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RESEARCH ARTICLE

Society, Politics and Nuclear Energy in Switzerland

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ABSTRACT

After the Fukushima accident, the Swiss Federal Council opted for withdrawal from nuclear energy in the horizon 2035. Considering that this decision cannot be studied in historical isolation, this article describes the evolution of the relationship between nuclear energy and the Swiss society by highlighting four distinctive periods: the social mobilisation of the seventies and eighties, the turning point of the nineties, the nuclear revival in the late 2000s and the Fukushima accident. To describe this relationship, we will analyse social mobilisation and the results of initiatives and empirical studies related to nuclear energy in Switzerland.

KEYWORDS: Fukushima, Nuclear Energy, Society, Perception

On 25 May 2011, two and one half months after the nuclear accident at Fukushima Daiichi, the Swiss Federal Council opted for withdrawal from nuclear energy by 2035: the actual four power plants in Switzerland shall operate until the end of their life expectancy and no new power plant shall be constructed. To what extent is it a direct consequence of the accident in Japan or the consequence of a long turbulent history between nuclear energy and Swiss society? The aim of this article is to demonstrate the relevance of the historical argument by describing the evolution of the relationship between nuclear energy and the Swiss society.

In order to understand this relationship, some distinctive features are important to be reminded. First, Switzerland is shaped and influenced by federalism with the practices of

communal and cantonal autonomy; therefore the issue of energy is under the competencies of the Confederation and cantons¹. Second, the Swiss political system of direct democracy provides the population with an important power: citizens can launch a campaign to collect signatures for a so-called ‘popular initiative’ on any subject and, when enough signatures have been collected, the population votes on the submitted subject. The popular initiatives contribute to a culture of deliberative and discursive democracy in Switzerland.

Science, for instance biotechnology, nuclear energy or animal experimentation, has been the object of many initiatives that engendered intense public debate.

Finally, the Swiss society lies at the crossroads of three cultures: French-, German- and Italian-speaking cultures, with German-speakers representing almost three-quarters of the Swiss population. The multicultural composition of the society has implications for the political system (representativeness) as well as for the media sphere (regional media in each linguistic region). Humanities studies have found differences in public attitudes towards science or the environment depending on the linguistic region (Diekmann *et al.*, 2009; Crettaz von Roten, 2012).

‘In this article, the characteristics of the relationship between nuclear energy and the Swiss society will be documented by the analysis of social mobilisation and of the results of initiatives and empirical studies². These characteristics will help us define four distinctive periods in the evolution of the relationship between nuclear energy and the Swiss society in the past forty years: the first success in the seventies and eighties, the turning point of the nineties, the nuclear revival in the late 2000s and the Fukushima accident in 2011.

The four periods of the relationship

After the Second World War spread the myth of a nuclear future in the hope of a peaceful use of atomic energy in Switzerland (Favez and Mysyrowicz, 1987) as in most Western countries (Bauer, 1995). As it was close to the post-war society’s values, this technology benefited from an unparalleled promotion, which

lost sight of its complexity, of associated risks, of difficulties related to costs and waste management. The Swiss government spurred the electricity industry to enter into the field of nuclear energy. In the 1960s, this industry designed and constructed its own type of atomic reactor in Lucens, in the French-speaking part of Switzerland. However, an accident occurred in the prototypical power reactor in 1969 and, following this fiasco, the industry gave up its own atomic technology design and deferred to foreign technology. After this accident, four steps have driven the Swiss phase-out of nuclear power according to our analysis.

1970s-1980s: the first success of nuclear opponents at Kaiseraugst

In Switzerland, the first nuclear plants were built at the end of the 1960s: Beznau in 1965, which was in operation in 1969 for Beznau_1 and 1971 for Beznau_2, and Mühleberg in 1967 and in operation in 1971. In the 1970s, the two oil crises (1973-1974 and 1979-1980) shook the dream of infinite energy resources and the industry was reinforced toward the development of nuclear energy: the construction of another power plant at Gösgen started in 1973, followed by Leibstadt in 1974.

In the 1970s, Switzerland recorded social movements linked to various issues, such as environmental protection, promulgation of peace, women empowerment, etc. (Giugny and Passy, 1997). The first two issues shared common themes with the anti-nuclear movement born at the same period. Bauer (1995) defined the reaction time from first innovation to public controversy to about twenty years for nuclear energy, and Switzerland follows this pattern. Anti-nuclear activists claimed a

¹ For the evolution of the role of the State over energy in Switzerland, see Romerio (2008).

