Go For More Wind Power than Today Among Swedish Women and Men



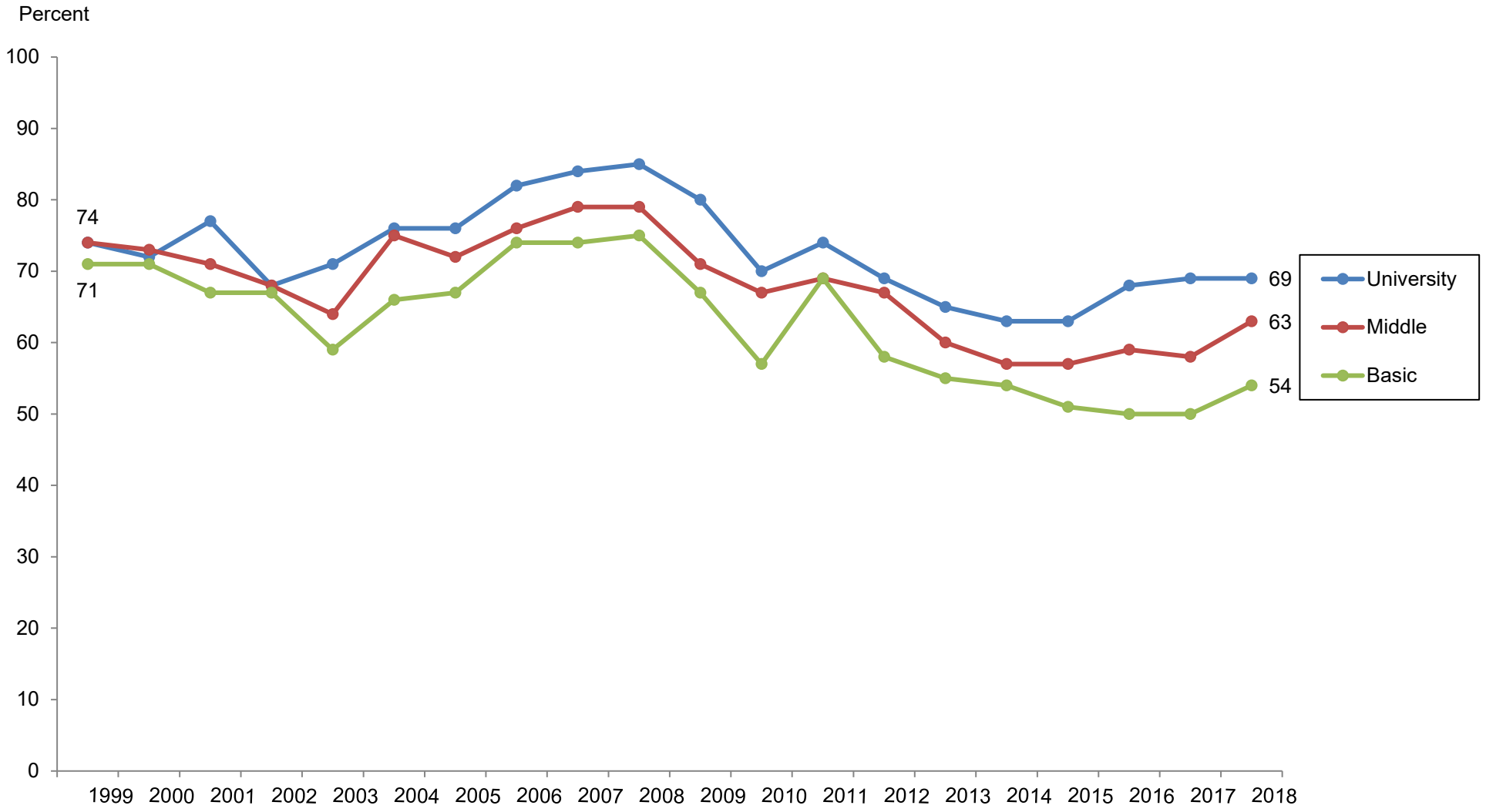
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: No answers are not included in the percent calculations.
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se.

Percent in Favour of Go For More Wind Power than Today Among Swedes in Different Age Groups



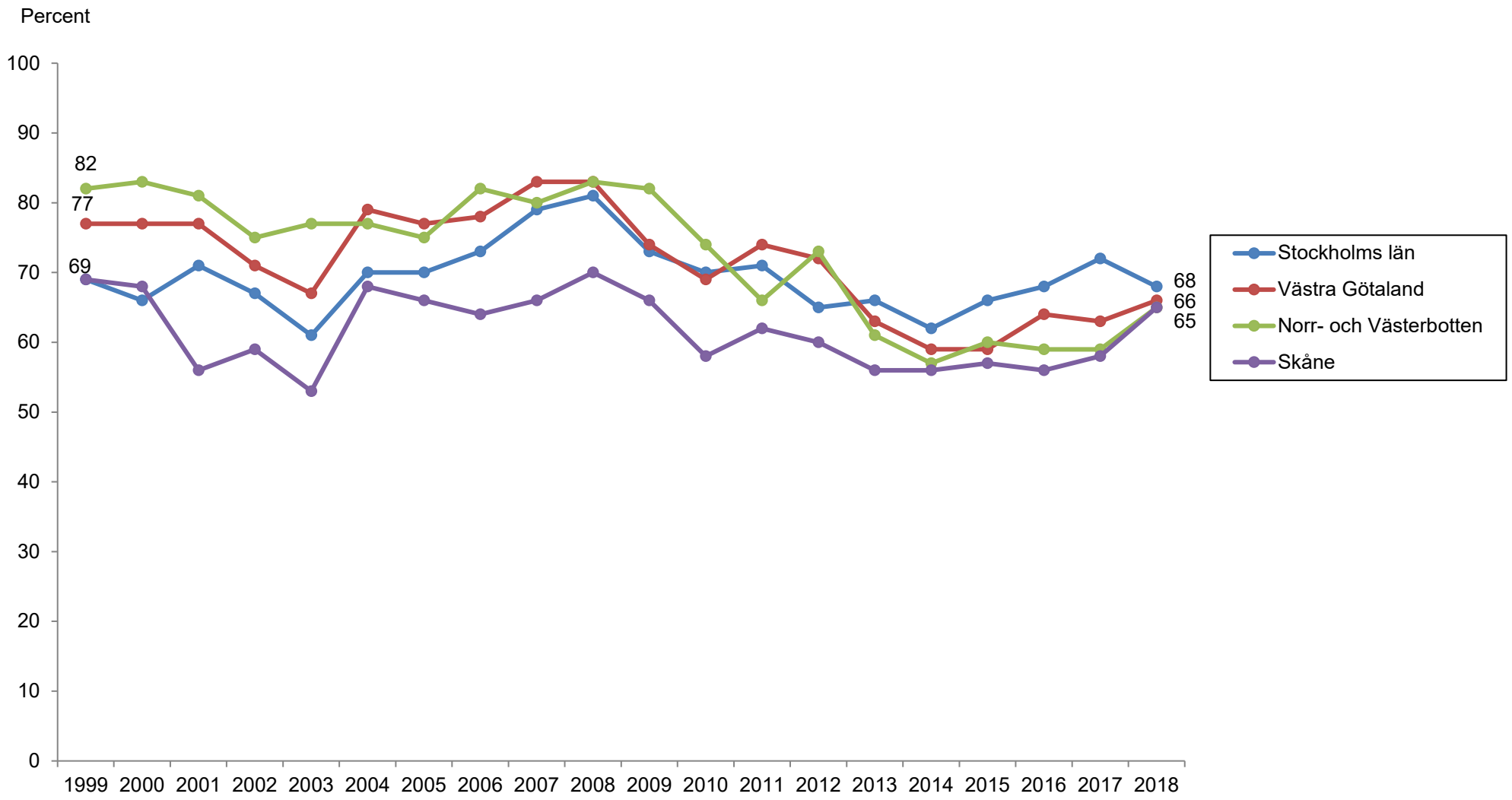
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: No answers are not included in the percent calculations.
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se.

Percent in Favour of Go For More Wind Power than Today Among Swedes in Different Educational Groups



Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: No answers are not included in the percent calculations.
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se.

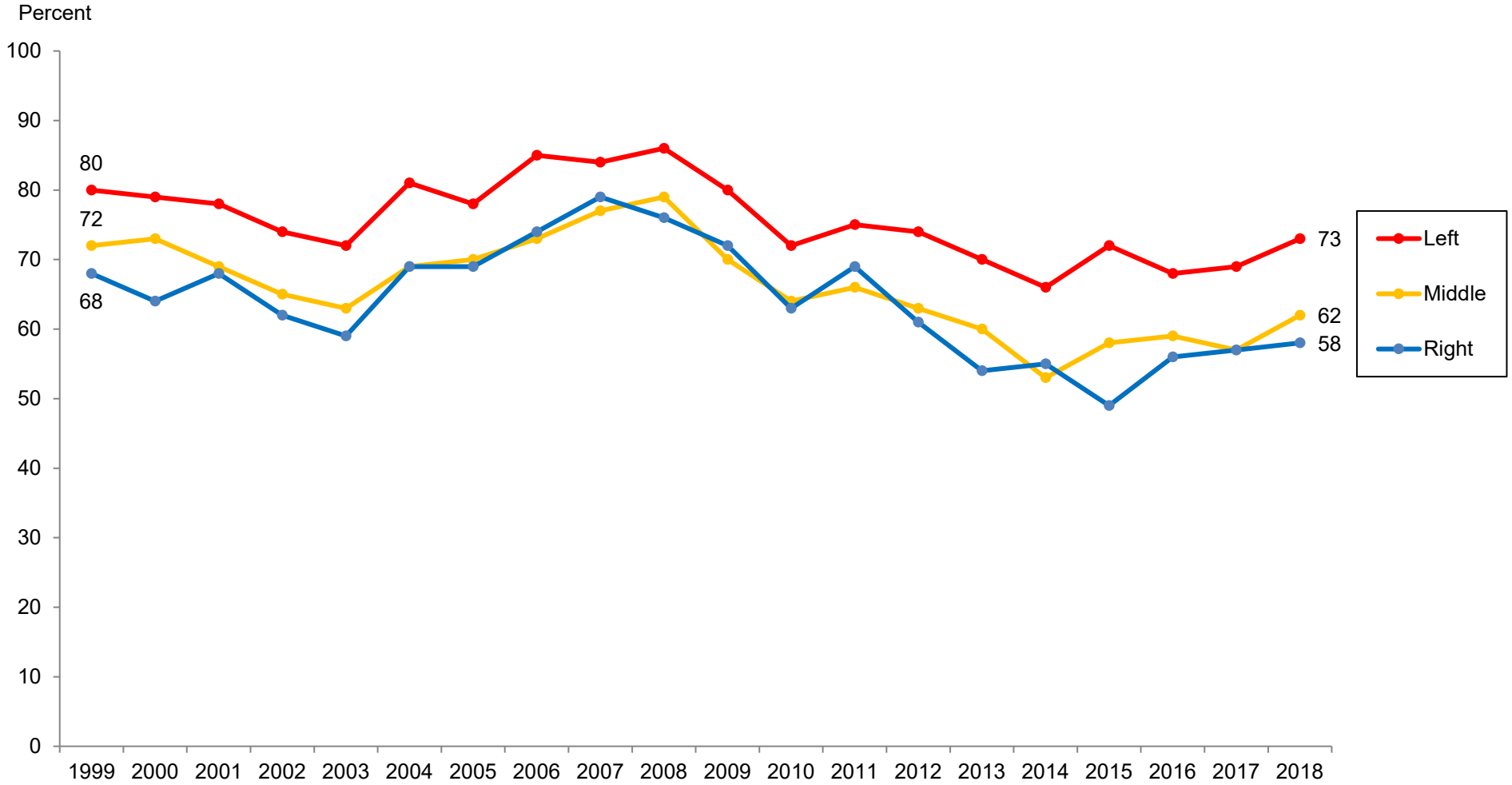
Percent in Favour of Go For More Wind Power than Today Among Swedes in Different Regional Parts of Sweden



Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: No answers are not included in the percent calculations.

