

Factors Affecting Public Opinion of Nuclear Energy in the United States

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Public opinion in action

Between 1976 and 1992, antinuclear activists sponsored 21 ballot initiatives in 11 US states aimed at banning the construction of nuclear power plants or shutting down existing nuclear power plants. The votes on these initiatives provided an unequivocal test of public opinion. In all but one case, the antinuclear effort failed and the public voted in favor of the plants. Why? With all the dramatic imagery linked to nuclear power and the fear this imagery can evoke (Weart 2020), the results of these ballot initiatives must have come as a surprise.

Also surprising must have been the first time a nuclear power plant received regulatory approval to extend its operating license by 20 years (subject to continuing regulatory review)—with little, if any, opposition. License renewals for another 90 nuclear power plants followed smoothly.

In fact, a 36-year program of research shows that the majority of the US public favors nuclear energy, and this support is even stronger among nuclear power plant neighbors. This article draws primarily from that extensive and in-depth program of research on public attitudes toward nuclear energy by Bisconti Research.¹

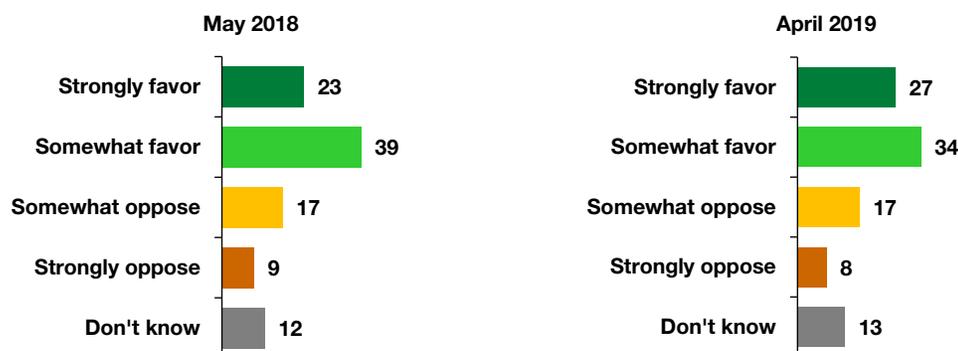
Favorability trends

Bisconti Research has tracked public opinion on some questions at least annually since 1983. The surveys used nationally representative samples of at least 1,000, with a margin of error of plus or minus three percentage points.

In 2019, 61% of the US public said they favored “the use of nuclear energy as one of the ways to provide electricity in the United States.” The national survey findings for 2018 were practically identical (see Findings 1).

Findings 1 Favorability to nuclear energy steady (General US Public, 2018 and 2019).

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 in the United States? (%)

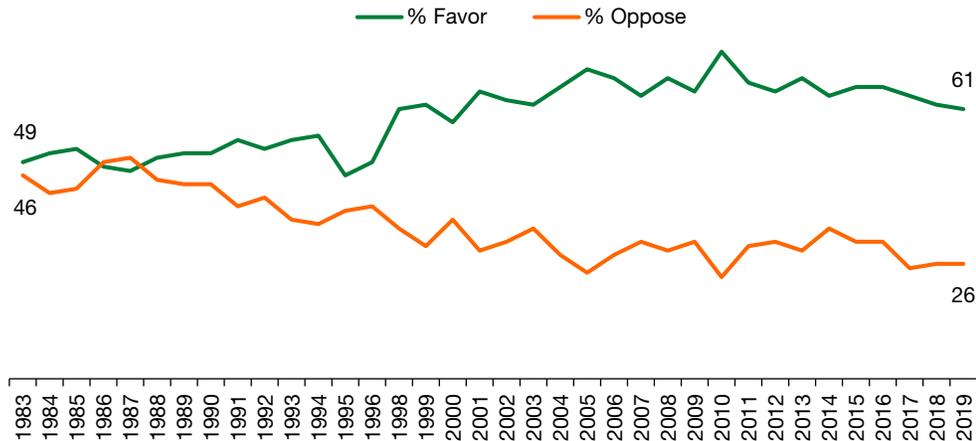


¹Dr. Ann Stouffer Bisconti initiated the research program in 1983 at the Nuclear Energy Institute (NEI) and its predecessor, the US Council for Energy Awareness (USCEA). Bisconti Research, Inc. continues the program with various sponsors, through the present day. For the past 15 years, the fieldwork of all surveys has been by Quest Global Research.

The long-term trends show that support for nuclear energy is much greater today than it was when the survey program began in 1983 (Findings 2).

Findings 2 Favorability to nuclear energy increased over long term (General US Public, Annual Averages).

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 in the United States? (%)



In 1983, the public was equally divided between those in favor of nuclear energy and those opposed. In 2019, those who favored nuclear energy outnumbered those who opposed by 61% to 26%; 13% had no opinion. There have been some downturns—most notably after the accident at Chernobyl in 1986 and the tsunami at Fukushima in 2011. Upturns coincided with periods of perceived need for energy. Those in favor peaked in 2010, as the industry geared up for a nuclear renaissance and the Democrats in power (historically unlikely allies) began to see the environmental benefits of this clean-air, carbon-free energy. The Fukushima accident the next year put a damper on this new enthusiasm.

Over the years, open-ended questions asking reasons for respondents' opinions of nuclear energy have found that accidents are the main concern people have, and, therefore, real accidents like Chernobyl and Fukushima reinforce this concern. That is especially true when the media coverage shows images of devastation or human tragedy. In the case of Fukushima, images of devastation from the earthquake and tsunami could easily have been associated with the accident at the nuclear power plant that was caused by the tsunami. As of 2015, top reasons mentioned by those who *avored* nuclear energy were:

- Need the energy (13%)
- Environment, clean, less air pollution (10%)
- Low cost (8%)
- Others: safe, reliable, efficient, good alternative

The top reasons that came to mind by those *opposed* to nuclear energy were:

- Danger, accidents (49%)
- Waste (10%)
- Others: prefer other sources, not needed, scary

Two points jump out from these numbers:

- First, favorable attitudes are less focused than unfavorable attitudes. There is no single favorable attribute such as clean air energy that stands out. The attributes are diffuse and fuzzy. That indicates a need to focus more clearly on how nuclear energy benefits humanity.
- Second, among reasons to oppose nuclear energy, accidents are the main concern, far more than waste. However, waste does become a concern once it is raised, and some policymakers view waste as an obstacle.