² The issue of nuclear energy has not given rise to a few specific academic surveys in Switzerland, besides surveys from the nuclear lobby. Therefore, we performed a secondary analysis of related surveys such as the International Social Survey Program Environment survey (ISSP 1994 and 2000, www.isp.org), the Eurobarometer Science (2000, 2010), Biotechnology (2002, 2005) and Nuclear waste (2008) (EB, ec.europa.eu/public_opinion/index_en.htm) and UNIVOX Umwelt surveys from Gfs (www.gfs-zh.ch).

planning according to 'real' needs of the country and not according to needs of an industry in uncontrolled expansions (Mironesco *et al.*, 1986); they showed active resistance against the constructions of Gösgen and Leibstadt power plants (Favez and Mysyrowicz, 1987). Swiss people were also mobilized against power plants in construction in the bordering countries, *i.e.* Creys-Malville and Superphénix in France.

A third construction project at Kaiseraugst, near Basel, was vigorously opposed: occupation of the future power station's building for eleven weeks from 1 April 1975, large demonstrations (*e.g.* 20,000 people protested on 31 October 1981), cantonal initiatives, etc. This project has raised intense debate on the question of the role of the State, of the respective competencies of the Confederation and the cantons and of private sector action in the energy area (Mironesco *et al.*, 1986). The construction started in 1985 with the authorization given by parliament, but the project was given up in 1988, after years of fighting (Küpper, 2006). After that, electric companies opted for the acquisition of shares in French nuclear power plants (Romerio, 2008).

The social mobilisation also took political forms: for instance, an initiative 'to safeguard people's rights and safety during the construction and operation of nuclear facilities' was launched in 1975³. On 18 February 1979, the outcome of the vote was very close but the Swiss citizens refused the initiative (51.2% disagreed with the initiative, electoral turnout 49.5%). Then, on 20 May 1979, the citizens agreed with the 'Atomic Energy Act', which regulated the peaceful use of nuclear energy, and laid down the principles governing nuclear safety and construction⁴ (68.9% agreed, electoral turnout 37.6%).

Despite the failure of the first initiative, anti-nuclear activists began to collect signatures for two new initiatives ('for a future without new nuclear power plants' and 'for a secure, economic and environmentally friendly energy supply'). Citizens were

³ The 1970s also resulted in a series of cantonal initiatives, *e.g.*, in canton Basel in 1975.

⁴ The act requires clause of need as well as the settlement of the issue of nuclear waste and decommissioning for any proposed new nuclear plant.

invited to vote on those initiatives in 1984. The Federal Council recommended rejecting both initiatives, believing that Switzerland could not do without nuclear energy due to the increase of energy consumption, that adverse financial consequences would result from the abandonment of nuclear energy and that Swiss nuclear power plants offered sufficient guarantees in terms of security and environment. On 23 September 1984, both initiatives were rejected with roughly the same proportion of opponents (about 55% disagreed, electoral turnout 41.7%). The analysis of voting behaviour (VOX) noted a cleavage at the regional level (the percentage of agreement to the two initiatives was higher in the Italian-speaking part, in the Geneva region, the Jura and Basel) and at the level of partisan sympathy (more left-wing voters accepted the initiative)⁵. This rejection did not ring the death knell for anti-nuclear social mobilisation: in 1986, activists began collecting signatures for two initiatives ('to abandon atomic energy' and 'to stop the construction of nuclear power plants — moratorium').

In 1986, the Chernobyl cloud unfolded over Europe, which destroyed the possibility of distancing: it became evident that one cannot escape the consequences of a nuclear accident. More generally, risks — nuclear ones and of other kinds — and risk distribution characterized the new form of 'risk society' (Beck, 1992). Beck described how the characteristics of nuclear risks — from modernization, global, escaping perception, with a potential of disaster so high that it is almost impossible to act *a posteriori* — were typical of this society. 'In other words, what becomes clear in risk discussions are the features and gaps between *scientific* and *social* rationality in dealing with the hazardous potential of civilization. Social movements raise questions that are not answered by the risk technicians at all, and the technicians answer questions which miss the point of what was really asked and what feeds public anxiety' (Beck, 1992:30). The Chernobyl cloud was especially detected in the Italian-speaking part of Switzerland, and the effects of this accident are still observable today, twenty years after the accident (OFSP, 2006).