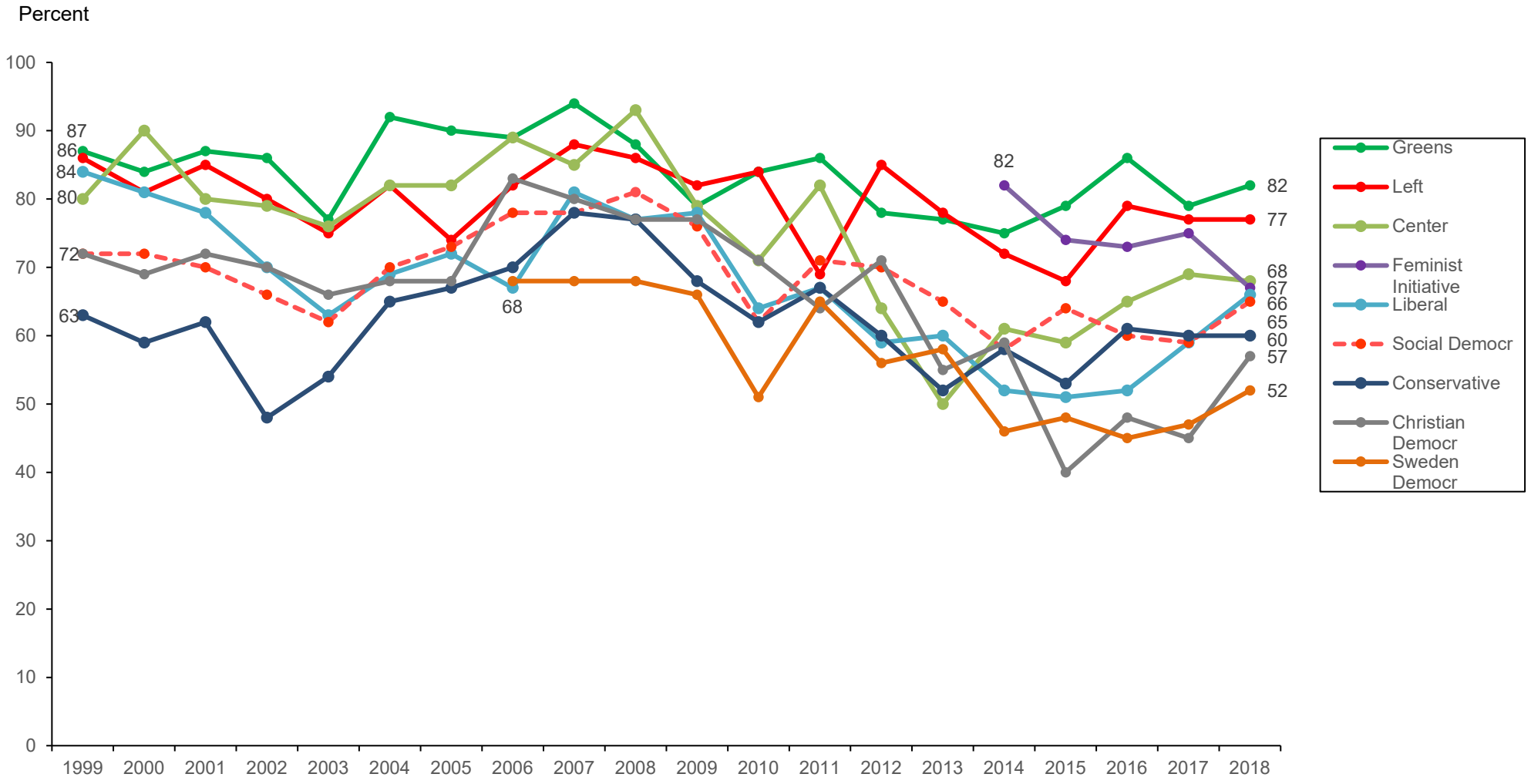
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se.

Percent in Favour of Go For More Wind Power than Today Among Swedes with Different Ideological Self-Placements



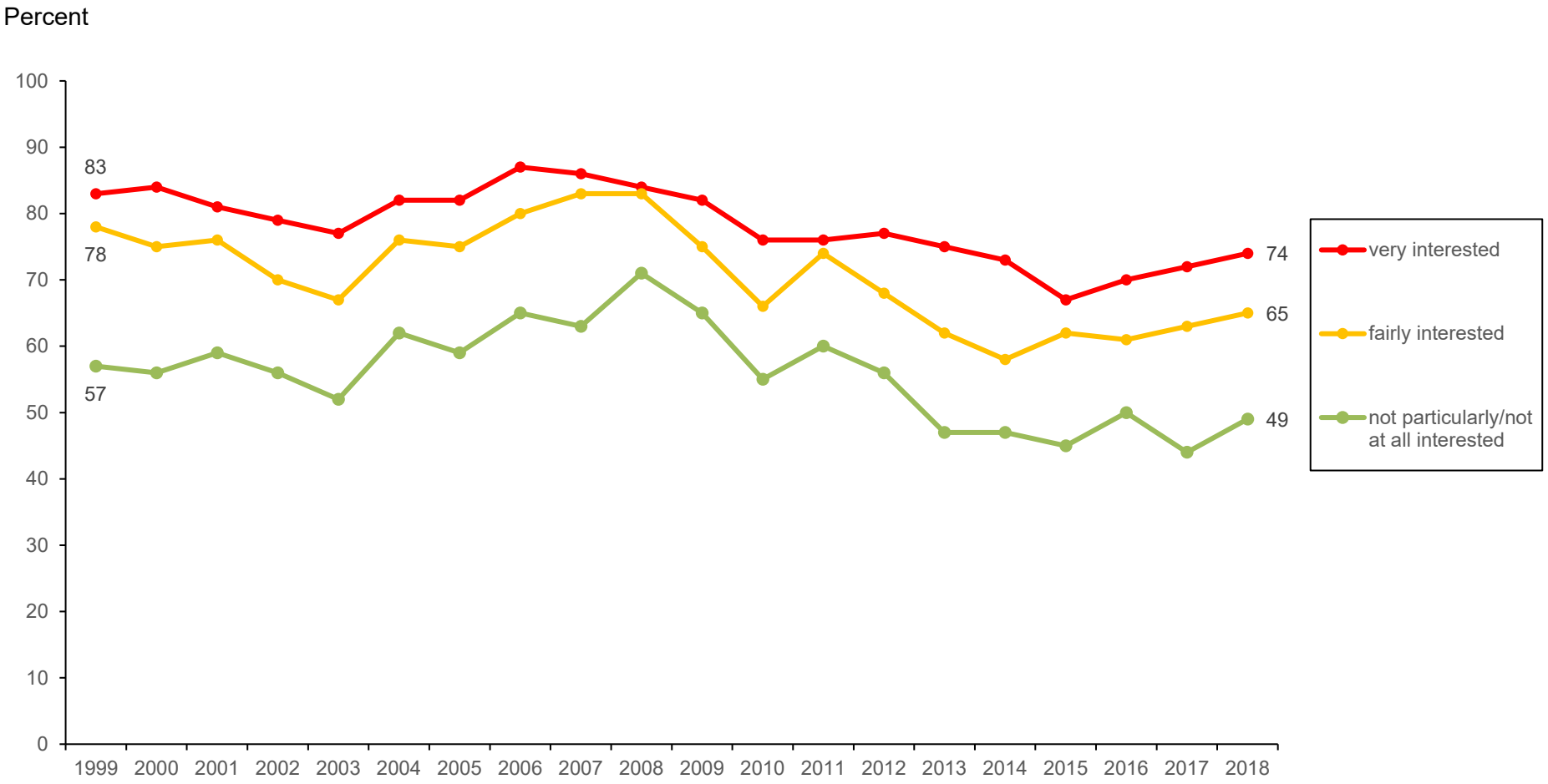
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: No answers are not included in the percent calculations.
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se.

Percent in Favour of Go For More Wind Power than Today Among Swedes with Different Party Sympathies



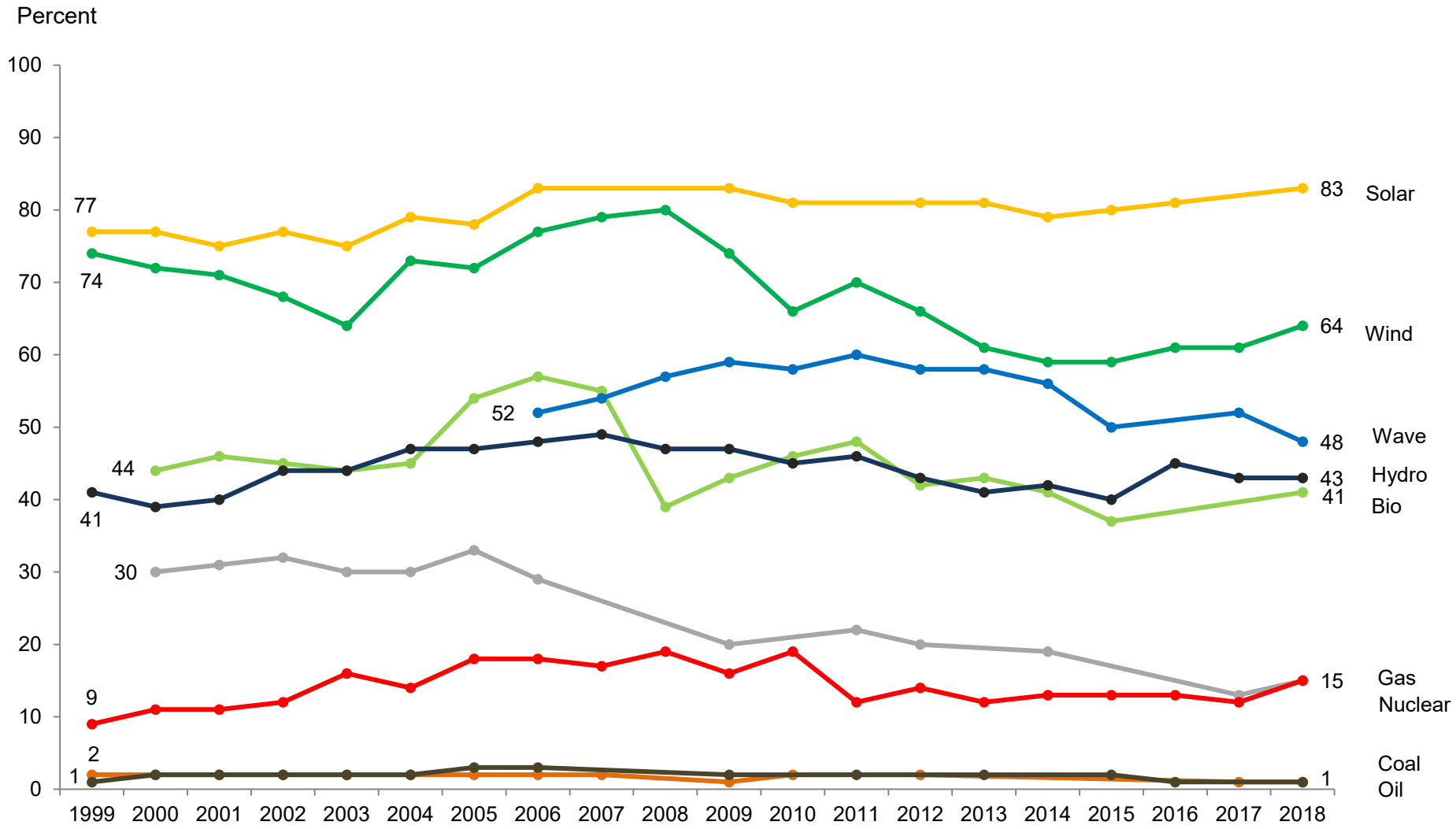
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: No answers are not included in the percent calculations.
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se.

