FORATOM
THE VOICE OF THE EUROPEAN NUCLEAR INDUSTRY

What people really think about nuclear energy

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Regaining public acceptance

Editorial

Nuclear power is a reliable, baseload, low-carbon energy source that can contribute to the fight against climate change. It is also competitive and can help reduce energy dependency. It is vital that politicians take the lead and implement bold decisions regarding the energy mix. Developments in Finland and the UK show that if the political decision to include nuclear in the energy mix is taken and information is communicated in an open, inclusive and democratic way, people tend to become more favourable to nuclear power.

The March 2011 accident at the Fukushima-Daiichi nuclear plant in Japan had an impact on public opinion towards nuclear power. Yet the results of opinion polls carried out throughout Europe after the accident show that opinion is polarised and country specific. In Germany and Switzerland, opposition to nuclear rose sharply, while in other countries, particularly those where with plans for new reactors such as the UK, France and Finland, much of the population still backs nuclear. In many countries – the UK, France, the Netherlands, Spain and Finland among them – after a dip just after the accident, public acceptance of nuclear has recovered.

Before Fukushima-Daiichi, public acceptance of nuclear had been increasing. The **Eurobarometer on Radioactive Waste**, published in July 2008,[1] showed there were almost as many in favour of nuclear energy (44%) as against it (45%). This was mainly because people were concerned about climate change and security of supply issues. The survey also showed a significant gap between views in countries with a traditionally anti-nuclear culture such as Austria, Cyprus, Malta and Portugal, and those in countries where support for nuclear is strong, including Hungary (63% in favour), Sweden (62%), the Czech Republic (64%) and Lithuania (64%). Despite negative headlines arising from Fukushima-Daiichi, nuclear remains what the pollsters call a “back-of-the-mind” issue, one which only preoccupies people when it’s in the news. The public’s attitudes can change quickly and is influenced in polls by the way the questions are phrased.

A COMPLEX ISSUE

INTRODUCTION

Nuclear energy has a crucial role to play in the European energy mix. There are 129 nuclear power reactors in operation in 14 countries across the European Union. About one third (27%) of all the electricity produced in the EU is nuclear-generated.

No Europe-wide opinion poll regarding nuclear has been carried out since the Fukushima-Daiichi accident and the current state of public opinion and the real impact in the EU of the Fukushima accident still needs to be assessed.

The results of the July 2008 Eurobarometer survey showed that since an earlier survey in 2005, there had been a gradual but significant evolution of public opinion in favour of nuclear power. Another survey, the **Eurobarometer on Nuclear Safety**[2] (April 2010) concluded that 56% of EU citizens wanted nuclear energy to be maintained or increased; up eight percentage points compared to a similar survey in 2007.

However, the same survey showed that most Europeans (51% against 35%) believed that the risks posed by nuclear power outweigh its advantages. And yet most (59%) were confident that nuclear power plants can be operated safely. The issue of public acceptance is complex and if these sometimes conflicting results demonstrate one thing it is that we need to find a more accurate view of public opinion in Europe.

European nuclear industry supports

800,000 jobs

METHODOLOGY

Nuclear energy and energy issues in general are not major concerns for EU citizens. They are known among pollsters as “back-of-the-mind” issues – issues which only become a concern when there is major media coverage, such as the coverage surrounding Fukushima. In a **Eurobarometer survey on energy technologies** (May-June 2006), EU citizens rated energy issues (14%) far below unemployment (64%), crime (36%) and healthcare systems (30%) in terms of importance. When stacked up against issues that have a direct and quantifiable impact on people’s lives, energy issues rarely take priority.

The methodology behind surveys impacts the outcome in a number of ways. Respondents in most surveys on nuclear energy are either asked to choose from a multiple choice list of answers to open-ended questions, or asked to reply spontaneously to a direct question with “yes” or “no”, “agree” or “disagree”. Though some standard question formats exist, avoiding bias when asking questions on opinions is not so easy. There are many ways to write a biased question. A question may be biased because it portrays one side of an issue more favourably. For example, a questionnaire might include the question, “Should nuclear energy be phased-out in an effort to make energy cleaner?” The option of phasing out nuclear is shown more positively than the option of not phasing it out – there is a reason given for phasing it out, but not for keeping it. Questions can be even more biased if they use emotional words. For example, the question, “Do you favour phasing out nuclear power because of the dangers of radiation?” is unlikely to gain many “no” responses except from people with a professional understanding of radiation.

Some surveys use a gently coercive approach. In an International Atomic Energy Agency survey into the climate change benefits of nuclear energy the results are completely different depending on whether the question refers to the “expansion” or “continuation” of nuclear power. The wording is crucial and figures alone are meaningless without some understanding of how they were gathered.