⁵ These analyses are available at http://www2.unil.ch/daris/IMG/html/liste_Vox_Voxit_f.html.

The project of construction at Kaiseraugst was abandoned two years after the Chernobyl accident.

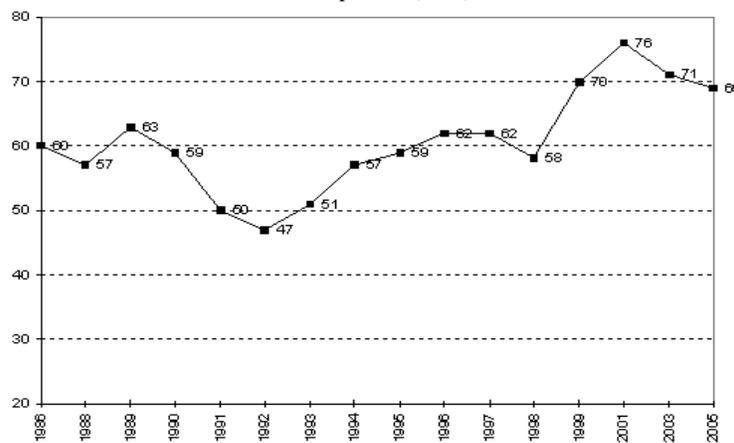
In this sensitive context for nuclear issues, empirical studies began to document public perceptions. However, no large survey was conducted on that issue: it mostly consisted of items included in surveys related to science or to the environment. The results of the Gfs surveys between 1986 and 1990 showed that around 60% of respondents considered that ‘risks posed by nuclear energy are unacceptable’ (Figure 1), that is, shortly after the Chernobyl accident.

To sum up, the Swiss population was strongly mobilised against the construction of nuclear plants in the 70s and 80s. Even if the people refused to prevent or restrict the operating conditions of nuclear energy in Switzerland, anti-nuclear activists recorded their first success at Kaiseraugst.

1990-2005: the first political success with the moratorium

The 1990s began with two initiatives related to nuclear energy: one requiring nuclear power phase-out and the other a ten-year moratorium against the construction of new nuclear power stations. The first was rejected by 52.9% of voters (electoral

Figure 1 — Approval of the statement ‘Risks posed by nuclear energy are unacceptable’ (in %)



Source: UNIVOX (2005)

turnout 40.4%) but the second — a ten-year moratorium — was accepted by 54.5% (electoral turnout 40.4%). The VOX analysis, realised after the vote, showed that decisive motives were multiple: among supporters of the initiative, it is the fear of nuclear power plants and radioactive waste as well as the need for a ten-year time for reflection that prevailed while opponents were afraid of energy insufficiency and saw no alternative to the use of nuclear power. In general, the majority of respondents believed that too much energy got wasted, that atomic energy and radioactive waste were hazardous, that alternative energy was functional, that new nuclear plants were unnecessary, and finally that the economic effects of abandonment were acceptable.

In the ISSP Environment surveys⁶ realised in Switzerland, 48.5% of respondents knew in 1994 the number of nuclear plants operating⁷ and 20% of respondents felt affected by nuclear power plants, but this percentage reached 37% in French-speaking part and 25% in the Italian-speaking part (Diekmann and Franzen, 1997). In 2000, 14 years after Chernobyl, 58% of Swiss respondents of ISSP Environment believed that a nuclear accident is likely (31% unlikely and 11% have no opinion). More, 21% of respondents considered nuclear power plants as extremely dangerous, and 32% very dangerous. Men considered the probability of a nuclear accident as less likely and considered nuclear plants to be safer than women did; more educated people acknowledged in a minor way the possibility of a nuclear accident and considered nuclear power plants to be safer than less educated people did. These individual factors that influence responses are consistent with literature (Boy, 2007; Pidgeon *et al.*, 2008; Keller *et al.*, 2012).

This increase of concerns towards nuclear energy was also observed in the UNIVOX surveys (Figure 1): the statement ‘Risks posed by nuclear energy are unacceptable’ was

⁶ The ISSP survey is an annual, cross-national collaboration within which each country undertakes a survey on rotating issues with nationally representative samples of the adult population (sample size between 1,000 and 1,400).