Percent in Favour of Go For More Wind Power than Today Among Swedes with Different Interest in Environmental Issues



Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: No answers are not included in the percent calculations.
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se

Percent Swedes Who Think Sweden - More than Today - Should Go For Different Energy Sources



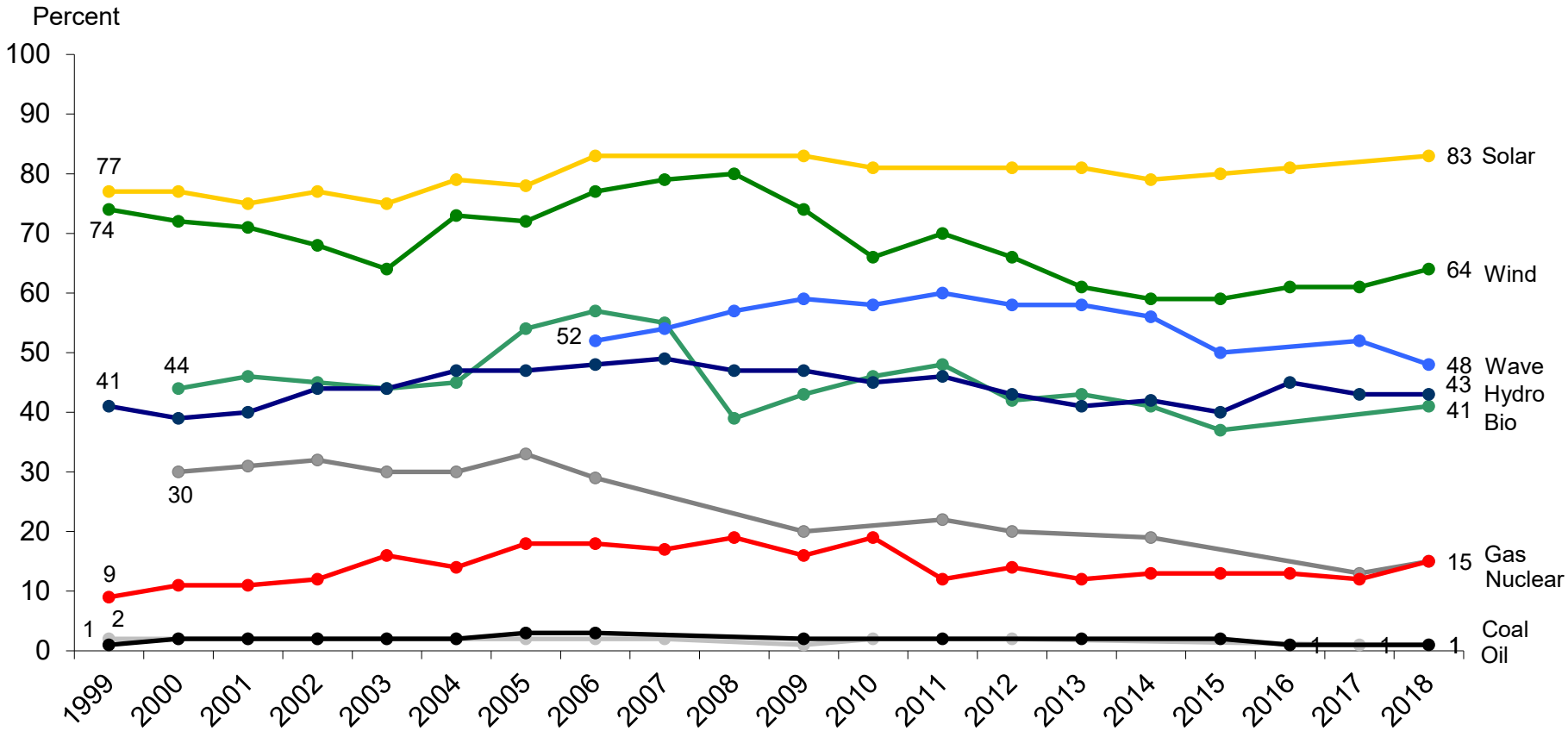
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: Percentages are calculated among respondents who answered the question for the different energy sources. The results for biofuel and gas in 1999 were 29 and 21 percent, respectively. Due to a suspected context effect in the questionnaire the results are not presented in the figure.
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se

Chapter 12

Swedish Opinion on Different Energy Sources

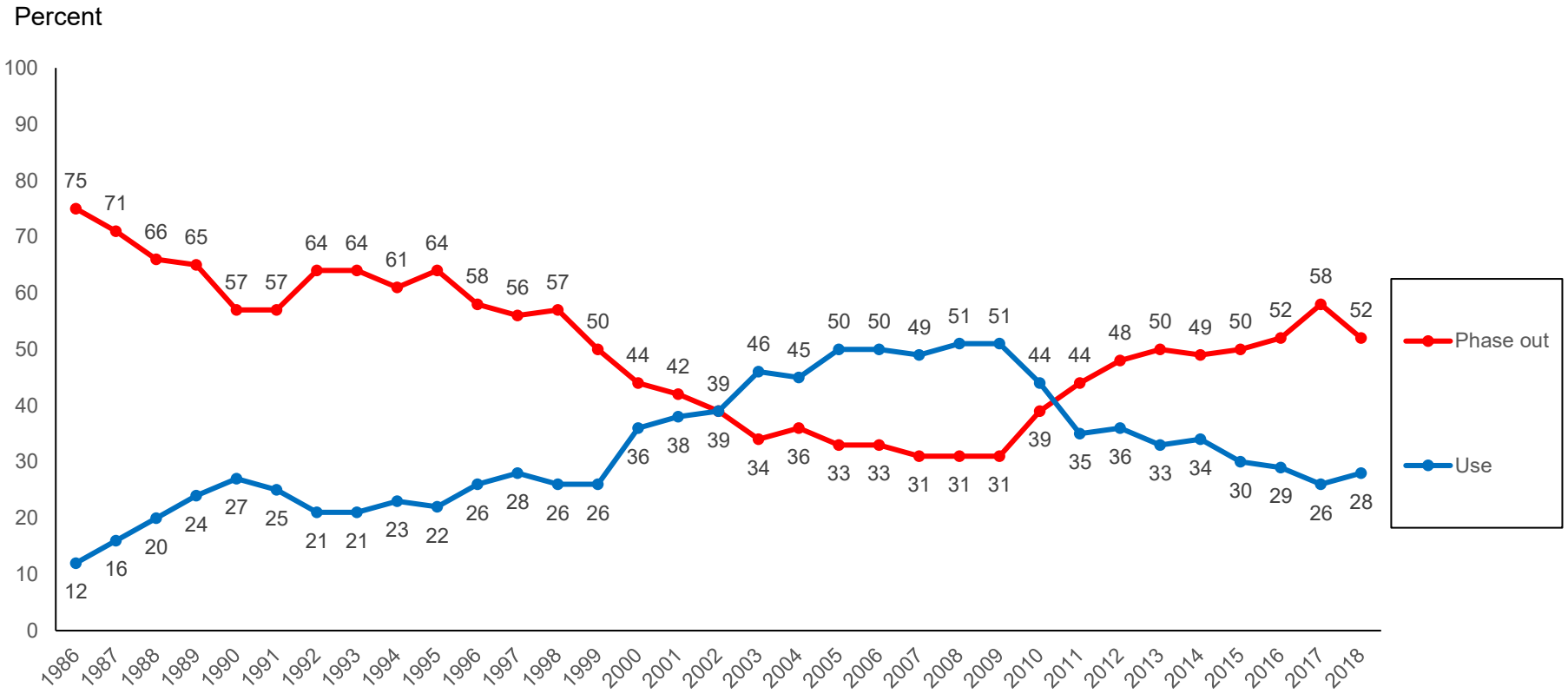
Per Hedberg **Sören Holmberg**

Percent Swedes Who Think Sweden - More than Today - Should Go For Different Energy Sources