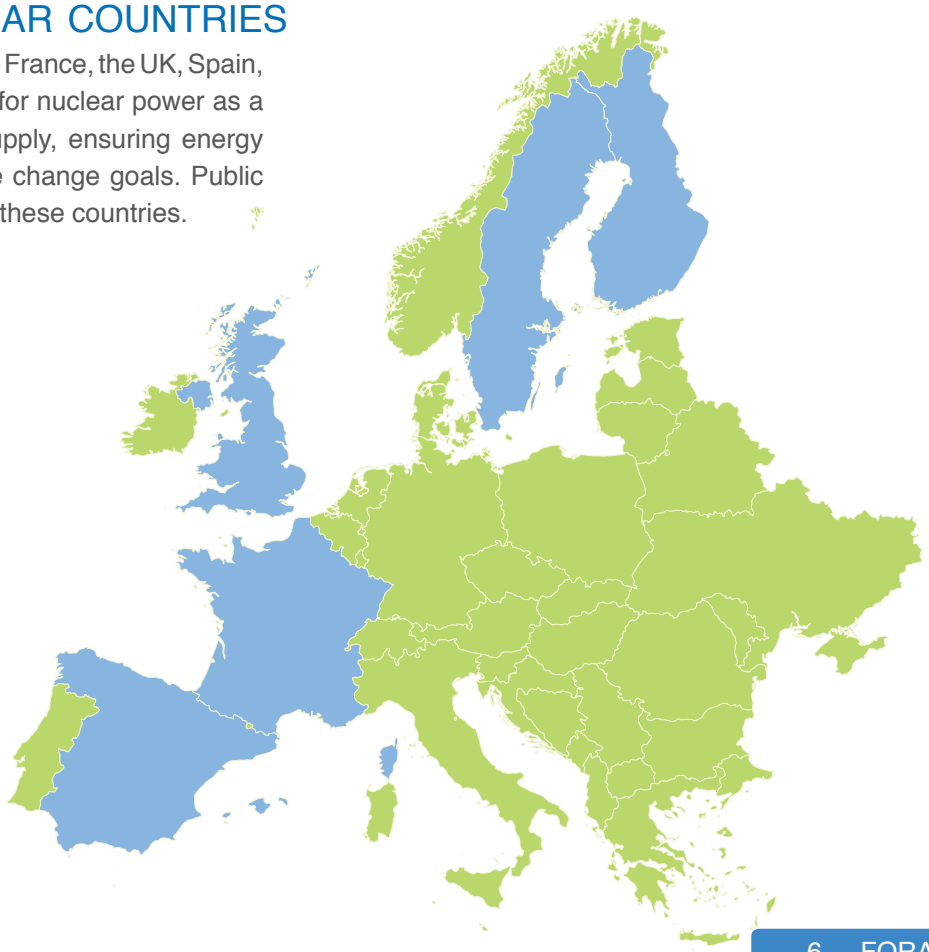
[1] Eurobarometer survey on radioactive waste: http://ec.europa.eu/public_opinion/archives/ebs/ebs_297_en.pdf
[2] Eurobarometer on nuclear safety: http://ec.europa.eu/public_opinion/archives/ebs/ebs_324_en.pdf

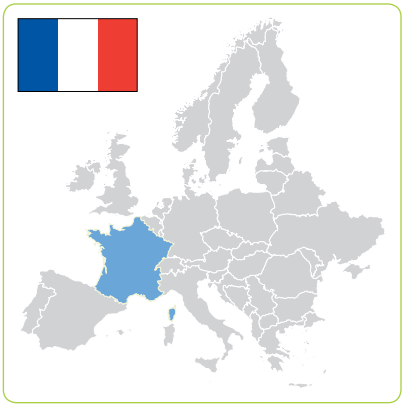
Diversity of situations due to political and cultural developments

Various Eurobarometer surveys reveal a clear division between countries within the EU. There are entrenched views in countries with a rigidly anti-nuclear culture, such as Austria, Cyprus, Malta and Portugal. In Hungary, Sweden, the Czech Republic and Lithuania there is strong support for nuclear energy. This polarisation makes it difficult to identify an “average EU view”.

Experienced nuclear countries

Europe’s leading nuclear countries – France, the UK, Spain, Finland and Sweden – have opted for nuclear power as a means of securing their energy supply, ensuring energy independence and meeting climate change goals. Public opinion usually supports nuclear in these countries.



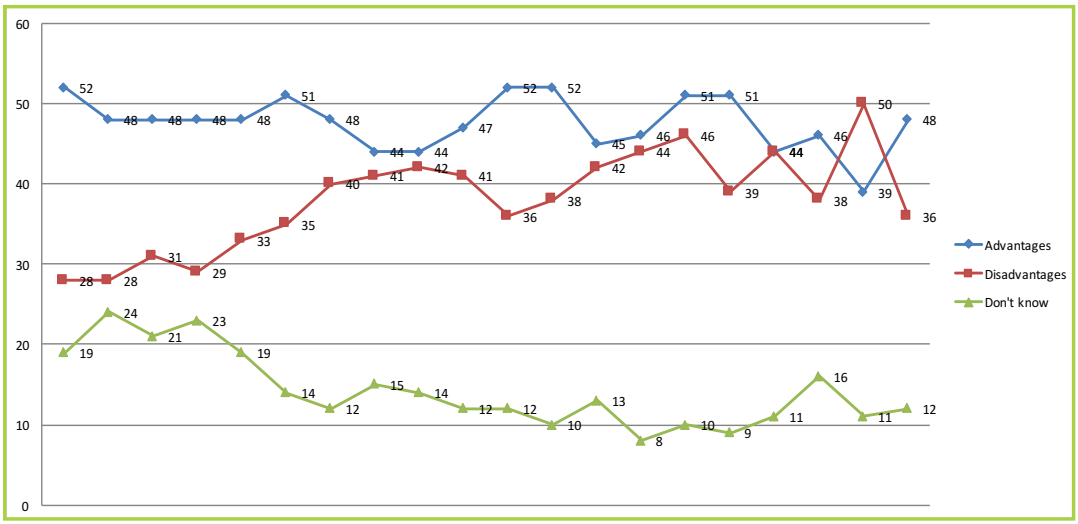


France

France is the world's largest nuclear power generator on a per capita basis and ranks second in total installed nuclear capacity behind the United States. France has 58 commercial nuclear reactors that produce around 76% of its total electricity. There is one reactor, a European Pressurised Reactor (EPR), under construction at Flamanville in Normandy. It has been delayed, but is scheduled to begin operation at the end of 2018. In July 2014, the French government adopted an "energy transition" bill, which pledges to increase the share of renewables in electricity production to 40% by 2030 and reduce the share of nuclear to 50% by 2025.

