BJRS
BRAZILIAN JOURNAL OF RADIATION SCIENCES

doi.org/10.15392/2319-0612.2024.2522
2024, 12(4B) | 01-20 | e2522
Submitted: 2024-06-21
Accepted: 2025-05-15

An Analysis of Brazil's Situation in the The Public Attitudes toward Clean Energy (PACE) Index in regard to Nuclear Energy

Razuck [a*], F. B.

[a] Ministry of Science, Technology and Innovation (MCTI), Brasilia, Brazil.

*Correspondence: razuckdabrasilia@hotmail.com

Abstract: Research on public perception of science and technology has become a relevant practice throughout the world, and public opinion and political support for nuclear technology are local and variable across countries. The Public Attitudes toward Clean Energy (PACE) Index is the world's largest publicly released international study on what people think about nuclear energy. Surveying is conducted by Savanta, and commissioned and analysed by Radiant Energy Group, the PACE Index was set up to track support/opposition for clean energy sources, what drives those attitudes, and how institutions can better cater to what the public wants. This paper aimed analysed the results of the PACE Index in order to evaluate the public's position in the world and in Brazil regarding the use of nuclear energy. Overall, it can be said that across the 20 countries surveyed, 46% of respondents support the use of nuclear energy and the preference for nuclear energy is larger than for onshore wind, biomass from trees, or gas with carbon capture and storage. Specifically, with regard to Brazil, it can be said that the public opposition to nuclear energy exceeds support, Reliability, Health & Safety and Climate Change are seen as an important energy attribute and the younger demographics are most supportive. In this sense, it is understood that through educational actions, scientific dissemination processes and discussions with society on the subject can help the process of public acceptance of nuclear energy.

Keywords: The Public Attitudes toward Clean Energy (PACE) Index, nuclear energy, Brazil.

SBPR

BJRS
BRAZILIAN JOURNAL OF RADIATION SCIENCES

doi.org/10.15392/2319-0612.2024.2522
2024, 12(4B) | 01-20 | e2522
Submitted: 2024-06-21
Accepted: 2025-05-15

Uma análise da situação do Brasil no Índice de Atitudes Públicas em relação à Energia Limpa (PACE) com relação à Energia Nuclear

Resumo: A investigação sobre a percepção pública da ciência e da tecnologia tornou-se uma prática relevante em todo o mundo, e a opinião pública e o apoio político à tecnologia nuclear são locais e variáveis entre países. O Índice de Atitudes Públicas em relação à Energia Limpa (PACE) é o maior estudo internacional divulgado publicamente sobre o que as pessoas pensam sobre a energia nuclear. A pesquisa é conduzida pela Savanta e encomendada e analisada pelo Radiant Energy Group. O Índice PACE foi criado para rastrear o apoio/oposição às fontes de energia limpa, o que impulsiona essas atitudes e como as instituições podem atender melhor ao que o público deseja. Este artigo teve como objetivo analisar os resultados do Índice PACE para avaliar a posição do público no mundo e no Brasil em relação ao uso da energia nuclear. Globalmente, pode dizer-se que nos 20 países inquiridos, 46% dos inquiridos apoiam a utilização da energia nuclear e a preferência pela energia nuclear é maior do que pela energia eólica terrestre, biomassa de árvores ou gás com captura e armazenamento de carbono. Especificamente no que diz respeito ao Brasil, pode-se dizer que a oposição pública à energia nuclear excede o apoio, a Confiabilidade, a Saúde e a Segurança e as Mudanças Climáticas são vistas como um importante atributo energético e a população mais jovem dá mais apoio. Nesse sentido, entende-se que por meio de ações educativas, processos de popularização científica e discussões com a sociedade sobre o tema podem auxiliar o processo de aceitação pública da energia nuclear.

Palavras-chave: Índice de Atitudes Públicas em relação à Energia Limpa (PACE), energia nuclear, Brasil.

SBPR

1. INTRODUCTION

Knowing and understanding how society thinks and consumes topics related to Science and Technology (S&T) has become a factor of great importance for the development of public policies. Increasingly, S&T are part of important political and social debates, as mechanisms that help and accelerate sustainable development [1]. Based on the results obtained, it is possible to improve scientific popularization and science education actions, as well as contributing to the formulation of public policies focused on this topic [1]. Thus, it is essential that citizens, in the contemporary world, have an idea, regarding S&T, of its results, methods and uses, as well as its risks, limitations and interests [2; 3].