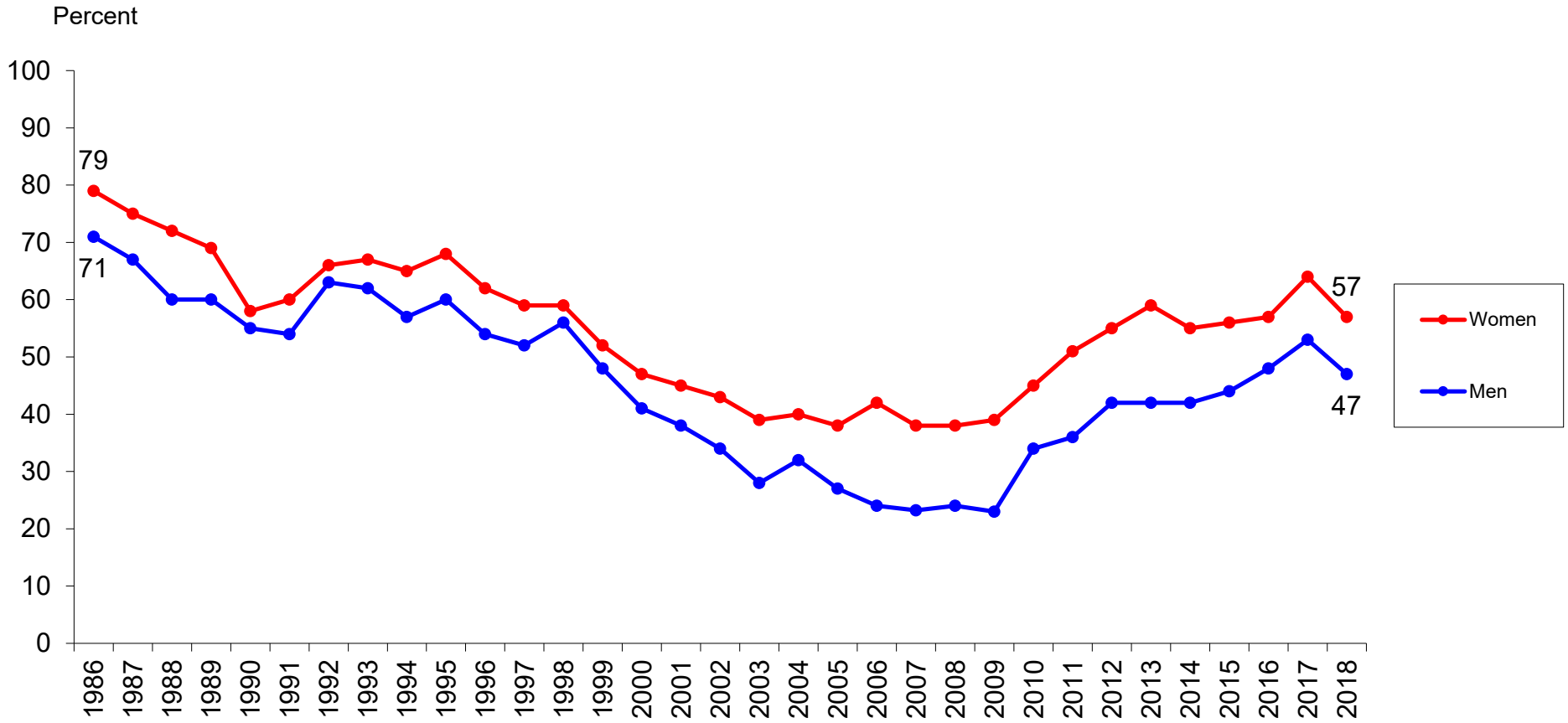
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: See question H in Appendix. Percentages are calculated among respondents who answered the question for the different energy sources. The results for biofuel and gas in 1999 were 29 and 21 percent, respectively. Due to a suspected context effect in the questionnaire, the results are not presented in the figure.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Swedes on the Use of Nuclear Power as an Energy Source



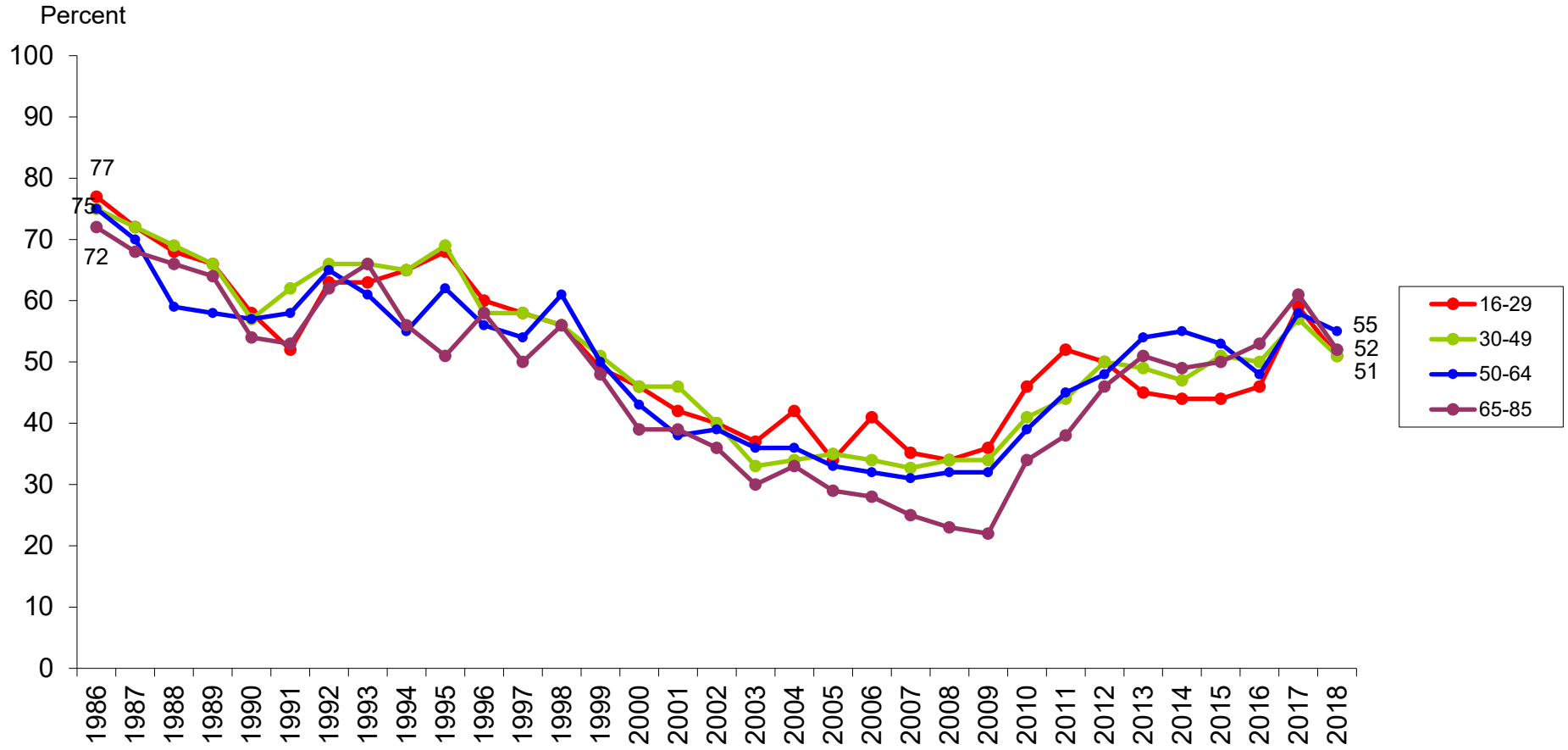
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden; Sample size 3 000 persons 16–85 years old; Mail questionnaires with an average response rate of 60 percent. The survey question asks about Swedes' opinion on the use/long term use of nuclear power as an energy source in Sweden. Response alternatives, including a "no opinion" alternative, are phrased as fairly concrete policy proposals and have varied some over the years (see Chapter 10). The number of substantial response alternatives was five up until 1996/97, but there after reduced to four. The words "use nuclear power" and "phase out nuclear power" has all the time been used in the response phrasings, making it possible to distinguish between people in favour of using nuclear power versus people in favour of phasing out nuclear power. Changes in question wording occurred between the years 1986-1987 (to question A), 1997-1998 (from question A to B), 1999-2000 (from question B to C), 2004-2005 (from question C to D) and 2009-2010 (from question D to E). See Chapter 10 for further details. In the figure, the old five substantial response alternative- question is used up until 1997 and after that the new four substantial response alternative-question starting in 1998. 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.
Comment: All respondents are included in the percent calculations.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Percent in Favour of Phasing Out Nuclear Power among Swedish Women and Men



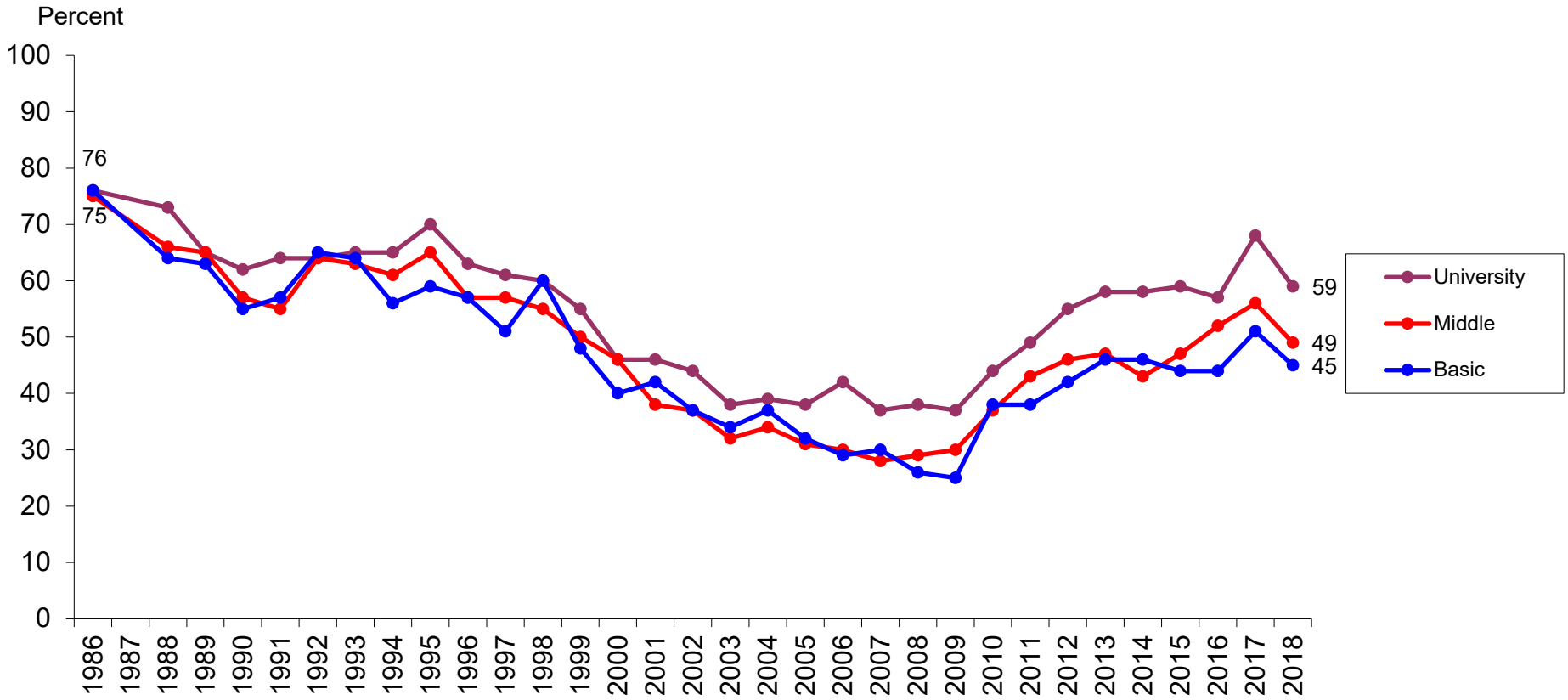
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: All respondents are included in the percent calculations.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Percent in Favour of Phasing Out Nuclear Power among Swedes in Different Age Groups