Advantages and drawbacks of nuclear[3]

Do you think France's production of 75 percent of its electricity from nuclear is an advantage or a drawback?

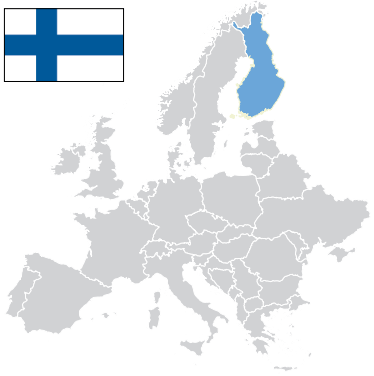


Explanation

Public support for nuclear power has always been strong in France. France took a federal, centralised decision in the 1970s to choose nuclear to reduce energy dependency and this decision to build reactors was applied across the whole country. Today there are 58 commercial nuclear reactors in operation in France, which means many citizens live in an area that has a nuclear power plant. School and industry trips are organised to visit nuclear power plants. People are familiar with the issues and consequently less resistant to nuclear.

Although nuclear reactors have always been operated safely, the French still worry that nuclear activities are risky. Fifty-five percent think the risk of a severe nuclear accident is high. However, they trust authorities and regulators with controlling and ensuring the safe operation of nuclear reactors. The latest opinion poll carried out by the French Alternative Energies and Atomic Energy Commission (CEA) in November 2015 shows that levels of pride and trust in nuclear remain high in France, and that most French (67%) believe nuclear is essential for energy independency. Yet only 30% think that it is "one of the less damaging sources of energy for the environment". The number of people who consider nuclear one of the cheapest sources of electricity is falling (43% in 2015, 56% in 2011). The credibility of scientists remains high (80%) and most (59%) believe scientists will find a sustainable solution to managing radioactive waste (59%).

[3] The French barometer on energy is available at: http://www.developpement-durable.gouv.fr/IMG/pdf/CS440-2.pdf



Finland

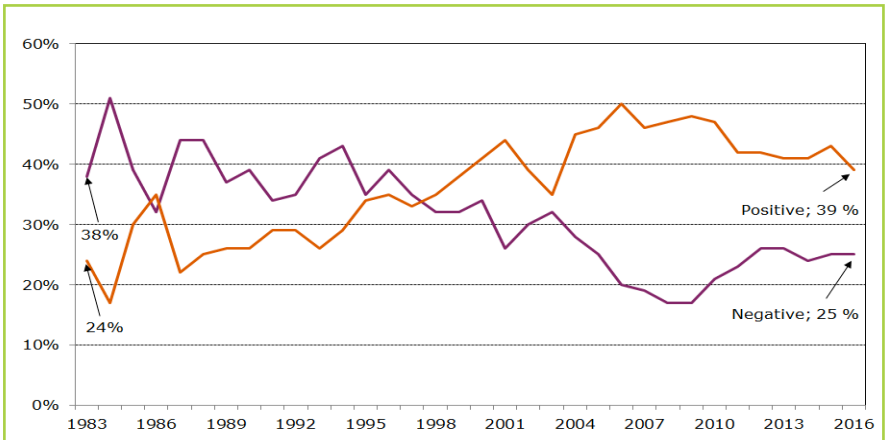
Finland has two nuclear stations, each with two reactors, and in 2015 nuclear energy accounted for 34% of total electricity production. Finland is expanding its nuclear capacity. In 2002, the government approved the construction of a new reactor (EPR), Olkiluoto-3, which will be the fifth in the country and is scheduled to start commercial operation in 2018. Construction of a sixth reactor, Hanhikivi-1, is in the early stages, but the company behind it, Fennovoima, says it will be operational in 2024. Hanhikivi-1 is being supplied by Russia's state nuclear corporation Rosatom.

The **Eurobarometer on Radioactive Waste** showed that 61% of Finns are in favour of nuclear, a high level of support. However, more recent poll results from Finnish Energy's annual Energy Opinion poll indicated a slight decrease in this support – possibly the result of press coverage surrounding Fennovoima's Hanhikivi-1 project being awarded to Russia. The poll indicated a more critical view towards all forms of power production. For the first time, wind power faced significant criticism.

"What is your general attitude towards nuclear power as an energy source in Finnish conditions?"

Source: Finnish Energy Industries and TNS Gallup Oy

Evolution of public acceptance of nuclear in Finland 1983-2016



Explanation

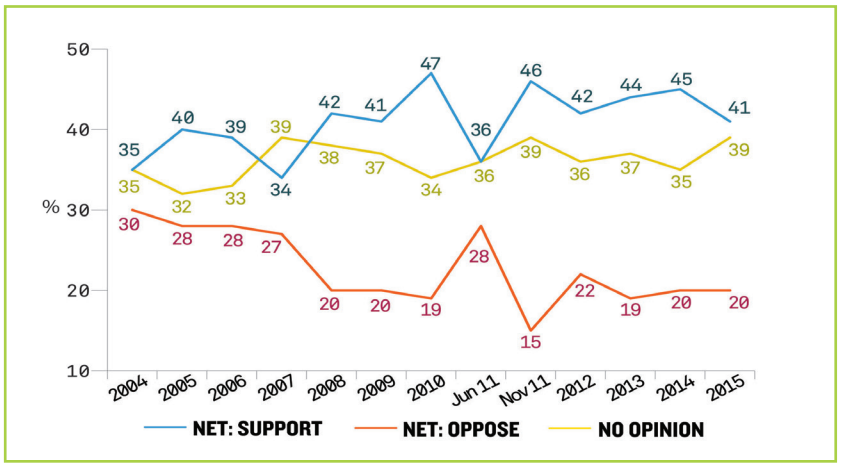
In Finland the debate on the future of nuclear began in earnest in 2001. Consultations took place and the decision to approve new build was taken by the Finnish parliament. There was no referendum, but indications were that citizens felt they were well-informed and part of a transparent public debate. The Finns are pragmatic. They realised that the best way to address both climate change and security of supply issues, particularly over-dependence on oil imports from Russia, was to use nuclear. The arguments against nuclear–that decommissioning is costly and that waste cannot be effectively managed – were proven inaccurate. Finland's nuclear industry pays for the dismantling of nuclear plants at the end of their operating lifetime and enough money has been set aside for this in a ring-fenced fund. Finland is also making progress on a final repository. In November 2015, Finnish nuclear waste management company Posiva was granted a licence by the government for the construction of a final disposal facility for spent nuclear fuel at Olkiluoto on the country's southwest coast – the first final repository in the world to enter the construction phase.