An important tool for understanding how the general population thinks about a particular topic is through opinion polls. Traditional public opinion polls, as we know them today, were born in the United States in the 1930s, that is, within American civil service, which influenced the methodologies and theories applied to the study of public opinion [4]. Until then, it was common to research or measure public opinion through so-called straw polls, surveys without scientific value – carried out without statistical methodological foundations – carried out mainly by media outlets. In the 1936 American presidential elections, however, George Gallup's polls achieved unprecedented success in predicting the results, and with this, a new era in the studies of public opinion began [4]. However, after the success in the 1936 electoral context – and especially after the Second World War – the methodologies used by Gallup were elevated to a level of extreme relevance in public opinion studies. With the establishment of scientific public opinion polls, as tools for measuring and forecasting public opinion. A determining factor for the consolidation of this vision of public opinion and for the propagation of the methodology applied in the traditional model is its scientific basis, made possible by the statistical rigor in the collection of data to be analysed later. In this traditional

research model, the representation of public opinion in a given population can be statistically extrapolated based on the samples collected through surveys [4].

Research on public perception of science and technology has become a relevant practice throughout the world. The United States promoted the first survey on public perception of science and technology in 1957, which was repeated over the following years [1]. In Europe, using the survey known as Eurobarometer, similar opinion polls were carried out in 1977, which were also continued in subsequent years. The initiative grew and, in the following decades, spread to several countries, such as India, China and Japan. In the mid-1990s, some Latin American nations promoted national surveys of public perception of S&T [1]. Public opinion and political support for nuclear technology are local and variable across countries. Social support should not be restricted to just associated jobs, it should consider familiarity with the technology and the everyday life of the place [5]. Therefore, public participation is fundamental in socioenvironmental decision-making processes and it is perceived that the absence or negligence in this participation of processes involving the nuclear area causes problems that could be solved more easily with effective risk communication and with educational processes, considering the reality of each country [5].

This because nuclear technology is part of our everyday life. Over the past decades it has helped to improve the quality of our lifestyle in many more ways than people can realize. Still, there is already great misinformation about the beneficial uses of radiation [6]. Overall, people seem to be fearful about risks and possible side effects towards activities involving ionizing radiation. Despite the socio-environmental damage suffered by areas affected by major negative events, nuclear technology is very important, providing numerous benefits to the population, such as in health [5]. Several surveys were conducted over the past years to study public acceptance of Nuclear Technology in worldwide. GlobeScan (2005), for the International Atomic Energy Agency (IAEA), and Eurobarometers (2010), published by the Nuclear Energy Agency (NEA) and the Organization for Economic Co-operation and

development (OECD), report similar socio-demographic trends: the higher the education level, the more favourable is public opinion towards nuclear power [3].

2. MATERIALS AND METHODS

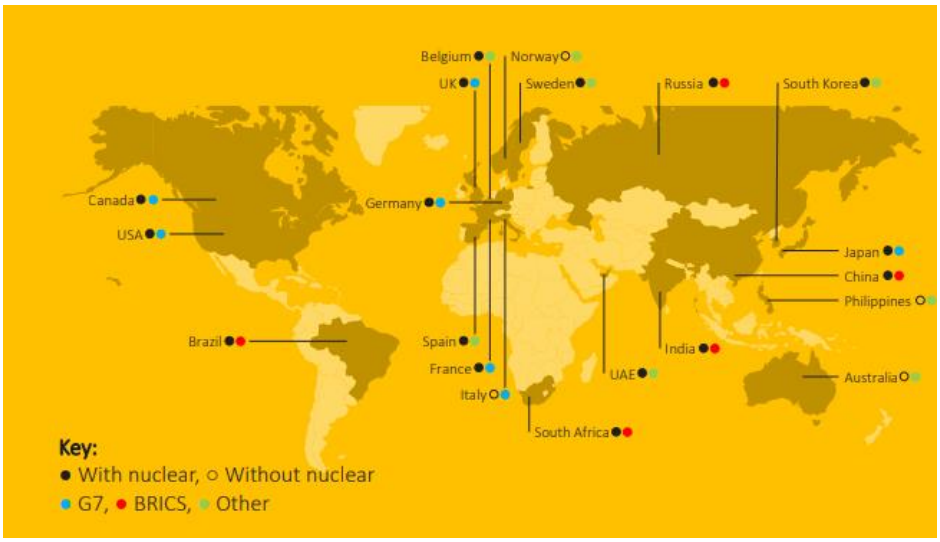
This paper provides an analysis on the results of the Public Attitudes toward Clean Energy (PACE) index in order to evaluate the public's position in the world and in Brazil regarding the use of nuclear energy.