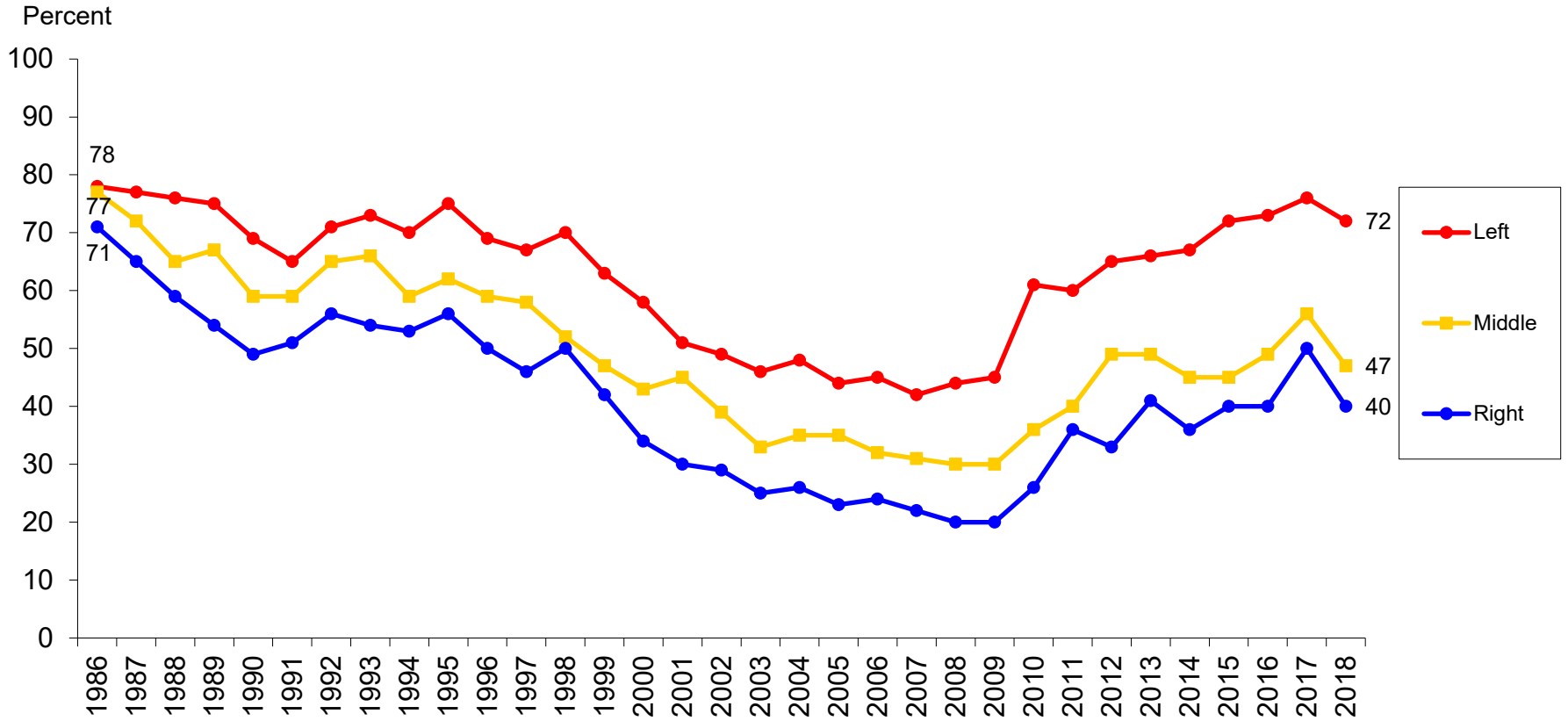
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: All respondents are included in the percent calculations.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Percent in Favour of Phasing Nuclear Power among Swedes in Different Educational Groups



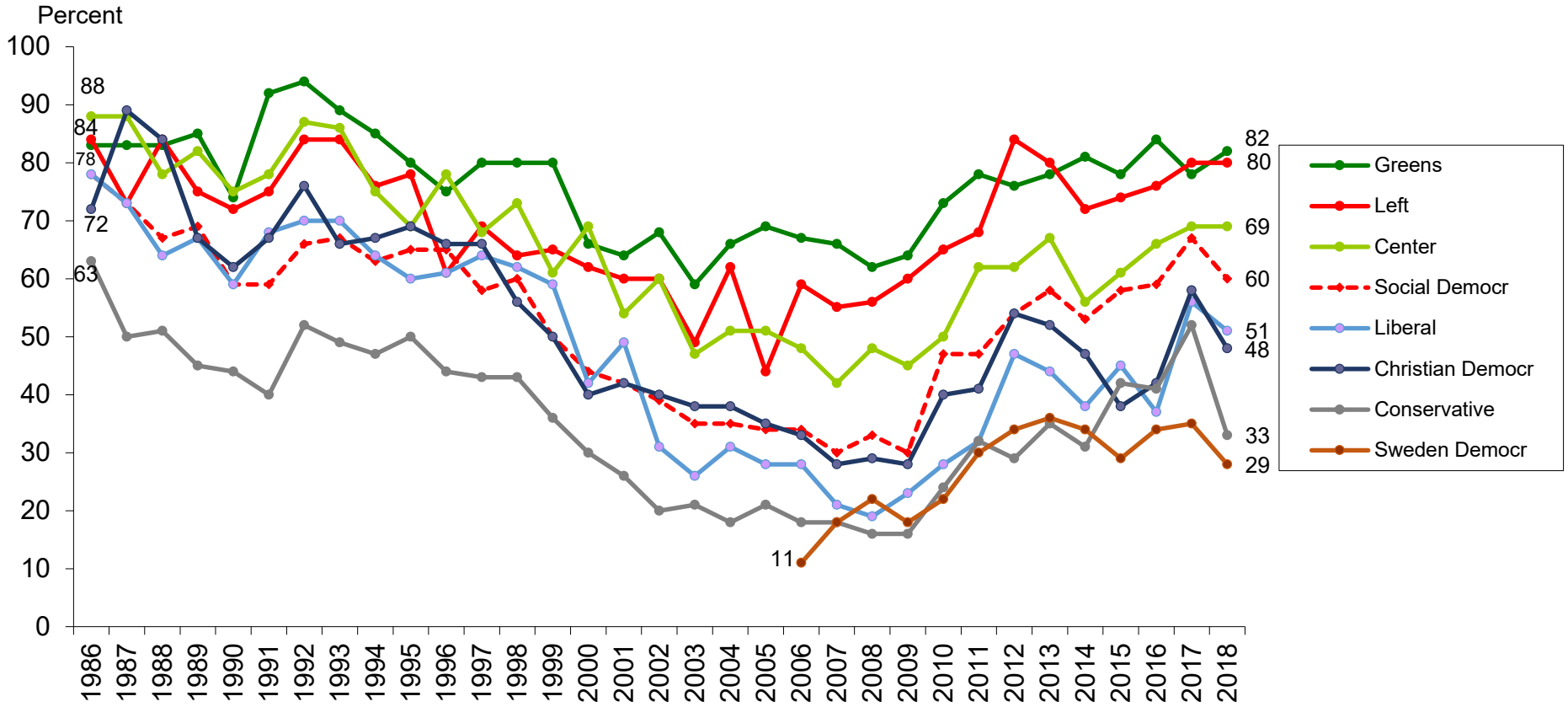
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: All respondents are included in the percent calculations.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Percent in Favour of Phasing Out Nuclear Power among Swedes with Different Ideological Self-Placements



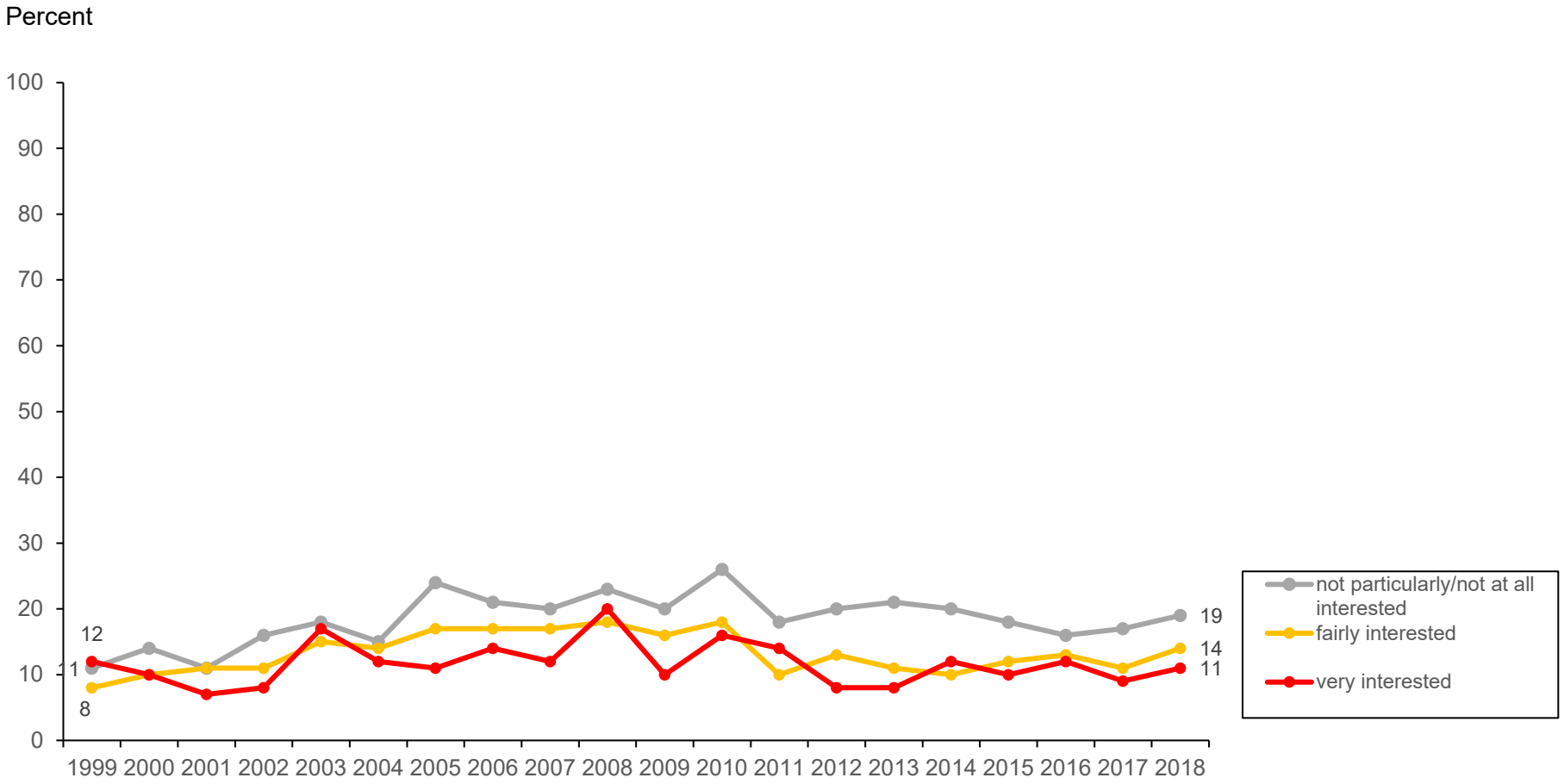
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: All respondents are included in the percent calculations.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Percent in Favour of Phasing Out Nuclear Power among Swedes with Different Party Sympathies