United Kingdom

The UK has 15 commercial nuclear reactors generating about 19% of its electricity, but the nuclear fleet is nearing the end of its lifetime and the Conservative government has committed itself to backing new build. Eight sites have been earmarked as suitable locations for new reactors with the first expected to be built at Hinkley Point in Somerset. The project to build two EPR units, estimated to cost £18bn (€23bn), was announced in October 2013, but it has been delayed as France's state-owned EDF, which is building the plant, secures partners and financing. An opinion poll published by the Nuclear Industry Association in February 2015 shows that 45% of the population favours new build. A December 2015 poll, also by the NIA, illustrates the same trend. Twice as many (41%) support rather than oppose (20%) new build plans. The poll also indicates that nuclear is perceived as the most effective source of energy to secure supply and is ranked highest for job creation and investment. Respondents said the main advantages of nuclear energy are that it is reliable, clean and sustainable. The results indicate that more than 70% believe nuclear is a necessary part of the energy mix. The main reasons for opposition to nuclear in the UK are waste, possible radiation leaks and the perceived general dangers of radiation.

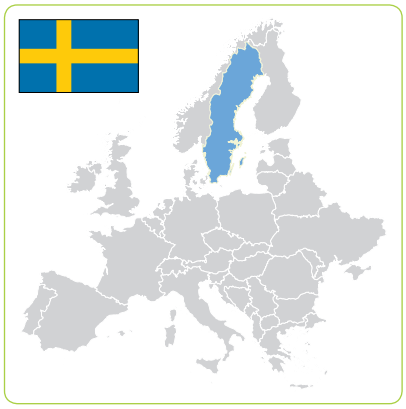
More people Support replacement new build than oppose

Source: NIA, 2015



Explanation

Oil reserves are dwindling in the North Sea and, until a minimal upturn in 2015, output had been declining. As a result, oil prices have increased and the UK's security of energy supply is being seen as under threat. People see nuclear power is a means of addressing this issue. The energy debate has helped increase public acceptance. UK citizens are also concerned with environmental issues and climate change. They are aware that renewables alone are not sufficient to tackle energy and environmental issues



Sweden

Sweden has ten nuclear reactors that account for about 34% of total electricity production. In June 2016, an agreement was signed between government and opposition parties that allows for the construction of up to 10 new nuclear reactors at existing nuclear sites in the coming years with permission also given to extend the operating lifetimes of units in the existing nuclear fleet. The agreement signified a significant U-turn in the left-wing ruling party's policy on nuclear energy. It says Sweden's goal of 100 percent renewable energy by 2040 did not mean that nuclear plants would be closed then. It also says 10 new reactors can be built.

Public support for nuclear in Sweden remains strong. A survey carried out in October 2014 by the Analysis Group shows that 36% (down from 32% in May 2014) of Swedes support the continued use of nuclear energy and the building of new reactors if needed; 32% (34% in May 2014) support the continued use of nuclear energy, but do not want any new reactors to be built. Twenty percent (24% in May 2014) want nuclear power to be phased out. The survey showed 44% (42% in May 2014) of respondents support the idea of closing old reactors to replace them with new ones and 28% (30% in May 2014) do not.

Spain

Spain has seven nuclear reactors that account for 21% of its electricity generation. The conservative government that took office in November 2011 is generally supportive of nuclear. In July 2012, it overturned a decision made by the previous socialist government and decided to allow the extension of the Garoña nuclear station's operating licence beyond 2013. The operator, Nuclenor, subsequently decided to shut down the plant on financial grounds, but has since revived the possibility of a restart.

An opinion poll carried out by Ipsos in July 2014, shows that opposition to nuclear in Spain stands at 54%, while public acceptance remains low at 29%. However, the same poll indicates that 25% are in favour of building new reactors, while 33% think that reactors should be operated until the end of their scheduled lifetimes and 38% support the progressive phaseout of nuclear power. The latest poll (June 2015) shows that 28% are in favour of nuclear energy and 60% against.

PHASE-OUT COUNTRIES

The international climate change agreements (Paris agreement - COP21- 12 December 2015) and the gas and oil crisis have prompted many European countries to question their phase-out policy and consider expanding their nuclear capacity to reduce GHG and ensure energy independence. However, some countries like Italy, Switzerland and Germany, have changed their mind after the Fukushima accident and decided not to build new nuclear reactors and/or to phase out nuclear.

Germany

Germany has eight nuclear reactors in operation that accounted for 14% of its total electricity production in 2015. The Chancellor, Angela Merkel, announced in March 2011 the immediate closure – at least until June 2011 – of seven nuclear reactors that began operation before 1980. In August 2011, it eight reactors were permanently shut down. In May 2011, the government adopted a decision to phase out nuclear completely by 2022. Popular support for nuclear power in Germany has been dwindling for years because of accidents like those at Chernobyl and Fukushima-Daiichi and the country's phase-out policy is an "expression of rational thinking among the German political establishment".