The report presents insights from a study conducted by Savanta on behalf of Radiant Energy Group. Radiant Energy Group is an energy consultancy offering strategic advice on the energy transition. It provides leaders with the insights and data-driven roadmaps they need to create a low-carbon, high-energy future. The PACE index was set up to track support/opposition for clean energy sources, what drives those attitudes, and how institutions can better cater to what the public wants. The PACE index is described as "the world's largest publicly-released international study on what people think about nuclear energy", with data collected from more than 20,122 adults aged 18+ respondents from 20 countries (Figure 1), between 17 October and 14 November of 2023, with the specific fieldwork periods varying slightly by market. The survey was carried out online [7].

The figures have been weighted to be nationally representative within each market across age, gender and region. Country selection and sample sizing 20 countries were selected for the survey with each to receive a minimum of 1,000 respondents. The countries were selected to include all G7 and BRICS countries, the world's top 14 countries by 2022 nuclear electricity generation, the UAE (COP28 host, a future BRICS country, and a recent nuclear new build country), and four countries without nuclear electricity generation from across the world: Australia, Italy, Norway and the Philippines. Eighty five percent of the global population powered by nuclear were represented in the survey. As the world's 7th largest

nuclear electricity generating country, Ukraine had been planned for inclusion but owing to recent difficulties in surveying in the country it was omitted from this survey [7].

Figure 1: Country selection - ● With nuclear; ○ Without nuclear; ● G7; ● BRICS; ● Other.



Source: [7].

3. RESULTS AND DISCUSSIONS

3.1. Questionnaire

A total of 52 questions were asked, divided into 15 blocks, in addition to 9 of a socioeconomic nature. In multiple questions, the list of energy options listed is based on large-scale onshore energies that are considered clean by some governments and have a potential for widespread scaling across the globe. The list includes Nuclear energy, Onshore wind farms, Large-scale solar farms, Biomass from trees, and Gas with carbon capture and storage (CCS). In question 10, the list of energy considerations is selected to include a broad mix of economic (cost, reliability, jobs), environmental (climate change, natural resource use, waste management), social (health & safety), and governance (well-regulated industry) criteria. The questions were divided into 2 groups: Screening questions and Survey questions (Table 1).

Table 1: Questionnaire.

Questions	
Screening questions	
Q – Gender. Are you…? Select one option.	Female; Male; I identify in another way; Prefer not to say.
Q16 – Age. How old are you? Move the slider until it shows your age in the box on the left.	18-100; Don't know.
Q17 – Region. Firstly, where do you live? Select one option.	Various country-dependent regions provided by Savanta as answers.
Survey questions	
Q1 - How concerned, if at all, are you about climate change? Select one option.	Not at all concerned; Not very concerned; Fairly concerned; Very concerned; Don't know.
Q2 - Thinking about environmental issues currently affecting the planet, which THREE of the following are MOST concerning to you? Please select up to three.	Climate change; Biodiversity loss (i.e., disappearance of animals and other species); Deforestation; Air pollution; Visual / Light pollution (i.e. disruption of views of nature); Solid waste pollution and littering; Noise pollution; Thermal pollution; Soil contamination; Radioactive contamination; Water and microplastic pollution; I'm not concerned by any environmental issues; Don't know; Other {open}.
Q3 - Thinking about how your country might shift its current energy generation mix, which of the following types of energy do you think your country should focus on? Select one option.	Nuclear energy; Onshore wind farms; Large-scale solar farms; Biomass from trees; Gas with carbon capture and storage (CCS); Other {open}; Don't know.
Q4 - How much, if anything, have you heard about the following energy options? Select one response for each option. Asked for: Nuclear energy, Onshore wind farms, Large-scale solar farms, Biomass from trees, and Gas with carbon capture and storage (CCS).	I have heard about this energy option, and know a lot about how it works; I have heard about this energy option, and know a little about how it works; I have heard about this energy option, but don't know how it works; I have not heard about this energy option; Don't know.
Q5 - To what extent, if at all, do you think the following energy options create greenhouse gasses that impact climate change? Select one response for each option. Asked for: Nuclear energy, Onshore wind farms, Large-scale solar farms, Biomass from trees, and Gas with carbon capture and storage (CCS).	Not at all; Not very much; A fair amount; A great deal; Don't know.