One of the difficulties in communicating about nuclear waste is that people hold an image of spent fuel as a liquid that is uncontrolled. Words alone are not sufficient to convey that spent nuclear fuel is solid, compact, and contained. For this reason, advocates find that actual models, such as a simulated fuel pellet accompanied by photos of the many layers of containment are helpful. Some advocates use props such as a Coke can to convey the amount of spent fuel that would be created by a family of four over a lifetime of using only nuclear energy for electricity.

Gender continues to be associated with attitudes toward nuclear energy (Findings 3). Among the general public surveyed in 2019, more men (69%) than women (53%) favored nuclear. But women were not more opposed; more women (20%) than men (7%) had no opinion. Education also continues to be a factor, as 68% of college graduates, compared with 56% of those with less than a bachelor’s degree, were in favor in 2019, again due to more college graduates having an opinion. Age differences were minimal, except that more of the public over age 50 had an opinion. Majorities of all political parties favored nuclear energy: 73% of Republicans, 57% of Democrats, and 59% of Independents. Political philosophy shows a wider divide; those favoring nuclear energy included 79% of conservatives, 58% of moderates, and 49% of liberals.

Findings 3 Favorability to nuclear energy, demographic groups (General US Public, April 2019).

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 in the United States? (%)

	<i>Favor</i>	<i>Oppose</i>	<i>No opinion</i>
Men	69	24	7
Women	53	27	20
Age: 18–34	57	26	17
Age: 35–49	61	22	16
Age: 50+	64	27	8
College graduates	68	25	7
Not college graduates	56	27	17
Democrat	57	33	11
Republican	73	18	9
Independent	59	26	15
Conservatives	79	15	6
Moderates	58	29	14
Liberals	49	42	9

Public majorities have supported specific uses of nuclear energy, including the following propositions, for decades. In 2019, majorities agreed we should:

- Renew the license of nuclear power plants that continue to meet federal safety standards—75% agreed; 16% disagreed.
- Prepare now so that new nuclear power plants can be built if needed in the next decade—67% agreed; 21% disagreed.
- Definitely build more nuclear power plants in the future—55% agreed; 31% disagreed.

Perception gap

The origins of nuclear fear are well described in Spencer Weart’s chapter in this encyclopedia, “Public Images of Nuclear Energy.” The negative imagery he describes persists today. Because of the negative imagery, it is often assumed that the public opposes nuclear energy, when this is clearly not the case. Over many years, the Bisconti Research survey program asked:

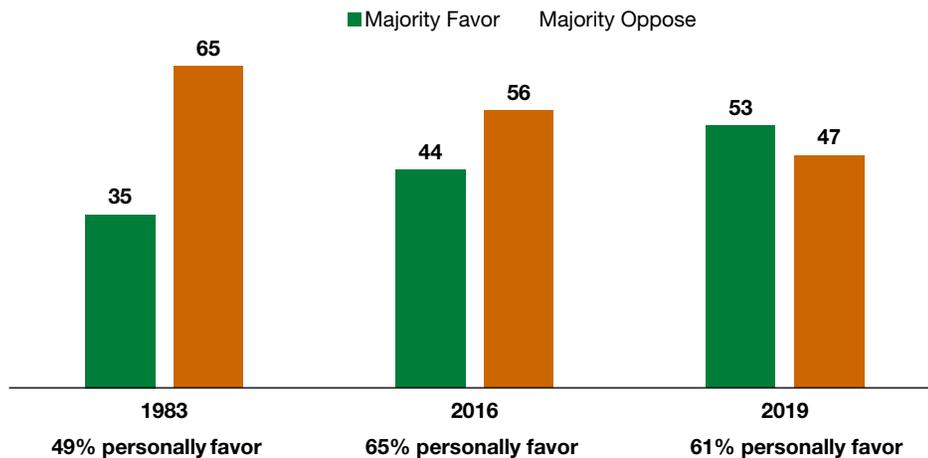
(1) respondents’ own opinion of nuclear energy and (2) their perceptions of the opinions of others. Over the years, the data have shown a very large perception gap—that is, the US public perceives public opinion toward nuclear energy as less favorable than their own opinion.

This perception gap can lead persons who favor nuclear energy to fear speaking out in support of nuclear energy. That silence, in turn, could reinforce erroneous perceptions of public opinion. In her book, *The Spiral of Silence*, political scientist Noelle-Neumann (1984) proposed the theory that people fall silent when they perceive that their position on a topic is in the minority, and this silence adds to the perception that the position is unpopular. More silence accentuates the perception and further reduces vocal support in a spiral until the silent side loses.

The 2019 survey found a remarkable change in the perception gap. In 2019, 61% personally favored nuclear energy, and 53% thought that others shared this view. The 2019 finding is especially remarkable because, in three decades of asking the question in slightly different ways, this was the first survey in which a majority of the public (53%) described public opinion as favorable.

This change indicates the possibility of greater attention in the public discourse to nuclear energy as a solution to future energy problems. Are more supporters speaking out? Observation indicates they are doing so (Findings 4).

Another remarkable finding is that slim majorities across demographic groups described public opinion as favorable. Notably, 58% of the young generation of adults (Millennials and Gen Xers) perceived public opinion toward nuclear energy to be favorable (Findings 5).