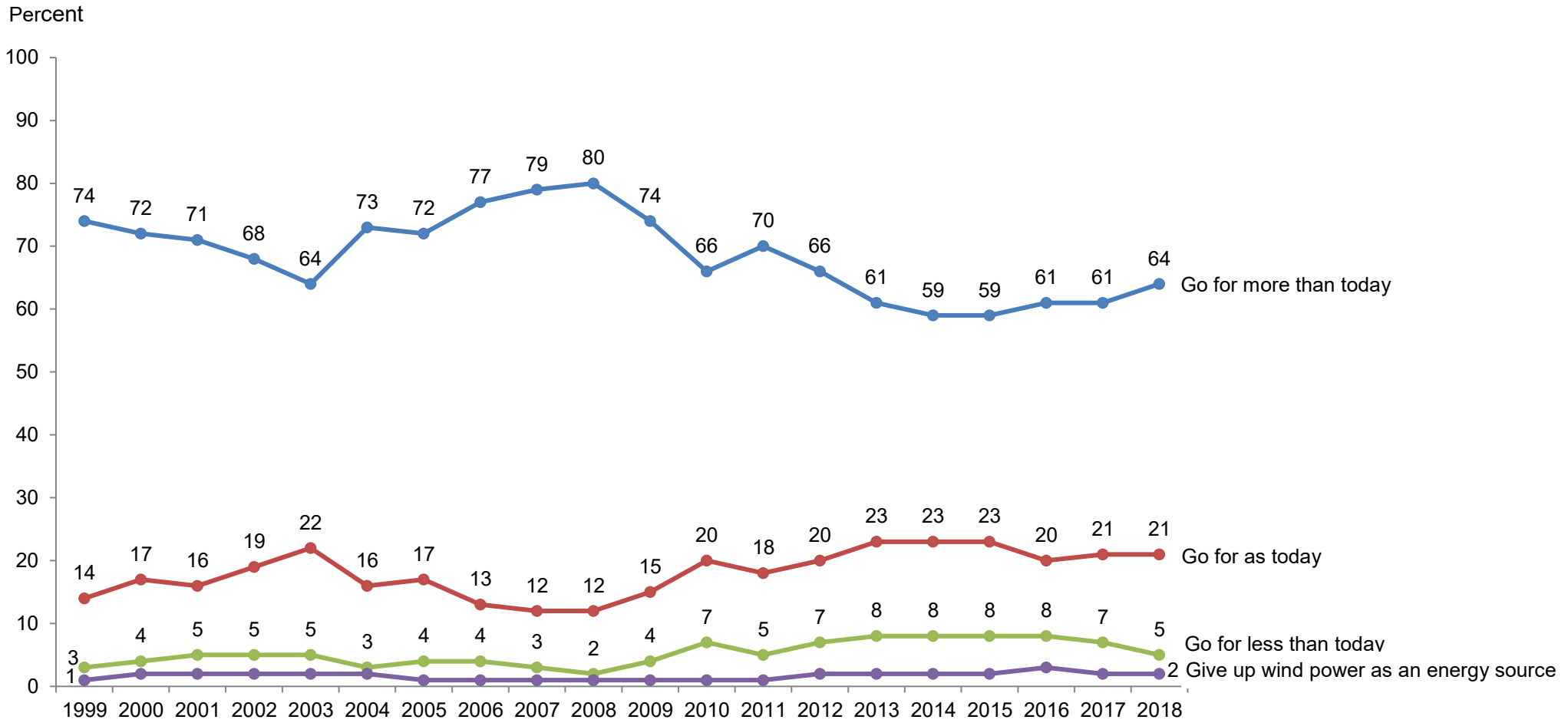
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: All respondents are included in the percent calculations. The results for Feminist Initiative are 82 percent in 2014, 77 percent in 2015, 82 percent in 2016, 85 percent 2017 and 78 percent 2018.
Principal investigator: Sören Holmberg, phone +4631 7861227, e-mail: soren.holmberg@pol.gu.se. Data processed by Per Hedberg.

Percent in Favour of Go For More Nuclear Power than Today Among Swedes With Different Interest in Environmental Issues



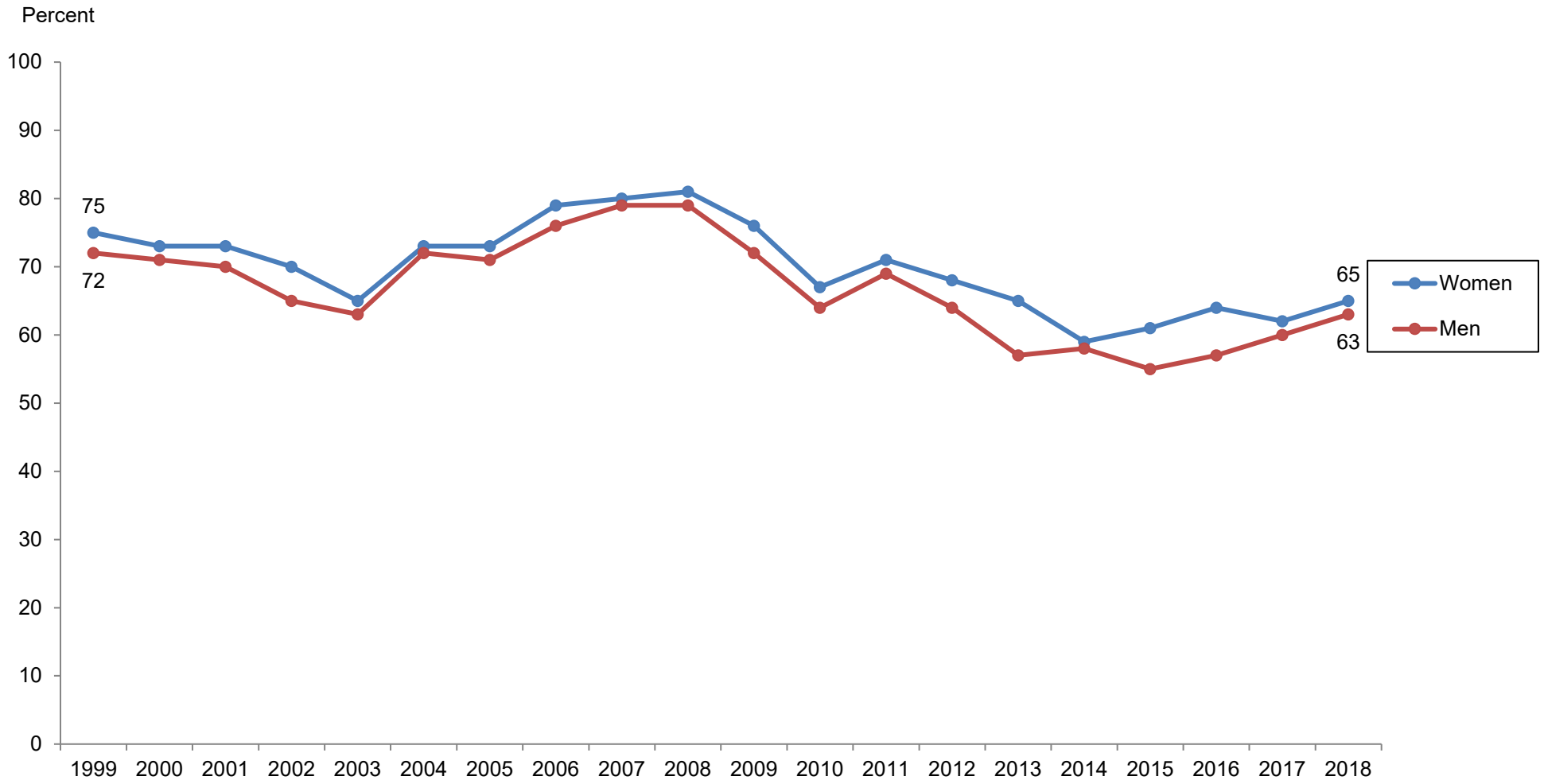
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: No answers are not included in the percent calculations.
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se

Percent in Favour of Go for More or Less Wind Power than Today among all Swedes



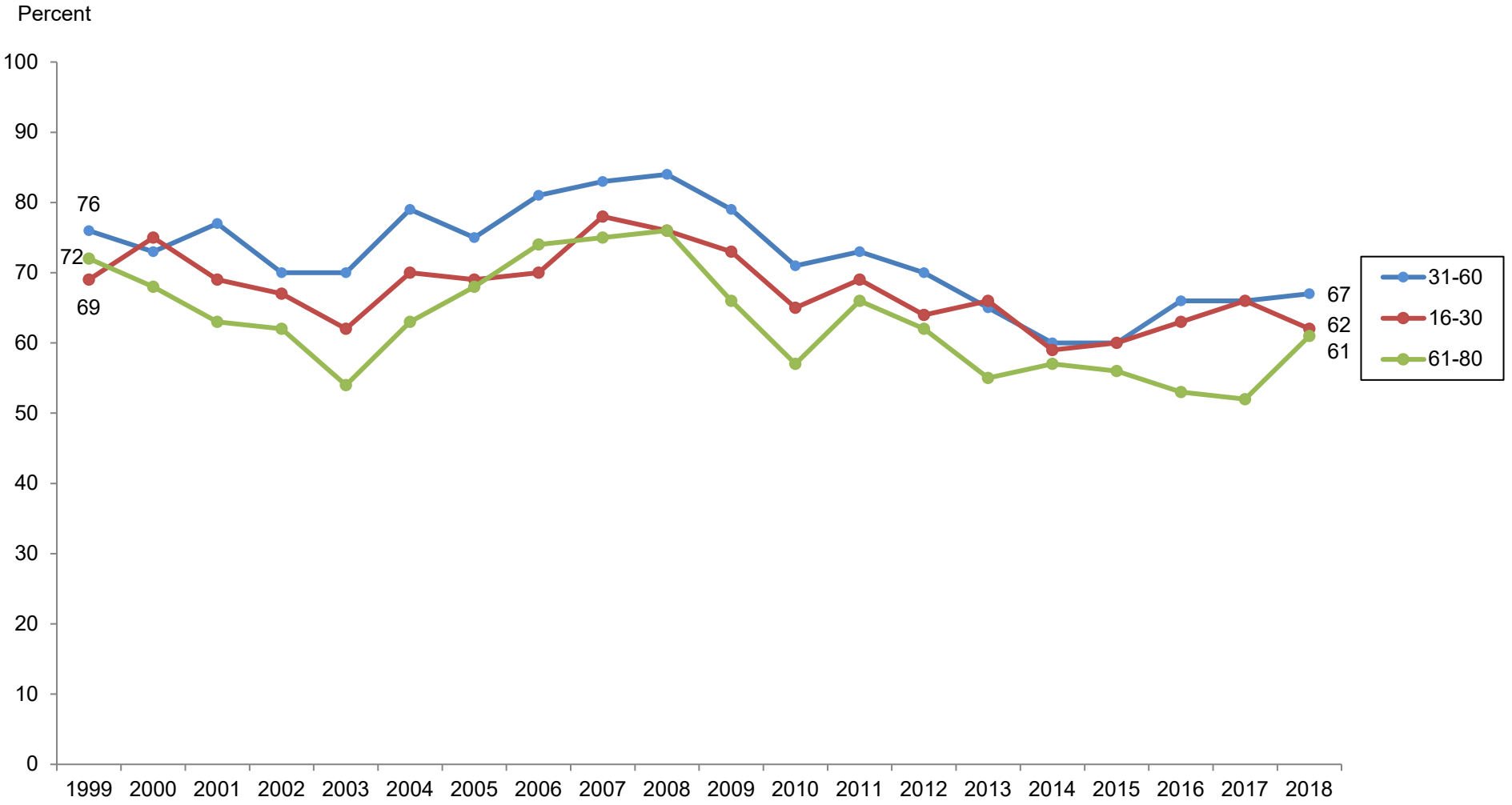
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden; Sample size 3 400 persons 16–85 years old; Mail questionnaires with an average response rate of 60 percent. The response alternatives also include a “no opinion” alternative, which have varied from 5-8 percent over the years (2018, 8 percent).
Question: “During the upcoming 5-10 years, how much should we go for wind power?” Five response alternatives: ”go for more than today”, “go for as today”, ”go for less than today”, ”give up wind power as an energy source” and ”no opinion”.
Comment: No answers are not included in the percent calculations.
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se.