⁷ Precisely, 33.5% in the Italian-speaking part, 34% in the French-speaking part and 53.2% in the German-speaking part (where all the Swiss nuclear plants are located).

approved by roughly 50% of the population in the 1990s and by 76% in 2001.

In the 2000 Biotechnology EB survey⁸, 26% of respondents estimated that nuclear energy will improve our way of life in the next 20 years, but 33% felt that it will make it worse (24% estimated there would be no effect, (Table 1). However, the percentage of negative effect increased in the following EB (52% in 2002, 59% in 2005) and at the same time, the percentage of people without opinion decreased (11% in 2002, 7% in 2005).

In 2003, Swiss people had to vote again on nuclear power phase-out and the extension of the moratorium against nuclear power plants. The campaign was very intense and, according to some sources⁹, *EconomieSuisse*, a corporate union for the development of the Swiss economy, would have given 15 million CHF to fight the two initiatives. This is a result of the tension between economy and ecology on the nuclear energy issue. On 18 May 2003, 66.3% of voters rejected the phase-out and 58.4% rejected the moratorium extension (around 49.7% of participation). However, the VOX analysis realised after the vote showed that left wing and green voters were more likely to accept the initiatives, whereas right wing ones were more likely to reject it. Even among opponents to the initiatives, a majority said they were opposed to the construction of new nuclear power

Table 1 — Effect of nuclear energy in our way of life in the next 20 years
(in %; EB)

	Positive effect	Negative effect	No effect	DK
2000	26	33	24	17
2002	15	52	22	11
2005	31	59	3	7
2010	33	40	18	9

Source: Analyses from the author

⁸ The EB surveys, financed by the European Commission, have been conducted between two and five times per year since 1973; they measure the state of public opinion toward the European Union and other issues, including science. The national samples come from a multistage random design of the adult population, with approximately 1,000 face-to-face interviews conducted.

⁹ See for example, *Work* 18 March 2011.

plants, thereby approving the main and true claim of the moratorium.

To sum up, nuclear energy was under threat at the beginning of this period, but ended on a positive note with the results of the 2003 vote. This may result from the actions of the nuclear lobby but also from those of the Swiss Federal Office of Energy, which played the role of mediator, trying to relaunch a constructive dialogue between opposing views on nuclear energy (Romerio, 2008).

2005-2011: nuclear revival

After the mid 2000s, two main issues changed circumstances for nuclear energy. In February 2005, the Kyoto protocol entered into force — a protocol ratified by Switzerland in 2003. The Intergovernmental Panel on Climate Change (IPCC) submitted its report in February 2007. This period witnessed a change of image of nuclear energy. After the Second World War, nuclear energy was depicted as protective toward the nature in comparison to big hydropower projects (Favez and Mysyrowicz, 1987). But in the 1980s and 1990s, disasters such as Three Mile Island (1979) or Chernobyl (1986), as well as the problems of nuclear waste, categorised it as an environmentally unfriendly energy source. However, in the 2000s, concerns about the climate changed the image of nuclear energy, which was from then on depicted as climate friendly and carbon-free. The second issue is the financial crisis of 2007-2008: if the crisis hit Switzerland to a lesser extent than neighbouring countries, it engendered in the population concerns about the future. The electricity sector argued that an imbalance in the electricity market, due to the renunciation of nuclear energy, would be a hindrance to economic development.

The 2008 EB on nuclear waste indicated that 40% of the Swiss respondents were in favour of nuclear energy, whereas 52% were opposed, and 65% thought that it was advantageous because it emitted less greenhouse gases than, for instance, oil and coal (Swiss Federal Office of Energy, 2008). However, this advantage was more frequently acknowledged among men (73%), among older people (69% of the 55 years old and more),

among the more educated (70% among tertiary level) and among people on the right side of the political scale. Simultaneously, the Gfs surveys showed a strong decrease of approval of the statement 'Risks posed by nuclear energy are unacceptable' between 2001 (76%) to 2008 (46%) (Figure 1).