Findings 4 For the first time in 36 years, more say the majority favors nuclear energy (General US Public).*(Includes only respondents who said others favor or oppose)***1983 Question:** To the best of your knowledge, are most people in your community in favor of or opposed to nuclear energy? (%)**2016/2019 Question:** Do you think that the majority of people in your community favor or oppose the use of nuclear energy? (%)Bisconti Research, Inc. (2019) *Public Opinion on Nuclear Energy: Turning a Corner?* American Nuclear Society.**Findings 5** Perceived favorability to nuclear energy, demographic groups (General US Public, April 2019).

Do you think that the majority of people in your community favor or oppose the use of nuclear energy? (%)

	Favor	Oppose
Men	54	46
Women	53	47
Age: 18–34	58	42
Age: 35–49	50	50
Age: 50+	52	48
College graduates	55	46
Not college graduates	52	48
Democrat	50	50
Republican	60	40
Independent	53	47
Conservatives	65	35
Moderates	52	48
Liberals	40	60

Mushiness

In the 1980s, Yankelovich (1991), in conjunction with *Time Magazine*, developed an index to distinguish issues about which public views were “firm and stable” from those that were “unstable and mushy.” Factors associated with greater mushiness include low congruence between one’s own perceptions and those of others, low personal engagement, and a low sense of feeling knowledgeable about the topic.

Public opinion toward nuclear energy tends to be mushy, Bisconti Research surveys find. It is easily influenced by new information and even by slight changes in the context in which public opinion questions are asked. For this reason, the ability to track the same identical question in the same context is valuable (Bisconti, 2016). A context of discussing environmental hazards and alternative solutions can trigger negative thoughts and images about nuclear energy such as Weart (2020) described in his chapter on “Public Images of Nuclear Energy.” Recently, Gallup has asked the exact same question that the Bisconti Research polls have tracked for 36 years but in the context of questions about environmental hazards. The answers are always less favorable to

nuclear energy in that context; in 2019, Gallup found the public divided 49% in favor to 49% opposed; Bisconti Research found 61% in favor to 26% opposed; 13% had no opinion.

What remains in common, even with the influence of a negative context, is that the majority of the public in both surveys sits in the middle—*somewhat* favor or *somewhat* oppose or don't know. That is another sign of mushiness.

There is a common misperception that a large portion of the public is firmly opposed to nuclear energy because opponents have been outspoken. Those saying they were strongly opposed in 2019 included 21% of those surveyed in the Gallup question context and 8% in the Bisconti question context. Obviously, being strongly opposed does not equal being firmly opposed, as opinions of many potentially strongly opposed respondents change depending on the question context.

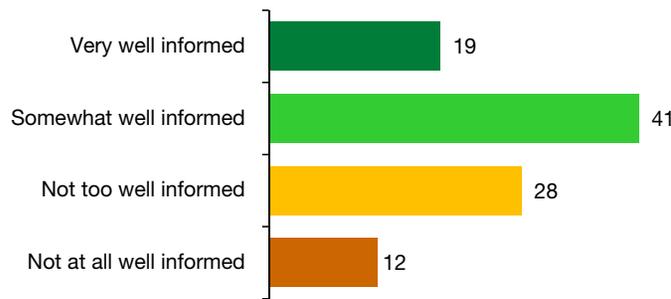
Familiarity builds favorability

Surveys consistently have found that few members of the US public feel very well informed about nuclear energy. In 2019, only 19% said they felt very well informed about the topic. These include more men, college graduates, and Millennials and Gen Xers (Findings 6).

There is a close correlation between the level of feeling informed on nuclear energy and attitudes toward this energy source. Among those who felt very well informed about nuclear energy, 68% *strongly* favored nuclear, and 7% were *strongly* opposed. Those who felt less well informed tended to express opinions in the middle or no opinion at all (Findings 7).

Findings 6 Level of feeling informed about nuclear energy (General US Public, April 2019).

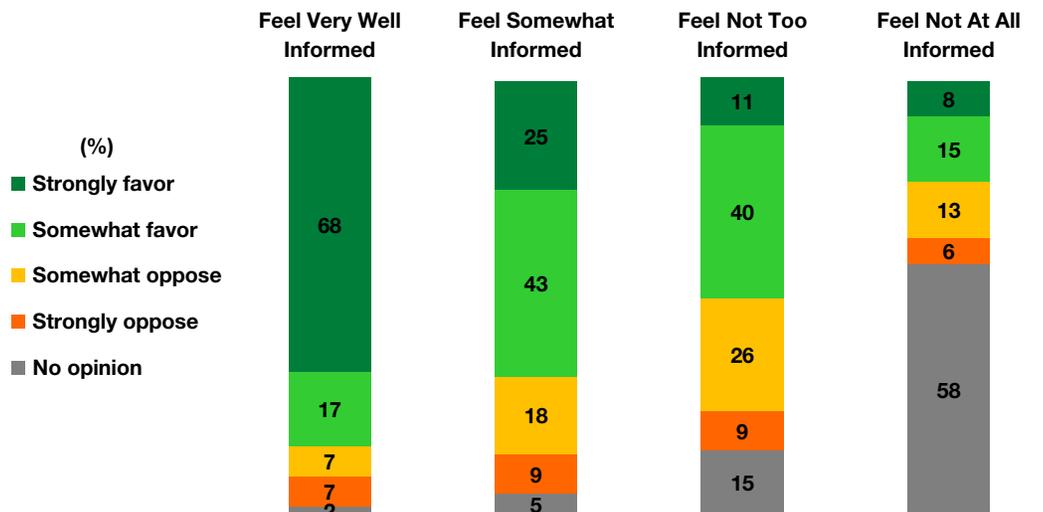
How well informed do you feel about nuclear energy used to produce electricity? (%)



Findings 7 Informed about nuclear energy, by favorability to nuclear energy (General US Public, April 2019).

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 in the United States? (%)

How well informed do you feel about nuclear energy used to produce electricity?