An opinion poll commissioned by DATF in April 2014 shows that 72% support a unified European energy policy. However, 56% oppose the idea that Germany should review key energy policy goals such as the nuclear phase-out.

Belgium

Seven nuclear reactors supply almost half of Belgium's electricity output. In 2014 the figure was 48%, but in 2015 it fell to 37% because of a number of temporary shutdowns. In July 2012, the government agreed on a phase-out plan for Unit 1 at the Tihange nuclear power station to operate 10 years beyond its original planned lifetime until 2025. In October 2014, a new Belgian government came into office and agreed that the Doel1 and 2 reactors would also be granted ten-year extensions. This decision was confirmed in December 2014. The bill was ratified by Parliament in June 2015 and agreed by operator Electrabel and the government in July 2015. In early October 2015, the Belgian nuclear regulator, the Federal Agency for Nuclear Control (FANC), approved an action plan submitted by Electrabel outlining actions to be taken over the next decade to ensure the continued safe operation of the two Doel reactors. The Minister for Energy, Environment and Sustainable Development, Marie-Christine Marghem, is in favour of nuclear energy and is considering extending the operational duration of all Belgian reactors beyond 2025.

According to an opinion poll commissioned by the Belgian nuclear industry association, Forum Nucléaire[5], and published in March 2015, six out of 10 Belgians believe that nuclear energy has more advantages than disadvantages; 63% back the continuous operation of nuclear power plants; and 75% are in favour of an energy mix including renewables and nuclear energy.

[7] The Belgian nuclear forum's survey can be found at: http://www.nuclearforum.be/fr/forum/68-des-belges-estiment-qu-il-sera-difficile-de-remplacer-l-energie-nucleaire-par-d-autres

Switzerland

Switzerland has significant hydroelectric power sources, but no oil and gas reserves. It depends, therefore, on imports to make up its requirements. In 2015, around 33% of Switzerland's electricity was produced by its five nuclear reactors. Before the March 2011 Fukushima-Daiichi accident, the Swiss government had decided to replace ageing reactors with new ones and was in the process of approving the construction of new units at three locations. After the accident, policy shifted. The Swiss government and parliament voted to ban new reactors and to close the country's existing units at the end of their useful lifetimes.

A popular initiative on nuclear energy submitted by the Green Party in 2013 had enough signatures to be put to a nation-wide vote. The vote will take place on 27 November 2016. The initiative called for a mandatory 45-year operating limit for the country's five nuclear reactors. On 27 November, Swiss citizens voted by 54% against the Green Party's initiative to close nuclear power plants (NPPs) after 45 years of operation. Under the Swiss Energy Strategy 2050, nuclear reactors should continue to operate as long as they are deemed safe by the independent safety regulator (IFSN).

A November 2015 swissnuclear[6] poll on public opinion towards nuclear in Switzerland showed that 58% (compared to 63.5% in December 2014) consider nuclear plans necessary. Seventy-one percent (77.6%) believe Swiss nuclear plants are safe and 66% (70%) think they should be operated as long as they are safe. Seventy-five percent said they want an independent electricity supply, 77.8% want a public vote on the policy of *Energiewende* (energy transition) and phase-out of nuclear.

According to a 2015 survey by the Federal Office for Statistics, 39.6% (compared to 46.8% in 2011) considered nuclear plants "very dangerous" and 37.3% (34% in 2011) "rather dangerous".

[6] *For more details see: http://www.swissnuclear.ch/upload/cms/news/CommuniquEckwert2015_FR_final_neu.pdf*

New build countries in Central and Eastern Europe

In the Baltic States, Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia, which all have new-build plans at various stages, public support is strong.

In some of these countries – particularly the Baltic States, Romania and Slovenia –

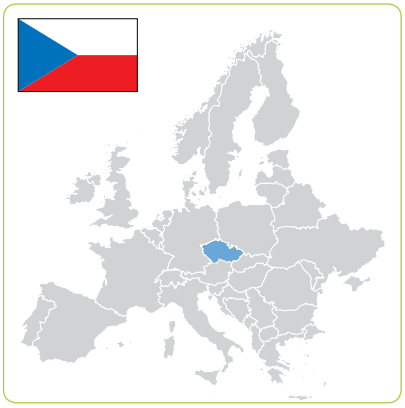
public opinion has not been monitored to a significant degree and conclusions about attitudes towards nuclear are difficult to reach.

Bulgaria

Nuclear energy accounted for 31% of total electricity production in Bulgaria in 2015.

Units 3 and 4 of the Kozloduy nuclear station were shut down in December 2006 to meet the requirements for joining the European Union. Units 1 and 2 were closed at the end of 2002 and a modernisation plan is being implemented for units 5 and 6. In March 2011, the Russian and Bulgarian governments agreed on a three-month moratorium on the construction of the planned Belene nuclear station to calculate an exact price and to fully assess seismic risks. However, in March 2012, the Bulgarian government decided to abandon the construction of the two planned treactors on financial grounds. A third reactor at the existing Kozloduy sited is being considered.

According to a study carried out by Gallup in February 2012, 51% of Bulgarians supported the construction of Belene, 22% were against, and the rest had no opinion.



Czech Republic

The Czech Republic has six nuclear reactors, which produce 32% of total electricity. The Czech Republic exports electricity primarily to Germany, Austria and Slovakia. Two more reactors are planned for the existing Temelin nuclear station. In November 2012, the government said it wanted to increase the share of nuclear in domestic electricity production to 50% by 2040. However in April 2014, state-controlled utility ČEZ cancelled an open tender for the construction of two additional reactors planned for Temelin. In June 2015, the Czech Cabinet approved a national action plan for the long-term future of nuclear energy, including plans to build new nuclear units at the existing Temelín and Dukovany nuclear sites. The government said the National Action Plan for the Development of Nuclear Energy counts on at least one new power reactor being built at Dukovany and Temelín, with a probable total of four new reactors in the long term at the two locations. The plan recommended that ČEZ create a subsidiary to prepare construction plans and explore options for financing the reactors. However, the plan said that final approval of construction of the first new reactors could wait until 2025.