Questions	
Q6 - How reliable, if at all, do you think the following energy options would be as a source of energy? Select one response for each option. Asked for: Nuclear energy, Onshore wind farms, Large-scale solar farms, Biomass from trees, and Gas with carbon capture and storage (CCS).	Not at all reliable; Not very reliable; Fairly reliable; Very reliable; Don't know.
Q7 - If your country were to use more of the following energy options, what impact do you think this would have on your energy bills? Select one response for each option. Asked for: Nuclear energy, Onshore wind farms, Large-scale solar farms, Biomass from trees, and Gas with carbon capture and storage (CCS).	Much cheaper energy bills; Slightly cheaper energy bills; No difference; Slightly more expensive energy bills; Much more expensive energy bills; Don't know.
Q8 - From what you know about each of the following energy options, to what extent, if at all, do you support or oppose using each one to generate electricity in your country? Select one response for each option. Asked for: Nuclear energy, Onshore wind farms, Large-scale solar farms, Biomass from trees, and Gas with carbon capture and storage (CCS).	Strongly oppose; Tend to oppose; Neither support nor oppose; Tend to support; Strongly support; Don't know.
Q9 - Assuming all these energy options were viable for your country, which policy approach, if any, do you think your country should take on each of the following energy options? Select one response for each option. Asked for: Nuclear energy, Onshore wind farms, Large-scale solar farms, Biomass from trees, and Gas with carbon capture and storage (CCS).	Phase out and ban use through political decisions; Keep using, but do not allow the building of any more; Keep using, and allow the building of more but without government subsidies; Keep using, and encourage the building of more with government subsidies; Don't know.
Q10 - Thinking about providing for your country's future energy generation needs, which THREE of the following considerations are MOST important to you? Please select up to three.	All-in cost (i.e. cost of infrastructure, cost to consumers); Providing reliable energy; Providing self-sufficiency (i.e. not needing to import; energy); Providing well-paid job opportunities; Tackling climate change; Natural resource use; Waste management; Health & safety; Well regulated industry (i.e. environmental impact, trusting industry to do what's right); Other {open}; Don't know; None of these.
Q11 - Banks and pension funds can choose to invest in industries that are socially responsible, sometimes known as ESG, ethical, or sustainable investing. To what extent, if at all, would you prioritise banks and pension funds that include or exclude the following	I would prioritise banks and pension funds that include this energy in their socially responsible investments; My priorities would not be affected by whether this energy is included or excluded from socially responsible investments; I would prioritise banks and pension

Questions	
energy options in their socially responsible investments? Select one response for each option.Asked for: Nuclear energy, Onshore wind farms, Large-scale solar farms, Biomass from trees, and Gas with carbon capture and storage (CCS).	funds that exclude this energy from their socially responsible investments; Don't know.
Q12 - How concerned are you, if at all, about the following considerations of nuclear energy's use? Select one response for each option. Asked for: Waste management, Health & safety (i.e. nuclear meltdowns, impact on people living nearby); Time it takes to build.	Not at all concerned; Not very concerned; Fairly concerned; Very concerned; Don't know.
Q13 - Which of the following, if any, have been your TWO MAIN sources of information about nuclear energy? Please select up to two options.	Your home energy provider; Independent research (e.g., books, internet, lectures, etc.); School; Friends and family; Environmental groups (e.g., Greenpeace, WWF, Friends of the Earth); Social media; News and television programmes; Businesses; Government; Don't know. Other {open}.
Q14 - What comments, if any, do you have relating to the reasons for you supporting or opposing nuclear energy? Type your answer below.	{Open}
Q15 - Are you a member or supporter of any environmental organizations (such as Greenpeace, WWF, Friends of the Earth)? Select one option.	Yes; No; Prefer not to say.
Q18 - Which of the following best describes your race / ethnicity? Select one option.	Various country-dependent race / ethnicities provided by Savanta as answers.
Q19 - Approximately, what is your total household income, including any bonuses and income from investments, before taxes? Select one option.	Various country-dependent financial brackets provided by Savanta as answers.
Q20 - Which of the following political parties / groups would you be most likely to vote for? Select oneOption.	Various country-dependent political parties / groups provided by Savanta as answers.
Q21 - Do you live in a… Select one option.	Urban area - a city / metropolis; Sub-urban area - a small or medium-sized town; Rural area.
Q22 - Do you have children aged under 18? Select one option.	Yes, one child aged under 18; Yes, more than one child aged under; No, I don't have any children aged under 18.