Plant neighbors more favorable

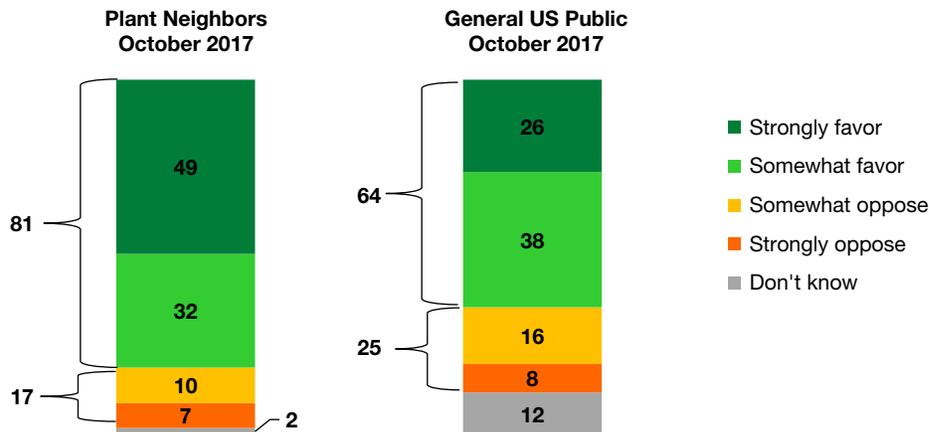
Familiarity is shown to make a difference in surveys of nuclear power plant neighbors. Persons who live near nuclear power plants are overwhelmingly favorable to nuclear energy. Their opinions are the opposite of NIMBY (Not In My Backyard).

Bisconti Research conducted seven biennial surveys of nuclear power plant neighbors from 2005 through 2017. Each survey included at least 1,000 persons selected within the 10-mile radius of the US sites with operating nuclear power plants—59 sites in 2017. The surveys excluded households with people who work at a nuclear power plant and might have a vested interest.

Over the seven surveys, public support has continued to be broad and deep. In 2017, 81% favored the use of nuclear energy, and half were strongly favorable. Those opinions were more favorable than those of the general public who were surveyed at the same time (Findings 8).

Findings 8 Favorability to nuclear energy (Plant Neighbors and the General US Public, October 2017).

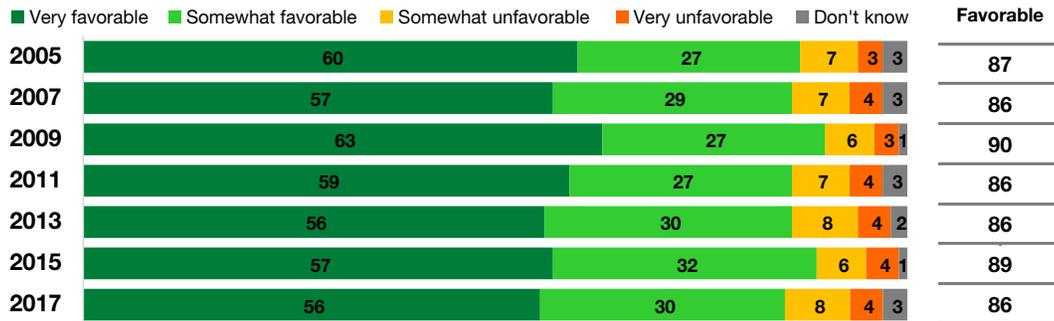
Overall, do you strongly favor, somewhat favor, somewhat oppose, or strongly oppose the use of nuclear energy as one of the ways to provide electricity in the United States? (%)



Those favorable attitudes are grounded in excellent performance, according to plant neighbors. Almost everyone (86% in 2017) reported a favorable impression of the nearby plant and how it had operated recently; 56% were very favorable (Findings 9).

Findings 9 Impression of nearby nuclear power plant (Plant Neighbors Surveys).

Thinking of the nuclear power plant closest to where you live, would you describe your general impression of this plant and the way it has operated recently as very favorable, somewhat favorable, somewhat unfavorable, or very unfavorable? (%)



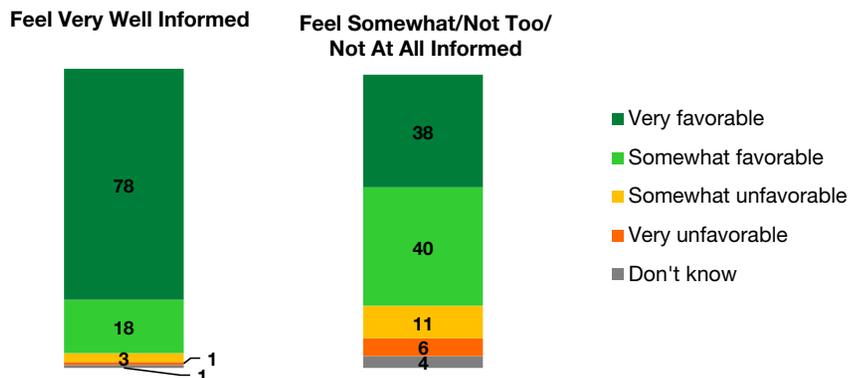
When asked about the community’s impression of the nearby plant, there is virtually no perception gap appearing in any of the seven surveys. Residents continued to be aware that most people in the community have a favorable impression of the plant: most recently, in 2017, 75% thought most people in their community have a favorable impression, 12% thought they were unfavorable, and 13% were unsure.

Plant neighbors feel better informed about nuclear energy than does the general public; in 2017, 45% said they felt very informed. Of those who said they felt very well informed, 78% were very favorable to the nearby plant, and 1% were very unfavorable (Findings 10). Because activism is usually dependent on feeling very well informed without a topic, the chances of nuclear plant neighbors becoming activists in favor of a nearby plant versus opposed to a plant are on average 78 to 1.

Findings 10 Impression of nearby plant, by how informed residents feel about nuclear energy (Plant Neighbors Survey, October 2017).