An opinion poll conducted by IBRS and commissioned by ČEZ in October 2014 showed that 43% of the population favoured nuclear new build while 31% was against it. The main arguments put forward by respondents in favour of nuclear were affordability (28%), energy independence (18%), sustainability (10%) and energy performance (8%).

Hungary

Hungary has one nuclear station with four reactors at Paks. The plant is the largest power producer in the country and meets 53% of Hungary's domestic power needs. In 2009, Hungary announced plans to double the capacity of Paks with two new reactors. Members of Parliament approved the plan in March 2009 and the first new reactor is scheduled be completed by 2025. The new reactors are intended replace existing units at Paks which are due to shut down by 2037. In January 2014, the government signed an agreement with Russia's Rosatom to build the reactors, with Russia providing 80% of the finance.

Hungarians were the European citizens who were most favourable to nuclear power (63%), according to the **Eurobarometer on Radioactive Waste** published in 2008. Even amidst fierce political opposition to new build, Paks NPP managed to keep its approval rating at 70% or higher in recent years.

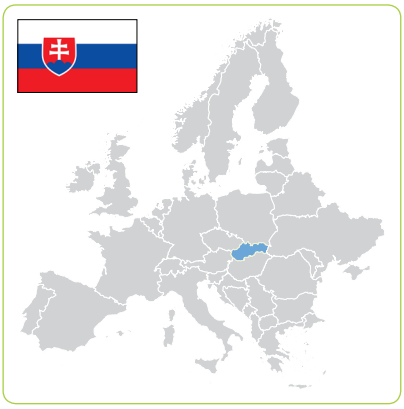
Poland

Poland has experienced significant economic growth and electricity consumption is expected to rise noticeably in the following years. Poland relies mostly on coal to meet its energy needs, yet many coal-fired power plants have been operated for over 30 years and need to be modernised or decommissioned.

In January 2009, the Polish government adopted a resolution on nuclear energy that indicates that called for new nuclear reactors to be generating electricity by 2020. In January 2014, the Council of Ministers adopted the Polish Nuclear Power Programme, thus confirming the intention to construct the first nuclear power plant in Poland and designating PGE S.A. as the investor for the project.

The development of the investment process as well as future operation of the nuclear plant within the PGE group is the responsibility of PGE EJ 1.PGE EJ 1 is currently working on updating the schedule of investment. Simultaneously, site investigation and environmental assessment are being carried out at two potential locations.

In the latest survey conducted by the Polish Ministry of Energy in November 2016, 61% of respondents said they were in favour of building a nuclear power plant in Poland, which is the highest score in the history of the poll and signifies 10% increase in support comparing to the results from 2015. Furthermore, 48% of respondents would also agree to live in the immediate vicinity of the nuclear power plant.



Slovakia

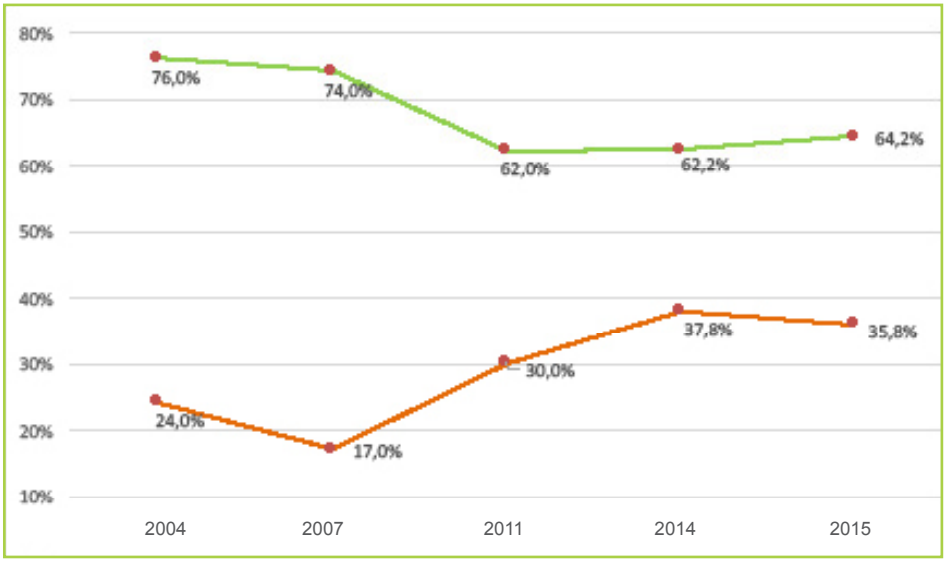
Slovakia has four nuclear reactors at two nuclear power plants, Mochovce and Bohunice. Nuclear power accounted for 56% of total electricity production in 2015.

In November 2008, the government announced that the construction of units 3 & 4 at Mochovce NPP had begun. In December 2008, the Slovak government chose Czech utility, CEZ, as its strategic partner in proposals to construct the fifth reactor of the Bohunice NPP. Mochovce 3 & 4 are still under construction. Their completion has been delayed and they are now expected to be connected to the grid by 2017 and 2018 respectively. The construction of Bohunice 5 is still in the pipeline. A new Act on Civil Liability for Nuclear Damages approved by the Parliament entered into force in January 2016.

In Slovakia, support for nuclear energy is strong. According to the latest opinion poll commissioned by Slovenske Elektrarne, the Slovak energy company, over 64% of the population backs nuclear new build in the country.