Percent in Favour of Go For More Wind Power than Today Among Swedish Women and Men



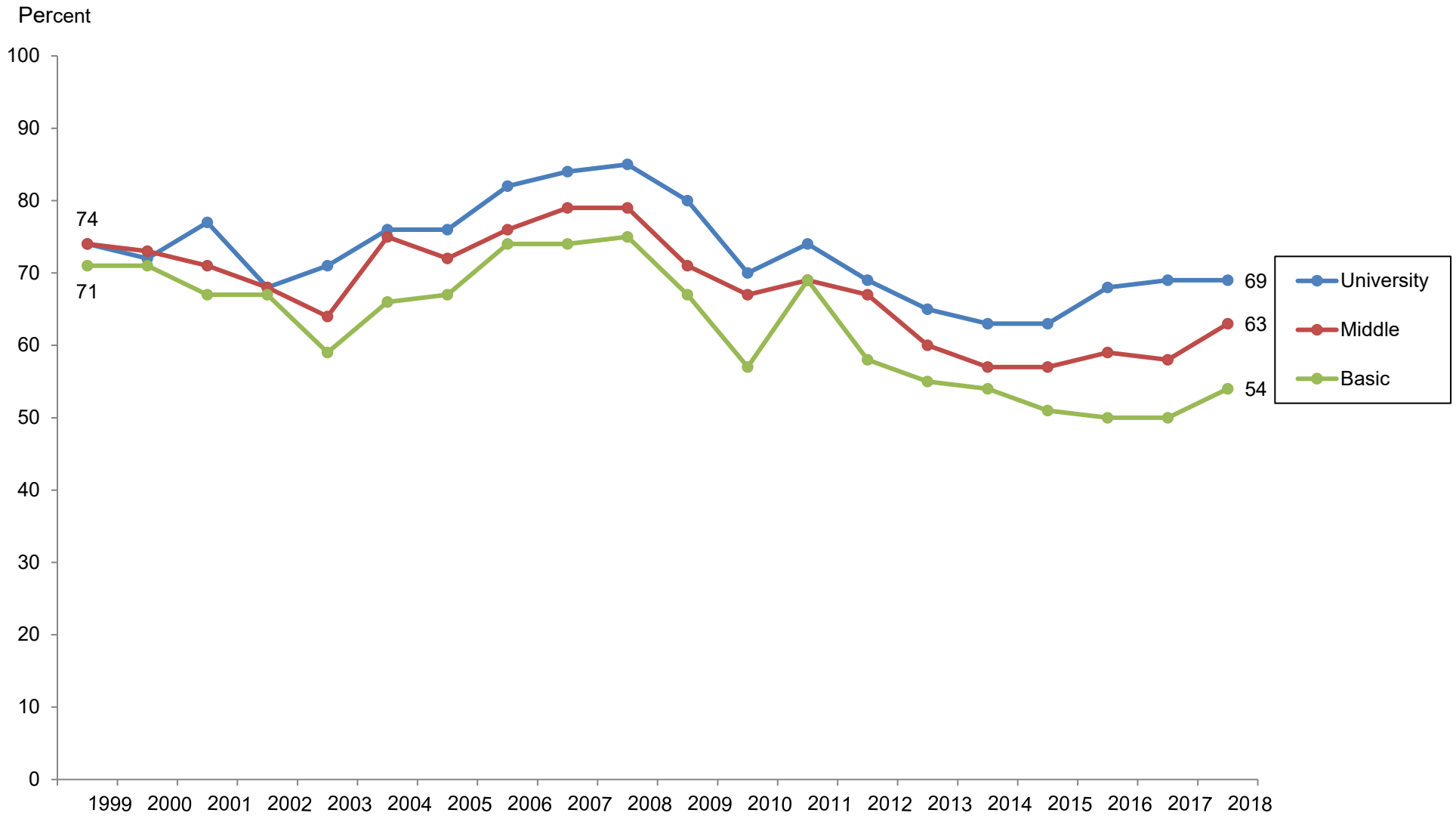
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: No answers are not included in the percent calculations.
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se.

Percent in Favour of Go For More Wind Power than Today Among Swedes in Different Age Groups



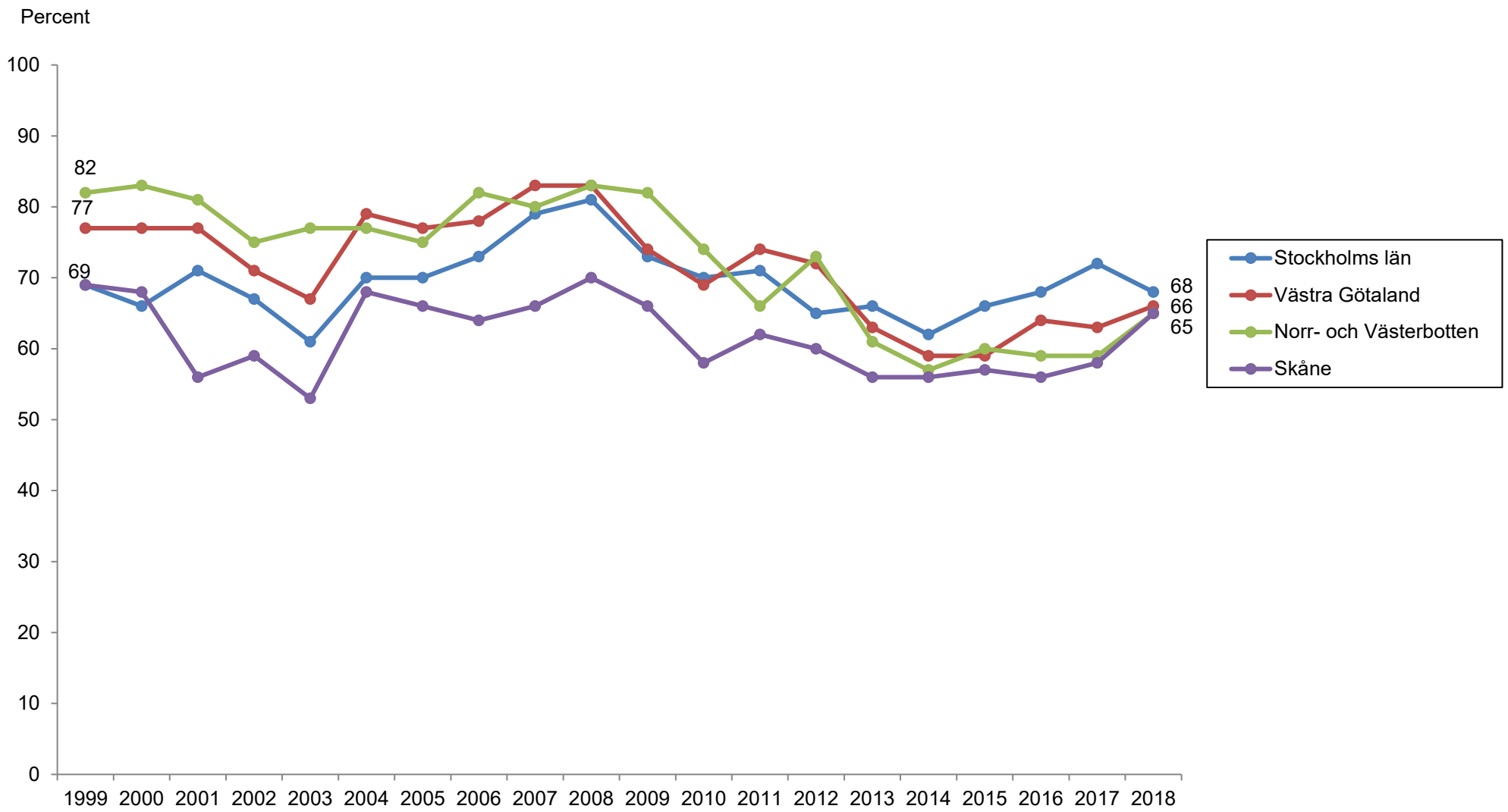
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: No answers are not included in the percent calculations.
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se.