In 2010, only 40% of the Swiss respondents to EB Science considered that nuclear energy will have a negative effect on our way of life in the next 20 years (33% positive, 18% no effect, Table 1). These percentages varied, however, greatly among subgroups of the population: 43% of negative effect among women and 37% among men; 36% of negative effect among people aged 65 and more but 44% among people between 25 and 34 years old; 49% of negative effect among people living in large towns against 35% among people living in rural areas; 52% of negative effect in the French-speaking part, 37% in the German-speaking part and 34% in the Italian-speaking part.

At the end of this period, replacement of some nuclear power plants was necessary (for example, Mühleberg should stop in December 2012) and the general public would have a direct vote in this procedure. Nuclear energy was therefore more and more discussed in the political and public arena. Keller et al., (2012) highlighted differences of affective imagery of nuclear power among opponents and supporters of replacement of nuclear power plants in Switzerland: the first made more concrete and diverse associations (with risks negative feelings, accidents, radioactivity, waste, military use, negative consequences for health and environment) than the latter (with energy, necessity, description of nuclear power plants), which has practical implications for risk communications.

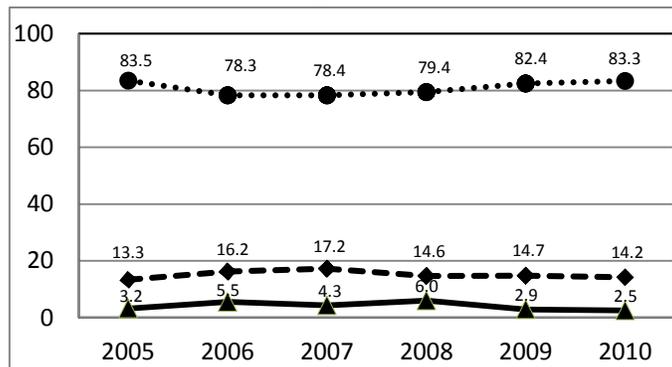
In addition, the problem of nuclear waste was still unsettled in Switzerland¹⁰ and possible sites were discussed in the media along with planned public consultations. In anticipation, the nuclear lobby bought pages in newspapers and commercials on television, where nuclear energy was described as climate

¹⁰ Since 2006, nuclear wastes have no more been sent to France or Germany, they have been since then sent to cool down in a large water pool in Würenlingen (AG). For an overview of Swiss nuclear waste management, see Kuppler (2012).

friendly, carbon-free and economic. Some sources state that Swiss nuclear lobby groups spend about 3 Million CHF per year, but the overall budget is non-available¹¹. Part of the actions of the lobby were surveys, which showed positive trends of acceptance of nuclear energy; since 2004, around 80% of Swiss people consider existing nuclear power plants rather safe¹² (Figure 2) and around 70% of the population agree that nuclear stations are needed to provide electricity in Switzerland. If in 2004 and 2005, more respondents were opposed to rather than in favour of replacement of old nuclear power plants, since then the majority has been in favour and its percentage increased (51% in 2006, 55% in 2009).

By conducting surveys, the pro-nuclear lobby seemed to target two well-known goals of the survey: first, the agenda-setting of the issue and, second, an improvement of the image of the issue. By highlighting that the majority of citizens support their own position, the pro-nuclear lobby sidelines the opinion of opponents to nuclear energy. However, those surveys showed public acceptance of nuclear energy so different from other

Figure 2 — Results on the statement ‘Do you consider the existing nuclear power plants in Switzerland rather safe or rather dangerous?’ (in %, green rather safe, red rather dangerous, white DK, Swissnuclear)



Source: Swissnuclear (2011)

¹¹ See for example, the following articles in the media: *Beobachter* 1 October 2010, *NZZ am Sonntag* 21 November 2010, *der Sonntag* 20 March 2011.

¹² The percentages are slightly lower in the French-speaking part than in the German-speaking part, where all existing nuclear power plants are located.

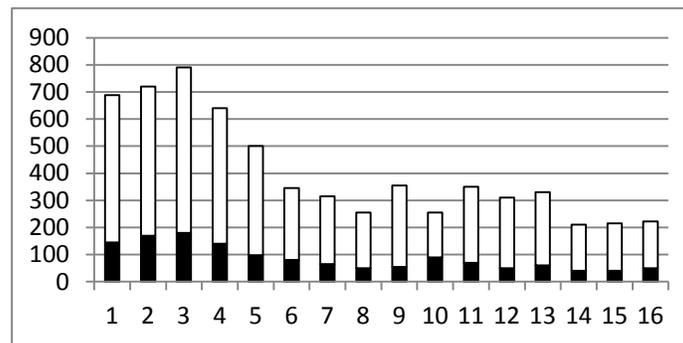
surveys' results¹³ that the media pointed the huge discrepancies that did not fit within 'normal' margin of errors (*L'Hebdo*, 27 March, 2007).