Thinking of the nuclear power plant closest to where you live, would you describe your general impression of this plant and the way it has operated recently as very favorable, somewhat favorable, somewhat unfavorable, or very unfavorable? (%)

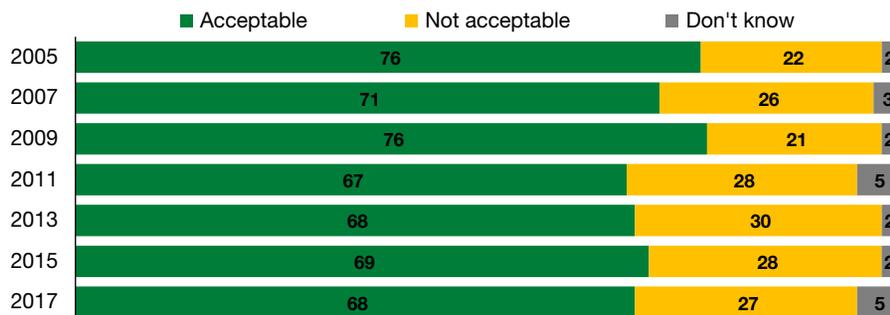
Do you feel very informed, somewhat well informed, not too well informed, or not well informed at all about nuclear energy used to produce electricity? (%)



Local support is so strong that, in 2017, 68% said they would find it acceptable to add a new reactor at the nearby plant. Just 27% would find it not acceptable, and 5% were unsure. Acceptability slightly declined after Fukushima—from 76% in 2009 to 67% in 2011 and then plateaued at 68% in 2013, 2015, and 2017. This figure is for all US nuclear power plants and is lower in some areas and higher in others. It is clear, however, that there are numerous sites where a new reactor would be readily acceptable. In a time of BANANA (Build Absolutely Nothing Anywhere Near Anyone), nuclear energy has the advantage of extraordinary local support (Findings 11).

Findings 11 New reactor acceptability (Plant Neighbors Surveys).

If a new power plant were needed to supply electricity, would it be acceptable to you or not acceptable to you to add a new nuclear reactor at the site of the nearest nuclear power plant? (%)



A 2019 survey of Canadians by Abacus Data also found a similar pattern of greater support for nuclear energy in provinces that are most familiar with the technology. After being told that “nuclear energy produces very little carbon emissions, similar to solar, wind, and hydroelectricity,” respondents were asked their opinion on “using nuclear energy technologies in situations where they could replace the use of higher emitting fuels.” Nationally, 49% said they would support using nuclear energy in those situations, 35% would be open to it, and 17% would oppose. In Ontario, where much of Canada’s nuclear energy capacity is located, most would support (56%) or be open to (34%) substituting nuclear for higher emitting sources; only 10% would oppose. In Quebec province, which does not produce any nuclear energy, 30% would oppose.

Foundations of local public support for nuclear power plants

Local support for the plants is grounded in familiarity, perceptions of safe plant operations, and favorable views of the company regarding safety, the economy, jobs, the environment, and community outreach. Nuclear power plant personnel are actively engaged in community outreach and projects such as support for schools and the local environment (Findings 12).

Findings 12 Percent agree with statements about company that operates the nearby nuclear plant (Plant Neighbors Survey).

Now, I'd like to ask you about the company that operates the nuclear power plant nearest to you. Please tell me if you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the following statements about this company. (%)

	2005	2007	2009	2011	2013	2015	2017
I am confident in this company's ability to operate a nuclear power plant safely.	88	87	91	87	89	90	88
I am confident that the company has prepared the plant to withstand the most severe natural events that may occur in this region.	n/a	n/a	n/a	79	83	82	81
This company is doing a good job of protecting the environment.	84	81	86	84	82	83	79
The plant helps the local economy.	n/a	n/a	90	87	91	89	90
There are good jobs for local people at the plant and in local businesses that provide services to the plant.	n/a	n/a	89	87	87	89	87
This company is involved in the community. (<i>"...as a good citizen."</i> 2005)	83	77	83	76	80	81	78

Local voluntary environmental programs around US nuclear power plants are especially extensive and were initiated long before such programs became fashionable among corporations. Because nuclear power plants are often located next to lakes, rivers, or ocean water, they are surrounded by diverse species of wildlife and plants. Several nuclear utilities sponsor parkland near their plants for use by the local community. These programs are on top of clean and safe performance and environmentally safe waste management, both of which are regulated.

A 1995 survey by Landsberger and Creatchman (1995) produced an inventory of US nuclear utility voluntary environmental programs to protect the land, water, and wildlife around their plants. The programs, published in the report, *Nuclear Power Plants and the Environment: 254 Things you Never Knew*, include many activities co-sponsored by environmental organizations such as the Nature Conservancy, Audubon Society, and Boy and Girl Scouts—as well as local government agencies, universities, and community groups. The report cites a manager at an electric utility that owns a nuclear power plant, as follows: “We’re not a manufacturing plant that can just up and move. This is our service territory. We’ve been here, serving this region, for nearly 100 years—and we’re not going anywhere. That gives us a major stake in preserving the beauty of the area.”

In addition to programs such as those to protect the environment, the nuclear utilities put considerable effort into energy education and outreach. Energy education centers were once the focal point for their energy education. These centers, like mini-museums, included exhibits and personnel to explain energy, nuclear energy, radiation, waste management, and other topics of interest. These centers were open to passersby from anywhere, as well as to the local community. They also served as places for community groups to hold meetings. After the 9/11 attacks and the increased imposition of security everywhere, centers located within the boundaries of the plants had to be closed. Plant tours, another important education vehicle, also were largely curtailed.