Percent in Favour of Go For More Wind Power than Today Among Swedes in Different Educational Groups



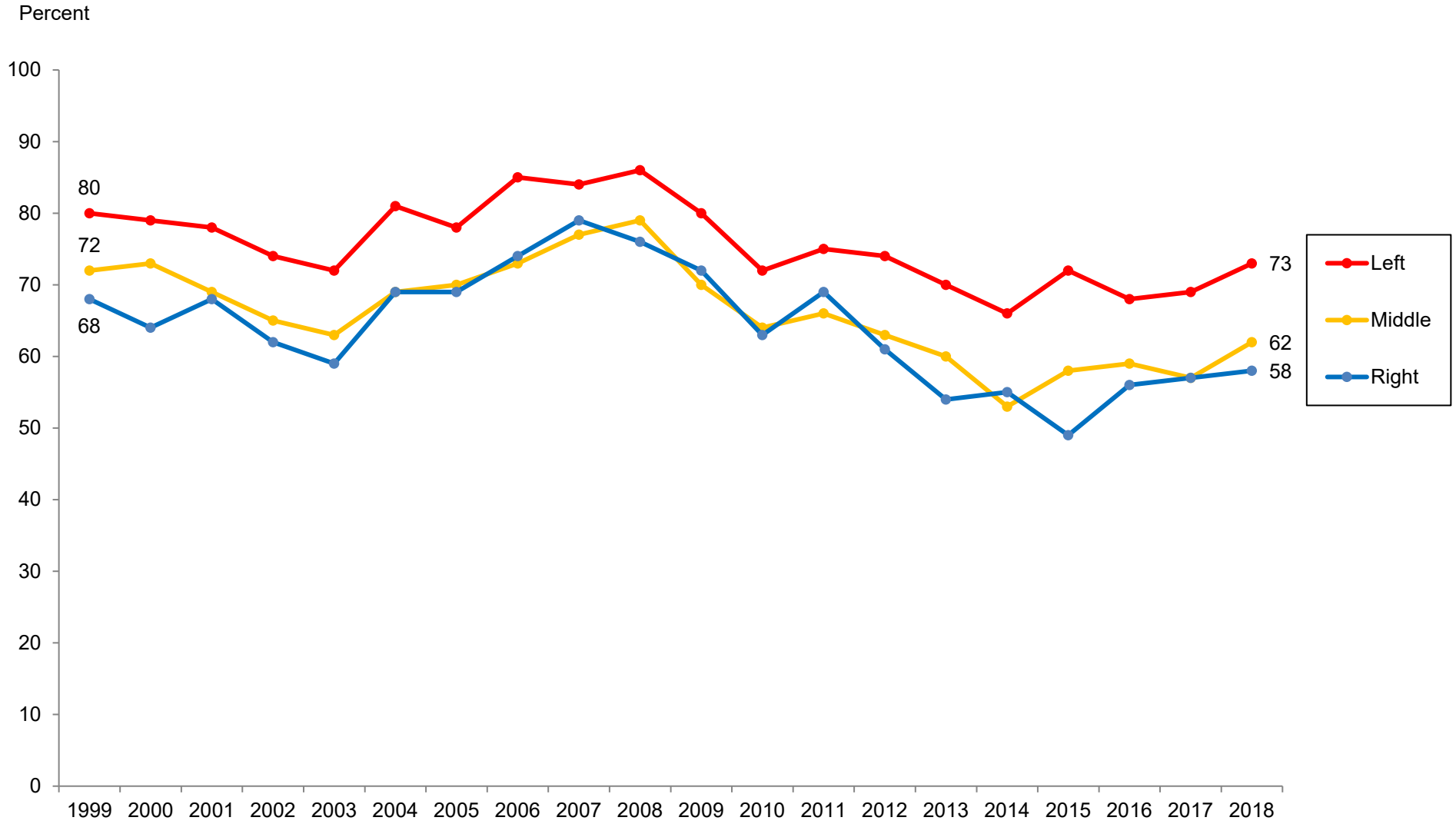
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: No answers are not included in the percent calculations.
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se.

Percent in Favour of Go For More Wind Power than Today Among Swedes in Different Regional Parts of Sweden



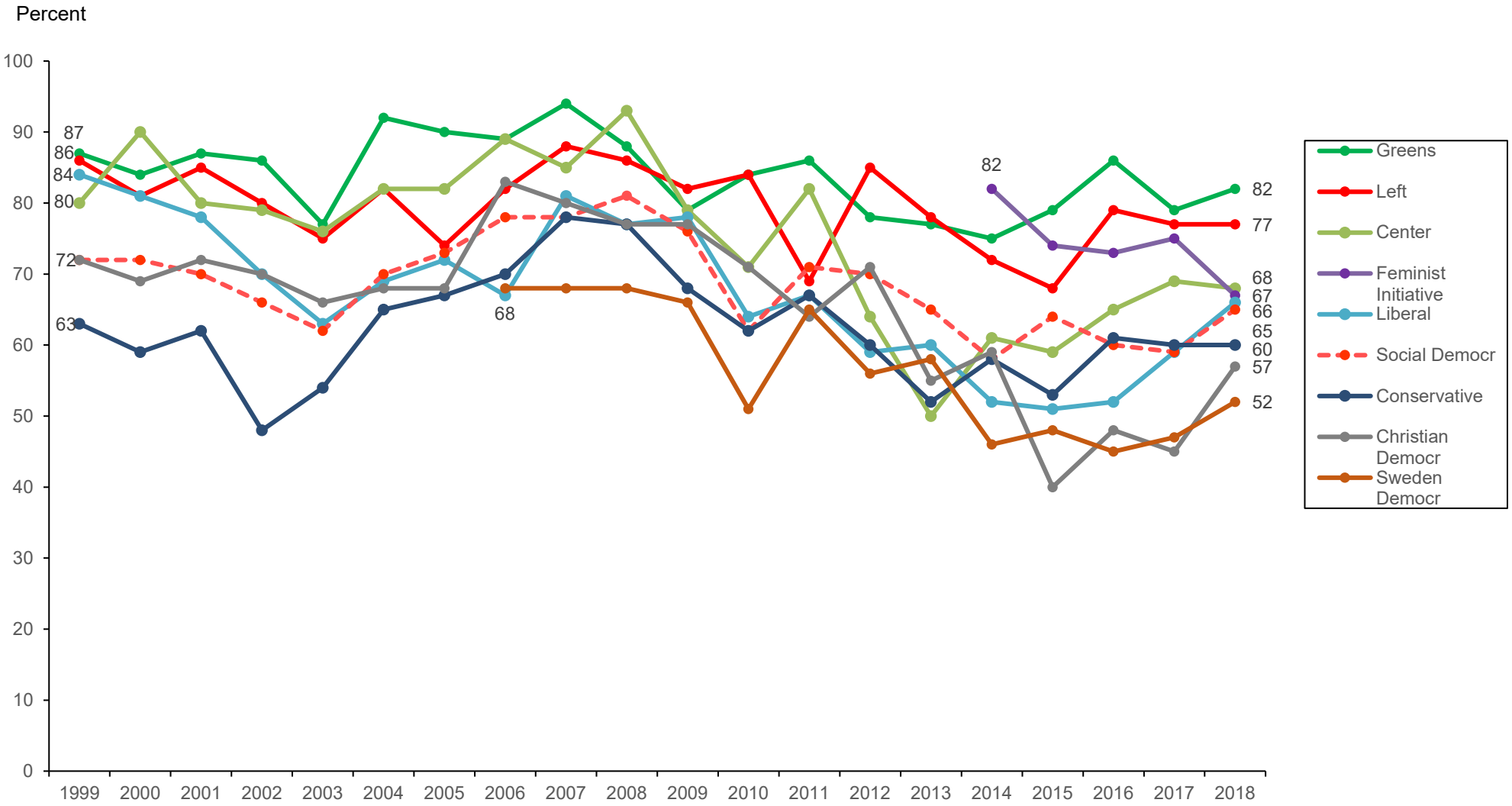
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: No answers are not included in the percent calculations.
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se.

Percent in Favour of Go For More Wind Power than Today Among Swedes with Different Ideological Self-Placements



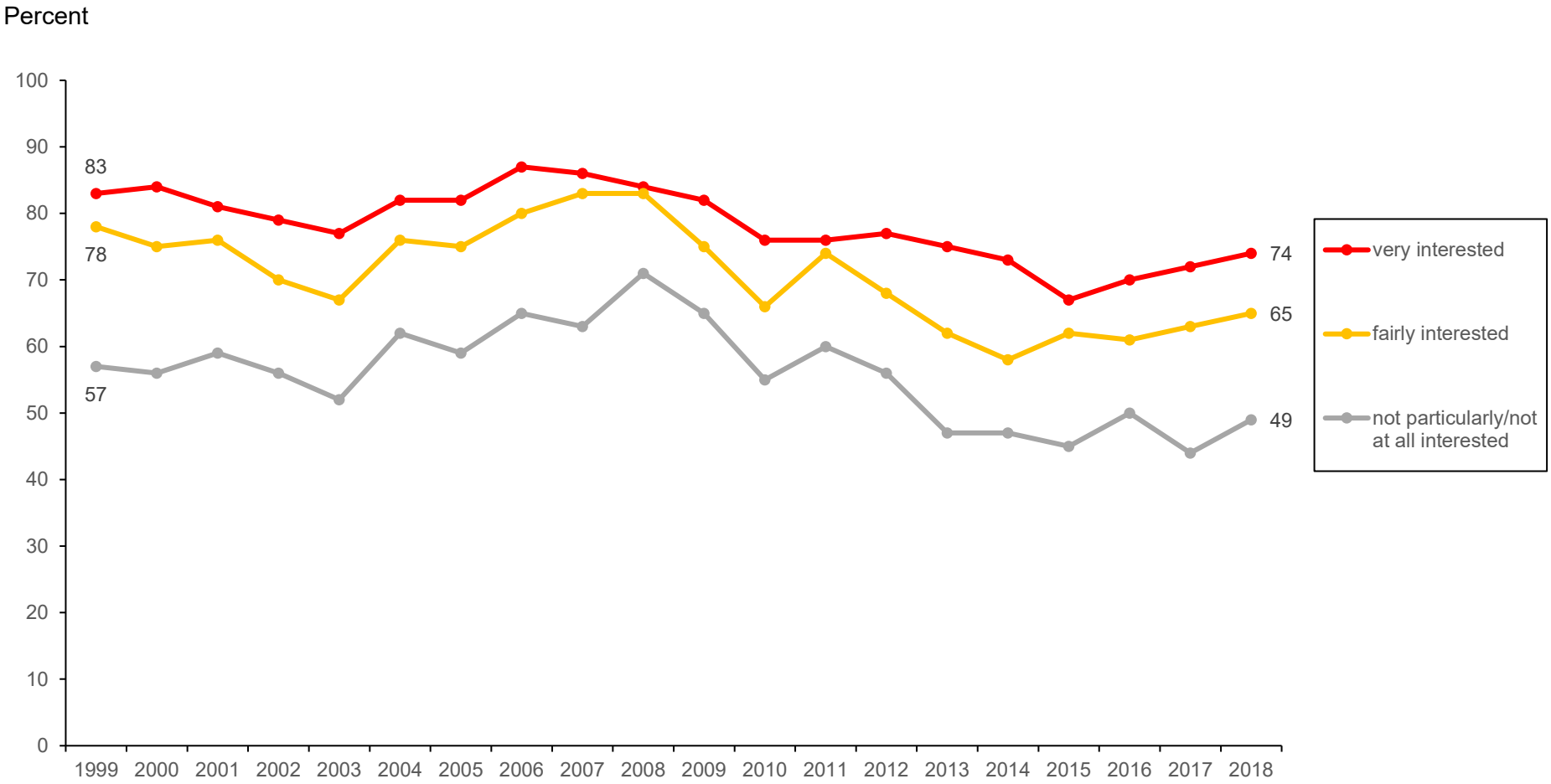
Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: No answers are not included in the percent calculations.
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se.

Percent in Favour of Go For More Wind Power than Today Among Swedes with Different Party Sympathies



Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: No answers are not included in the percent calculations.
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se.

Percent in Favour of Go For More Wind Power than Today Among Swedes With Different Interest in Environmental Issues



Data: The SOM Institute, University of Gothenburg; Annual nationwide surveys in Sweden.
Comment: No answers are not included in the percent calculations.
Principal investigator: Per Hedberg, e-mail: per.hedberg@pol.gu.se

Swedish Opinion on Using Oil as an Energy Source