In summary, this period saw a positive trend for nuclear energy acceptance due to external factors (climate change, financial crisis) and to an increase of means and actions of the nuclear lobby in Switzerland.

2011: the phase-out shortly after Fukushima

At the time of the Fukushima accident, Switzerland had four active nuclear power plants (all located in the German-speaking part) and nuclear power accounted for 40% of the total electricity production in the country¹⁴. After the accident, the media coverage was high: 6,668 occurrences of the term 'Fukushima' in the German-speaking and French-speaking media in the sixteen weeks after the accident (Figure 3). The media published different types of articles on this issue (editorial, international and national sections, science, politics, economics and even people sections, readers' comments, expert's corner, etc.) and

Figure 3 — Media coverage in the weeks 1 to 16 after the accident of Fukushima in the German-speaking (blue) and French-speaking (red) region



Source: Crettaz von Roten (2011)

¹³ Keller *et al.*, (2012) reported that in 2011 46% of the respondents of their study were in favor of replacing the existing nuclear power plants (36% opposed and 16% undecided), that is, 9% less than the results of Swissnuclear (2011).

¹⁴ Hydroelectric power plants accounted for 55%.

followed mainly four frames for science-related policy debates (Nisbet and Scheufele, 2009): the frame of governance and public accountability, of scientific and technical uncertainty, of alternative path, and, less frequently, of economic development (Crettaz von Roten, in prep.).

As the issue of nuclear energy was clearly framed as political before the accident — the issue was described as essential for the national elections that would occur in October, 2011 — the issue remained mainly political after Fukushima. On 14 March, 2011, the Federal Council decided a moratorium on the construction of new nuclear power plants for an indefinite period of time. The left parties, historically opponents to nuclear energy, asked the Federal Council (15 March, 2011) to elaborate a law to withdraw from nuclear and to close the oldest nuclear power plants in Switzerland. Civil society organisations and stakeholders were highly active (Greenpeace, WWF, *Pro Natura*, *Sortir du nucléaire*, *Non au nucléaire*, etc.); they organised, for instance, demonstrations (e.g. in March against Alpico, in May near Beznau, in June and September near Mühleberg).

A week after the accident appeared in the Sunday newspapers¹⁵ the results of a survey were realised shortly after the accident (17-19 March, 2011). According to them, 87% of the Swiss population wanted a withdrawal from nuclear energy; 62% wanted the oldest Swiss nuclear power plants to be stopped and 74% were opposed to the construction of new nuclear plants. Compared to a similar survey realised in January 2010, the percentage of people in favour of the construction of new power plants dropped from 55% to 21%. This survey had a huge impact as it was reported in most Swiss newspapers and on televisions, underpinning the argument that the population wanted a withdrawal from nuclear energy¹⁶. This survey had an effect of

¹⁵ A French-speaking and a German-speaking Sunday newspaper (*Le Matin Dimanche* and *Sonntagszeitung*) had commissioned and financed a survey on 506 voters in the French- and German-speaking part, and published it on 20 March 2011.

¹⁶ These results were confirmed by other surveys, i.e. a survey from Gfs in May 2011 reported that 84% of Swiss citizens supported the Federal Council's decision to suspend the proceedings to construct new nuclear power plants and that 65% of Swiss people agreed to withdraw from nuclear even if this meant a significant increase in the price of energy for consumers.

closure, preventing to consider ‘other outcomes’ to the catastrophe than that which emerged from the survey.

Information emerged about nuclear safety¹⁷ and about some accidents having occurred on Swiss nuclear power plants before. After that, the green party announced the launch of a popular initiative for nuclear phase-out (20 March, 2011) if the government did not take this decision itself. Some right-wing parties, which were historically pro-nuclear, showed more openness to a withdrawal from nuclear energy. A kind of political consensus thus seems to have emerged in the spring; parties differ however on the withdrawal’s time frame.