Personnel from nuclear power plants still actively engage with local community groups and schools. In some cases, the companies organize outreach formally. A model is the Fan Team approach used by the nuclear utility Baltimore Gas & Electric for two-way communication with the community before seeking license renewal of the Calvert Cliffs plant—the first plant to seek license renewal in the United States. Designated personnel, like spokes on a fan, took information to their peer groups and brought back questions and opinions from these groups to a central point. The result was that the community gained a good understanding of license renewal, and the company had a good understanding of public opinion.

The local newspaper reported the results:

We are sure some of the opponents to relicensing Calvert Cliffs Nuclear Power Plant were left confused following a hearing last week. Critics of the utility and the Nuclear Regulatory Commission denounced the relicensing process as well as nuclear energy. Then what happened next was a little startling. Calvert Cliffs residents stood up and told them to leave their plant alone. That Baltimore Gas & Electric had been a good neighbor. (*The Calvert Recorder*, 1999)

Some nuclear power plants report that establishing Community Advisory Groups has been helpful in engaging the public and creating more ways for two-way communication. They have been used, for instance, for advising the utility on community interests when storage facilities for spent nuclear fuel are built on the plant site or when a plant is being decommissioned.

Building support beyond local communities

Expanding familiarity to a population of millions is obviously challenging. Beyond local communities, the general public can best be reached when there is something related to nuclear energy that is on their minds. For example, when the Chernobyl accident occurred in 1986, there was vast interest in the safety of nuclear power plants. Quick research showed that the public was greatly reassured to learn about the main differences between the Chernobyl plant and those in the United States. The industry launched an

advertising campaign that explained, “Why What Happened at Chernobyl Did Not Happen at Three Mile Island.” The advertising showed the containment structure that surrounds US reactors and did not surround the Chernobyl plant. It also, for the first time, communicated the reality of the Three Mile Island accident—that no one was harmed. It helped that the news media, politicians, and even some nuclear critics reiterated these same themes.

The result was remarkable. Although Chernobyl caused a slight drop in favorability to nuclear energy, the ratings of the safety of nuclear power plants became slightly *more* favorable than before. The ratings of nuclear power plant safety then began an upward trend that continued with a couple of aberrations until a descent following the Fukushima accident in 2013 (Findings 13).

Findings 13 Perceptions of nuclear plant safety more favorable over long term (General US Public).

Thinking about the nuclear power plants that are operating now, how safe do you regard these plants? Please select one number on a scale of “1” to “7” where “1” means very unsafe and “7” means very safe. The safer you think they are, the higher the number you would give.



Today, nuclear power plant safety is not part of the public discourse. The tremendous influence of the Institute of Nuclear Power Operations on safety, including changes to all US plant operations based on lessons learned from Three Mile Island and Fukushima, is reassuring but is not a current topic for the news media. The ongoing daily oversight of all US plants by the Nuclear Regulatory Commission (NRC) and the fact that, if a nuclear power plant were not operating safely, the regulator would shut it down, is also very reassuring but not a current news topic.

Today, the energy related topic that is on the public mind and of interest to the news media is environmental, including clean air, carbon-free energy solutions, and transitioning away from fossil fuels. Within that context, there is a great deal of innovation taking place at the national laboratories and in private industries that can convey to the public that the nuclear energy enterprise is thriving. A thriving industry seems safer than one that is on its last legs. Some of that innovation is exciting and includes different sizes of reactors to meet different location needs. Innovative nuclear reactor designs can make real the promise that nuclear waste does not have to be wasted: some of them use the waste to create electricity and others can minimize waste.

These innovations are consistent with the international Clean Energy Ministerial that is taking a fresh visionary look at energy systems of the future in which nuclear energy can supply electricity, as well as clean drinking water, heat, hydrogen, and support for variable renewables.

The industry should not fear that talking about the technological advancements might shed a bad light on the current fleet, as the public expects a thriving industry to evolve and improve its products. Negative impact will happen only if those promoting new reactors disparage the current fleet by calling existing reactors unsafe, outdated, or old. None of those claims is true, as is evidenced by the fact that if a plant were unsafe the Nuclear Regulatory Commission would shut it down. All the existing plants are continually updated with new technology.