IN FAVOUR of future nuclear energy development

AGAINST future nuclear energy development



Explanation

Nuclear power is a major employer and there are concerns over jobs if nuclear plants were to shut down. In some new EU member states, nuclear energy provides a significant share of electricity production (Bulgaria: 31%, Czech Republic 32%, Hungary: 53%, Slovakia: 56%). People are concerned about a loss of energy independence and the possibility of becoming more dependent on energy imports from Russia if nuclear were to be phased out. Nuclear is generally seen as reliable and cost-effective in the long-term

Countries opposed to nuclear that are neighbours of pro-nuclear countries

In these countries, public opinion is traditionally strongly against nuclear power. This is the case in Austria, Denmark, Ireland, Luxembourg and Norway.

Austria

Austria has a long-standing opposition to nuclear power. In 1978, it passed a law which forbids the construction of power plants based on designs using nuclear fission. Austria has no nuclear reactors, yet 15% of its winter electricity consumption is generated by nuclear in neighbouring countries.

Austria has considerable hydroelectric capacity – 70% of the country's total generation – but limited fossil fuel resources and imports almost all its natural gas and oil. Hydroelectricity generation is seasonal, with greater production capacity in summer than winter. Austria imports significant amounts of electricity in the winter because of this seasonal generation pattern, mostly from Germany, the Czech Republic, Hungary, Switzerland and Slovenia.

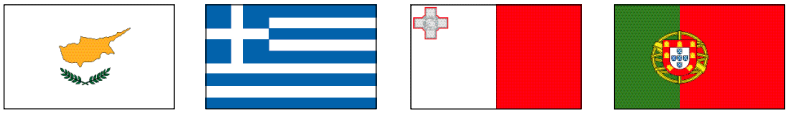
Public acceptance of nuclear power is low, standing at 14% according to the July 2008 **Eurobarometer on Radioactive Waste**.

Explanation

In 1978, a referendum was held on the future of nuclear power in Austria. Opposition was not as high as it is now: 32% voted against nuclear and 31% in favour, with 36% who did not vote and 2% invalid. The real shift in public opinion began because of concerns over safety as a result of the Three Mile Island accident in 1979 and Chernobyl in 1986. After the fall of the Soviet Union, Austria became concerned that its ex-Soviet neighbours, Slovakia and the Czech Republic, had existing plants that it believed could be unsafe, and that both countries might build new ones. An anti-nuclear campaign began and Austria's government tried to prevent these countries from building more units. The policy was supported by the media.

Countries where there is no real debate on the future expansion of nuclear power

In Cyprus, Greece, Malta and Portugal, few opinion polls on nuclear have been carried out. The level of support for nuclear power has only been analysed through **Eurobarometer surveys**. Though nuclear is not an issue, public opinion tends to strongly oppose it.



In Greece, 86% are opposed to nuclear, in Cyprus 81%, in Malta 62% and in Portugal 53%. This seems to suggest that when citizens are not well- informed they are more likely to believe in scare stories spread by opponents to nuclear.

Remarks

It is impossible to identify a single, unified European public opinion on nuclear energy. Political and cultural factors, amplified by external events such as Fukushima-Daiichi, influence public opinion in different ways. The dissemination of information through public debates, and governmental action reported in a responsible media, are essential in shaping public opinion. The more people know about nuclear the more they are in favour of it. However, the media's tendency to sensationalise nuclear energy and associated issues such as radiation and waste, clearly has a negative impact. In the UK, an open debate on nuclear has resulted in people

being well-informed. The Finns have been kept well-informed by a transparent parliamentary debate. In both cases these debates resulted in higher acceptance of nuclear. In Austria, the government's campaign against the construction of nuclear power plants in the Czech Republic and Slovakia has helped shape public opinion against nuclear. The French government's campaigns in favour of nuclear, along with public and parliamentary debates, have fostered positive attitudes towards.

Obstacles to increasing public acceptance

There are some trends that can be identified from opinion polls. People's perception of nuclear power is still driven by fear, connected primarily with safety, the threat of terrorism, the possible misuse of radioactive materials and the controversial question of what to do with radioactive waste.

The Safety issue

Safety is a precondition to gaining public acceptance. It has to be ensured.

Most people expect nuclear power plants to be safe; if they don't think they are, they tend to automatically oppose nuclear power. Nuclear safety and the public's belief that nuclear plants are safe are preconditions for public acceptance.

The **Eurobarometer on Nuclear Safety** (2010) showed that most EU citizens (59%) were confident that nuclear plants can be operated safely. In countries that use commercial nuclear reactors to produce electricity, people generally believe in the safety of the nuclear power plants. Most citizens (51%) thought that nuclear safety authorities were capable of ensuring that nuclear plants are safe. But people were divided on the capacity of nuclear operators to run the plants safely (47% trust nuclear companies, 43% don't). No Eurobarometer survey on nuclear issue has been published by the European Commission since 2010. It is therefore difficult to assess the evolution of public acceptance Europe-wide.

Radioactive waste management

Radioactive waste management is the public's main concern about the use of nuclear power with 78% of EU citizens believing that all radioactive waste is dangerous (source: **Eurobarometer on Radioactive Waste**, July 2008).

If the waste issue were resolved, most EU citizens would be in favour of nuclear power, with 39% of those opposed saying they would change their mind. The 2008 Eurobarometer said around 61% would support nuclear if the waste issue was resolved.

Security

Nuclear security and proliferation have been a growing concern since the terrorist attacks in New York on 11 September 2001. The results of the **Eurobarometer on Nuclear Safety** show that security and proliferation issues have a clear, negative influence on people's views on nuclear power: 52% of respondents disagree with the statement that nuclear plants are sufficiently secure against terrorist attacks; 45% disagree with the statement that nuclear materials are sufficiently protected against proliferation. Few opinion polls have addressed these issues; forthcoming polls should do so.