An internal document of Areva (25 March, 2011) considered that most governments ‘had pretty rational reactions following Fukushima’ except Switzerland and Italy. On May 25, the Federal Council opted for the scenario of withdrawal from nuclear energy by 2035. In the end of summer, the legislative (the Council of States and the National Council) confirmed this scenario but allowed research in the nuclear field (28 September, 2011). Projects for alternative sources of energy emerged (solar or wind energy, hydropower, natural gas power stations), even if those also raised some criticisms and oppositions (for example, on the part of citizens living close to wind power projects).

On 6 September, 2011, the socialist party launched a popular initiative named ‘Cleantech’ that proposed a move toward sustainable energy in Switzerland. The government issued a call for projects intended to stimulate energy saving. By the end of 2011, electricity consumption in Switzerland decreased by 2%. Sustainable energy and energy saving have emerged as two pillars for the future.

Discussion and Conclusions

This article has documented why current decisions on nuclear energy in Switzerland cannot be considered in historical isolation. The opposition to nuclear energy that began in the

¹⁷ The results of a study PEGASOS, conducted by 21 European experts and published in 2006, concluded that the earthquake risks in Switzerland were twice as large as had been previously estimated. The oldest nuclear stations have been sized according to values today considered as obsolete.

1970s was, in part, a resistance to this new technology, but also an indicator of the transformation of the social references — in particular about the definition of the relationship between humans and the environment, about the role of the State and about the market economy. Therefore, the 1970s society's change of attitudes affected not only nuclear energy, but science and technology in general; however points of view were crystallized on nuclear energy. On the one hand, opponents rejected a technology that would make society more misanthropic, that engendered risks toward the environment and that was governed by a too powerful industry. On the other hand, supporters of nuclear energy complained that the technology was victim of an irrational and ignorant society, which is one of the first occurrences of the deficit model¹⁸. A series of accidents (Three Mile Island, Saint-Laurent-des-Eaux, Chernobyl and Fukushima) have increased the share of the opposition and have therefore sounded the death knell for nuclear energy in Switzerland.

However, nuclear energy was the first of a long list of scientific issues that generated a resistance in society: biotechnology, information technology, nanotechnology, etc. All these scientific issues have shaped the 'scientific temper' of the Swiss people. The current attitudes towards science are rather positive, but concerns exist about the foreseen and unforeseen consequences of interfering with nature (Crettaz von Roten, 2012). This is specially the case with animal experimentation, biotechnology and nanotechnology. The 'scientific temper' is reinforced by direct democracy that regularly leads to gain information and to debate on scientific issues. Buchmann (1995) interpreted initiatives in the case of scientific and technological issues as a form of public resistance to technology.

Switzerland illustrates the European convergence towards participatory decision-making procedures on scientific developments; however, people in Europe were not called to the polls as often as the Swiss population in order to make decisions in the energy area (Romerio, 2008). To sustain the debate

¹⁸ This model refers to the assumption that the more the lay people know science and technology, the more they will love it.

between science and the Swiss society, various initiatives have been taken: creation of the Science and Society Foundation — in charge, among other things, of the Swiss science festival — generalisation of universities' open days, consensus conferences, science cafés, etc.

This evolution of public perception and political actions towards nuclear energy is not specific to Switzerland. For example, a similar trend of opinions has been documented in the USA (Pidgeon *et al.*, 2008). In some European countries, similar political decisions have been taken. In 1987, one year after the Chernobyl disaster, Italy decided by referendum the phase-out of nuclear power and the four Italian nuclear power plants operating were arrested, the last one in 1990. In Austria, the production of nuclear energy was prohibited by the 'Constitutional Law for a nuclear-free Austria' in 1999. In 2000, the German Chancellor fixed the withdrawal from nuclear energy in 2020 and, in March 2011, Angela Merkel decided to permanently shut down eight reactors and declared the definitive cessation of all German nuclear plants by 2022 at the latest.

This does not mean that the issue of nuclear energy is over from a social sciences' point of view. Future research should examine the influence of the Fukushima accident in various areas: on the evolution of nuclear energy acceptance, on the affective imagery of nuclear power, on the implementation of political decisions, etc.