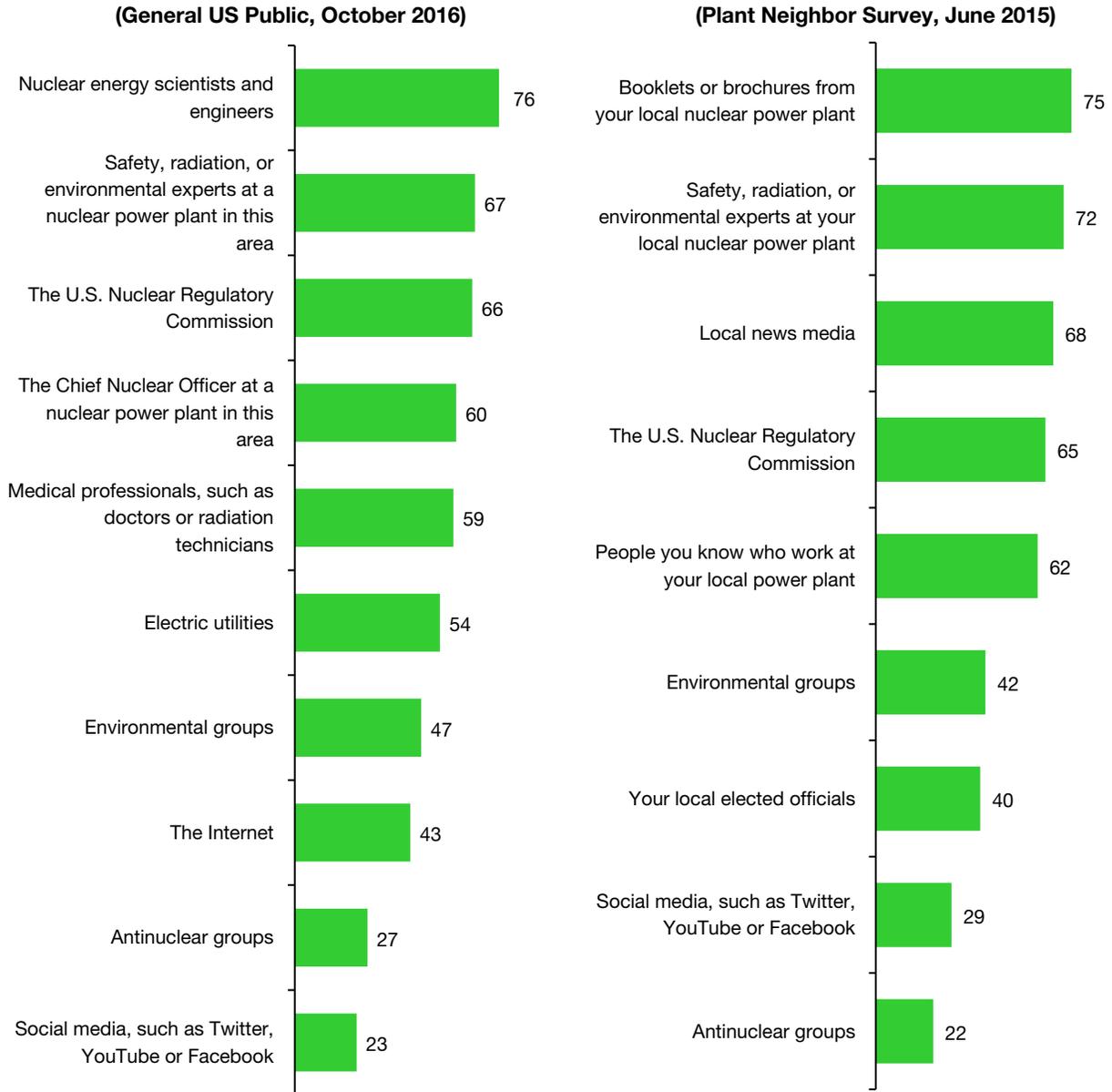
The interest in technological discussions extends to preferred spokespersons. Americans would prefer, by a wide margin, information from nuclear scientists and engineers, as well as from a safety engineer at a nuclear power plant in their area. Research finds consistently that plant neighbors and the general public both give greatest credibility to persons with hands-on experience with the technology (Findings 14).

Given the option of using solar or wind, there needs to be a compelling reason to use nuclear energy. Public discussions about climate change solutions often fail to mention nuclear energy even though nuclear energy produces more than half the US carbon-free energy. Even more important, nuclear energy offers *both* clean air and reliable electricity. It is the only carbon-free source of electricity that offers both in large quantities day in and day out. It keeps on generating electricity when the wind doesn’t blow and the sun doesn’t shine. Those are compelling reasons.

In fact, the public agrees, as seen in answers to questions designed to test messaging *after* completing the trend questions about public opinion. Most recently, in the 2019 survey, 75% agreed with the following statement: “We should take advantage of all carbon-free energy sources including nuclear, hydro, and renewable energy to produce the electricity we need while limiting greenhouse gas emissions” (Findings 15)

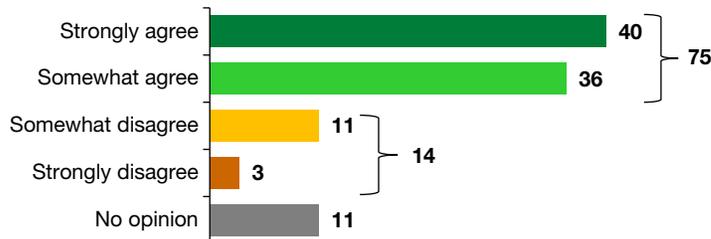
Findings 14 Percent rating information sources excellent or good.

Please tell me if you think each of the following would be an excellent, good, fair, or poor source of accurate and reliable information about nuclear energy. (%)



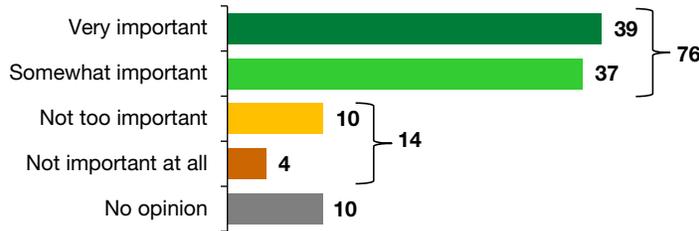
Findings 15 Agreement with using carbon-free energy mix, including nuclear, hydro, renewables (General US Public, April 2019).

Please indicate if you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the following statement. We should take advantage of all carbon-free energy sources including nuclear, hydro, and renewable energy to produce the electricity we need while limiting greenhouse gas emissions. (%)



Findings 16 Importance of nuclear energy as a carbon-free electricity source (General US Public, April 2019).

Nuclear energy produces more than half of all the carbon-free electricity in the United States. And given that nuclear energy is the only electricity source that provides both clean air and continuous 24-7 electricity, do you think nuclear energy should be very important, somewhat important, not too important, or not important at all in the future? (%)



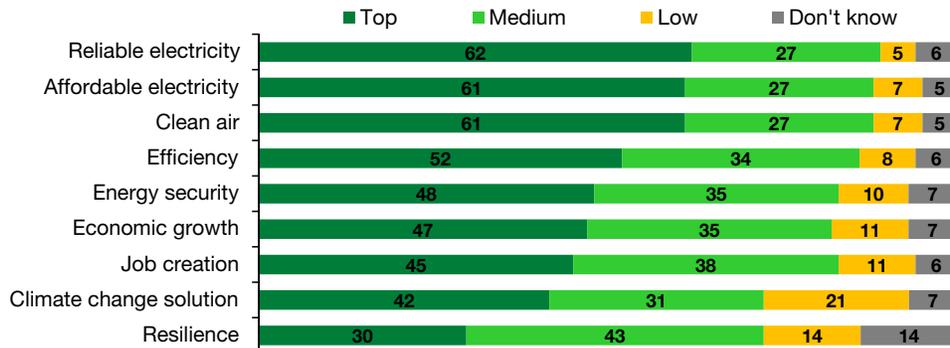
The survey continued: “Nuclear energy produces more than half of all the carbon-free electricity in the United States. And given that nuclear energy is the only electricity source that provides both clean air and continuous 24-7 electricity, do you think nuclear energy should be very important, somewhat important, not too important, or not important at all in the future?” Given these points, three-fourths said nuclear energy should be important (Findings 16).