Problem of trust

Most people do not trust the nuclear industry as a reliable source of information on nuclear issues. The **Eurobarometer on Nuclear Safety** shows that only 12% of EU citizens have confidence in the nuclear industry as a source of information on the management of radioactive waste. Even in countries where public acceptance of nuclear is high, most people do not trust the nuclear industry as a reliable source of information. In France the figure is 11% and in Finland 13%.

Information is the key to increasing public acceptance

Level of information

The results of the **Eurobarometers** show that the greater the level of knowledge about nuclear energy, the more favourable the opinion citizens have. On average EU citizens do not feel well-informed (74%, **Eurobarometer on Nuclear Safety**) about nuclear issues and radioactive waste in particular. However in countries where the level of real knowledge is greater like Sweden (Knowledge: 47%, Acceptance: 62%), Finland (51%, 61%), the Netherlands (44%, 55%) and the Czech Republic (41%, 64%), public opinion is also more favourable to nuclear power (**Eurobarometer on Radioactive Waste**).

What sources of information do people trust?

In the April 2010 **Eurobarometer on Nuclear Safety**, responses to a question about "credibility of source of information" was much as expected. Scientists (46%) are seen as the most credible source. However, it is worth noting that nuclear safety authorities (30%) have risen to second place in the credibility league. The credibility of non-governmental organisations' dropped by 11% to 19%. The EU has a rating of 15% and the nuclear industry of 12% (+1% over the previous survey). And although the media (television: 72%, newspapers: 40%) is EU citizens' main source of information, journalists have a credibility rating of only 23% and rank fourth in the credibility league.

Participation in decision-making

Only 1 in 5 Europeans (**Eurobarometer on Nuclear Safety**) would like to be directly consulted in the decision-making process regarding nuclear power. Around 25% would instead trust non-governmental organisations (NGOs) to represent their interests and 24% prefer to leave decisions to the authorities. This can be accounted for by the fact that people do not feel well-informed and, therefore, not competent enough to decide on such issues.

Positive evolutions

EU citizens are well aware of the fact that nuclear power is one of the main energy sources in many European countries (**Eurobarometer on Energy Technologies**, May-June 2006). Respondents rank nuclear power (36%) third among the most used energy sources, after oil (81%) and coal (77%). A significant number of EU citizens are now making the connection between nuclear energy, security of supply and climate change.

A growing awareness of the climate change benefits of nuclear power

European citizens are becoming more concerned about climate change and the fact that nuclear power is a non-emitting energy source. According to the latest **Eurobarometer on Radioactive Waste** (2008), 62% agree that one of the main advantages of nuclear energy is that it produces fewer greenhouse gas emissions than coal and oil. This is an increase of 4% compared to 2005.

Nuclear energy as a means of addressing security of supply and energy dependency

According to the **Eurobarometer on Radioactive Waste**, more than 64% of EU citizens believe that nuclear energy enables European countries to diversify their energy sources (an increase of 4% compared to 2005). The results of the latest **Eurobarometer on Nuclear Safety** show that 68% believe that using more nuclear energy would make Europe less dependent on fuel imports.

Those who live next to an NPP are more in favour of nuclear power

People are generally more likely to be in favour of building nuclear plants on existing sites. In Finland, the population in municipalities that host nuclear facilities is more favourable to nuclear energy than in non-nuclear municipalities. The results of a Finnish survey, Energy Attitudes 2008, reveal that most citizens near Loviisa (59%) and Eurajoki (60%) support the construction of a fifth nuclear plant in the country. The national average is 43%.

Nuclear energy is expected to be a substantial part of the energy mix in the future

Looking ahead three decades, Europeans anticipate a fundamental swing towards the use of renewable energies. The **Eurobarometer Survey on Energy Technologies** (May-June 2006) indicates that Europeans rank nuclear energy as likely to be the third most used energy source in 30 years' time after solar (49%) and wind (40%). In 2002, only 6% of EU citizens expected nuclear to be part of the energy mix in 20 years.

In the latest **Eurobarometer on Nuclear Safety** (2010), when asked whether they would like to see the share of nuclear energy reduced, maintained or increased, 56% said it should be maintained or increased. This is an increase of 8% compared to the previous survey.

Conclusions

Opposition to nuclear energy is often based on a lack of knowledge about how it works, about safety issues, radiation and the disposal of radioactive waste. But there is clear evidence that in countries where the debate on nuclear energy has been fair and transparent – Finland and the UK, for example – public support can be strong. Many realise, armed with the facts, that nuclear, along with renewables, must be part of an energy mix that can provide reliable baseload power and contribute to the fight against climate change. If there is the political will to promote it, the nuclear energy expansion will continue to gather momentum.

Public opinion evolves quicker than assumed. In common with many "back-of-the-mind" issues, people's attitudes towards nuclear are unfixed and influenced by media coverage, even by the nature and form of the questions that are asked. "There is little reason to believe that if the technical, environmental and economic case for nuclear energy is strong enough, popular opposition would act as an insuperable barrier," said Malcolm Grimston, Associate Fellow with the Sustainable Development Programme at Chatham House, London.

The message is clear: government campaigns, energy policy reviews and public debates play a major role in shaping public opinion. Governments and policymakers should be encouraged to undertake such action.

The accident at Fukushima-Daiichi in 2011 led to a short-term decrease in public confidence in nuclear energy in some countries. However, public support has generally held up well and the accident should have any significant impact on plans for nuclear energy's contribution to Europe's energy mix.

When it comes to energy policy, the benefits of nuclear must be clearly and frequently communicated. Political will is essential, but so is an improved effort by the nuclear industry to spread its message in terms that are easily understood and not seen as biased.

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