References

- Areva (2011) Impact of Fukushima event on nuclear power sector, Areva.
- Bauer M (1995) Resistance to new technology and its effects on nuclear power, information technology and biotechnology. In Bauer, M. (ed.), Resistance to new technology: nuclear power, information technology and biotechnology. Cambridge, UK : Cambridge University Press: 1- 42.
- Beck U (1992) Risk Society, Towards a New Modernity. London: Sage Publications.
- Boy D (2007) Pourquoi avons-nous peur de la technologie? Paris, Sciences Po les Presses.
- Buchmann M (1995) The impact of resistance to biotechnology in Switzerland: a sociological view of the recent referendum. In Bauer, M. (ed.), Resistance to new technology: nuclear power, information technology and biotechnology. Cambridge, UK: Cambridge University Press: 207-224.

- Crettaz von Roten F (2011) Monitoring media coverage, public debates and political responses of the accident of Fukushima Daiichi: the case of Switzerland, Report for the European MASIS project.
- Crettaz von Roten F (2012) The human-animal boundary in Switzerland: a cross-cultural perspective. In Bauer M. W., Shukla R., Allum N. (eds.), *The Culture of Science - How does the Public relate to Science across the Globe?* New York : Routledge: 319-331.
- Crettaz von Roten F (in prep) Newspaper reporting of Fukushima accident in Switzerland.
- Diekmann A and Franzen A (1997) Les Suisses et l'environnement. In OFS, *L'environnement en Suisse en 1997*, Berne: Office Federal de la Statistique: 363-372.
- Diekmann A, Meyer R, Mühlemann C and Diem A (2009) Schweizer Umwelt-survey 2007—Analysen und Ergebnisse, Bericht für BFS und BAFU.
- Favez J C and Mysyrowick L (1987) *Le nucléaire en Suisse*. Lausanne: L'Age d'Homme.
- Giugni M and Passy F (1997) *Histoires de contestation. Les nouveaux mouvements sociaux et leur institutionnalisation en Suisse, 1975-1995*, Paris : L'Harmattan.
- Keller C, Visschers V and Siegrist M (2012) Affective imagery and accepting of replacing nuclear power plants, *Risk Analysis* 32(3): 464-477.
- Kupper P (2006) From Prophecies of the Future to Incarnations of the Past: Cultures of Nuclear Technology. In Nowotny H. (ed), *Cultures of Technology and the Quest for Innovation*, Oxford: Berghahn Books: 155-166.
- Kuppler S (2012) From government to governance? (Non-) Effects of deliberation on decision-making structures for nuclear waste management in Germany and Switzerland. *Journal of Integrative Environmental Sciences* 9(2): 103-122.
- Mironesco C, Boysan T and Papadopoulos I (1986) *Débat sur l'énergie en Suisse. Les processus législatifs fédéraux de 1973 à 1983*, Lausanne: Presses Polytechniques Romandes.
- Nisbet M and Scheufele D (2009) What's next for Science Communication? Promising Directions and Lingering distractions. *American Journal of Botany* 96(10): 1767-1778.
- OFSP (2006) 20 ans après l'accident nucléaire de Tchernobyl: Les conséquences en Suisse, available at <http://www.bag.admin.ch/themen/strahlung/12267/12274/index.html?lang=fr>, (accessed November 25, 2012).
- PEGASOS (2006) Probabilistische Erdbeben-Gefährdungs-Analyse für KKW-Standorte in der Schweiz, Swissnuclear.
- Pidgeon N F, Lorenzon I and Poortinga W (2008) Climate change or nuclear power — No thanks! A quantitative study of public perceptions and risk framing in Britain. *Global Environmental Change-Human and Policy Dimensions*, 18(1): 69-85.

Romerio F (2008) Les controverses de l'énergie: fossile, hydroélectrique, nucléaire, renouvelable. Lausanne : Presses Polytechniques Universitaires Romandes.

Swiss Federal Office of Energy (2008) Attitudes towards radioactive waste in Switzerland. Available at: <http://www.news.admin.ch/NSBSubscriber/message/attachments/13144.pdf>, Accessed September 10, 2010.

Swissnuclear (2011) Eckwertstudie 2011. Pressebild. Available at: http://www.swissnuclear.ch/upload/cms/user/swissnuclear-Eckwertstudie_2011_-d.pdf, Accessed October 19, 2011.

UNIVOX (2005) Umwelt 2004/2005: Trendbericht. Zürich: Gfs.