In the 2019 national survey, respondents were asked to rate the importance of considerations for the way electricity is produced. All of them are attributes of nuclear energy. The considerations given highest importance were reliable electricity, affordable electricity, and clean air. More than 60% rated each of them “top” in importance. Other attributes given top or medium importance by almost everyone were: efficiency, energy security, economic growth, job creation, climate change solution, and resilience.

The concept of resilience, the ability to resist natural disasters, has been on the lips of policymakers recently due to dramatic disasters that many observers link to climate change. Nuclear energy plants can claim resilience, as their plants continue to provide electricity when many other types of plants are forced to shut down. That attribute trailed the others in the importance given, largely because the concept could have many meanings other than the ability to resist natural disasters (Findings 17).

Findings 17 Top considerations for electricity production (General US Public, April 2019).

Following are some considerations for the way electricity is produced. For each one, indicate if that consideration for the way electricity is produced is of top importance to you, medium importance to you, or low importance to you.



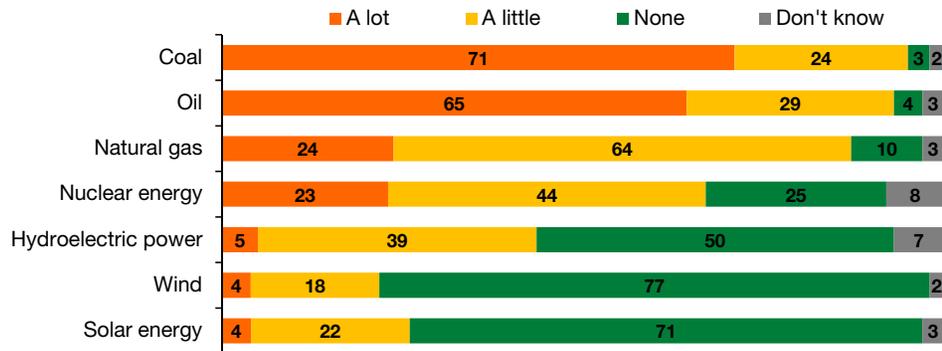
In multiple surveys, clean air scores as a top consideration in electricity production, but climate change does not. There is strong agreement across political parties on the importance of clean air but a partisan divide on climate change: fewer Republicans assign top importance to climate change. Nevertheless, in 2019, 60% of Republicans assigned at least medium importance to climate change, indicating at least openness to climate change messages.

The challenge in gaining entry into climate change discussions is that few members of the public recognize nuclear energy’s large clean air role. In a Bisconti Research survey in 2014, only 25% answered that nuclear energy releases no greenhouse gases, compared with more than 70% for wind and solar energy (Findings 18).

In 2019, Abacus Data asked a sample of 2500 Canadians about the carbon impact of six sources of electricity: “Does using these energy sources create more carbon pollution than oil, about the same or less?” Only 38% of the public knew that nuclear energy creates less carbon pollution than oil. That compares with 82% for solar, 80% for wind, and 63% for hydro.

Findings 18 Perceived sources of greenhouse gas emissions (General US Public, March 2014).

Greenhouse gases, such as carbon, may cause climate change. For each source of electricity that I'll read, please tell me if you think it releases a lot, a little, or no greenhouse gases, such as carbon, into the air. (%)

**Implications**

Despite the majority public support, there is no doubt that a stigma still attaches to nuclear energy and all things associated with radiation. The origins of this stigma are well chronicled by Weart (2020). Education about radiation with attentive audiences such as students and Scout troops is helpful. Some communities encourage their residents to measure radiation by handing out Geiger counters; they are, in fact, empowering the public with hands-on tools. For the broad inattentive public, just hearing information about radiation could trigger the old ingrained phantasmagoric images. Instead, the best way to reduce the stigma is to make the beneficial uses of radiation normal and well known—familiar (Bisconti 2011). In the case of nuclear energy, the more people see it to be needed, the less they see danger. Useful information on nuclear energy's benefits is provided by Hor-Lacy (2020), Waltar (2020), and by Bezdek (2020).

Today, the public senses that nuclear energy is needed, but they do not articulate a focused reason why it is needed. Nuclear energy has an essential role as the one energy source that delivers a large amount of carbon-free energy reliably all day every day. Learning about nuclear energy's unique role for meeting climate change and clean air goals greatly increases support.

A focused message about nuclear energy's contribution needs to be heard widely in order to build support. In the words of World Nuclear Association Director General Rising (2019): "The 445 nuclear reactors in 30 countries are the low-carbon backbone of electricity systems, operating in the background, day in day out, often out of sight and out of mind, capable of generating an immense amount of clean power. They are the silent giants upon which we rely today." Silence is the enemy of winning public hearts and minds.

Time and effort by those who recognize nuclear energy's important clean air value will be necessary. They must focus communications on vision for the future and a world with clean and abundant energy. That may include the innovations that support this future vision. The vision of nuclear energy as a part of the solution to major societal concerns gains substance by telling the interesting story of nuclear energy innovation, including the ongoing work of the national labs.

The fact that the perception gap may be narrowing—the public perception of public opinion was more favorable in 2019—suggests that more positive messages about nuclear energy's contribution are reaching the public. Credit is due to the many nuclear professionals and environmental advocates who are giving valuable time to outreach.

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