Questions	
Q23 - What is the most senior education degree you have obtained? Select one option.	No education; Primary school diploma; Lower secondary school license; High school diploma; University degree; Post-graduate degree; PhD and above; Don't know.

Source: [7].

The Net support for energy sources is calculated by subtracting the share of the public that opposes the use of the energy source from the share of the public that supports the use of the energy source. Net support (%) = Total support (%) – Total opposition (%). Net perception for how energy sources performs against energy attributes is calculated by subtracting the share of the public that negatively perceives the energy source's performance from the share of the public that positively perceives the energy source's performance. Net perception (%) = Total positive perception (%) – Total negative perception (%). Totals are calculated using respondent-level data to improve the accuracy of results. Analysis of cross-tab data may lead to rounding errors when compared with respondent-level data.

3.2. Executive Summary

The PACE tracked public perceptions about energy sources and what drives these attitudes, based on 4 aspects: a) The Global Opinion – involving questions about Nuclear support, Relative support and Relative preference; b) Energy Attributes – involving questions about the Ranking of energy attributes, Nuclear perception and Relative perception; c) Demographic Breakdowns – involving questions about Age, Gender, Nuclear knowledge, Environmental concerns and Political affiliation; and d) What the Public Wants – involving questions about Politicians, ESG investors e Nuclear industry.

3.2.1. The Global Opinion

In general, it can be said that 1.5x more people support nuclear energy's use than oppose it. Across the 20 countries surveyed, 28% of respondents oppose the use of nuclear energy while 1.5x more (46%) support it. 17 of the 20 countries surveyed have net support (support

exceeding opposition) for nuclear energy's use. The support is over 3x higher than opposition in the world's two most populated countries, China and India. The preference for nuclear energy is larger than for onshore wind, biomass from trees, or gas with carbon capture and storage. 25% of those surveyed say their country should focus on nuclear, behind only 33% preference for large-scale solar farms. Those with a technology-neutral and positive outlook to tackling climate change have a greater preference for nuclear than for any other source.

3.2.2. Energy Attributes

In general, it can be said that Reliability is the public's highest-priority energy attribute. Nuclear is seen as the most reliable thermal source of energy. No energy attribute is seen as important by a greater share of the public than reliability. While 66% of respondents view nuclear as reliable, biomass and gas are seen as reliable by fewer than 60%. The emissions from nuclear energy are seen as high by the majority. Over half (53%) of respondents see nuclear energy as creating a fair amount or a great deal of greenhouse gas emissions. The cost of nuclear is seen as low by more people than the cost of wind or solar in countries that have previously phased out nuclear's use. In Germany, Japan, South Korea and Sweden, countries that have had the largest politically-mandated nuclear phase-outs, nuclear energy is the most positively viewed technology for reducing energy bills. The safety and waste concern are high. However, the correlation between safety or waste concern and support is relatively low. Globally, 79% of respondents mention a concern about nuclear safety. Within this group, a majority of 40% nonetheless support the use of nuclear energy while a minority of 33% oppose it.

3.2.3. Demographic Breakdowns

In general, it can be said that Gender and nuclear knowledge consistently divide nuclear support. The male demographics and those self-identifying as most knowledgeable about how nuclear energy works are consistently the most supportive of nuclear energy's use. Age and environmental concern inconsistently divide nuclear support. In the majority

of countries surveyed, younger and more climate concerned demographics tend to be the least supportive of nuclear energy's use. However, this dynamic is not universal. In South Africa, younger and more climate-concerned demographics are the most supportive of nuclear energy's use. Across the G7, right-wing voters are currently the most supportive of nuclear energy. The nuclear sector employment standards, unionization rates, environmental regulation, and, often, nuclear plant state ownership, would suggest left-aligning voters could more closely identify with nuclear energy. Despite this, support for nuclear energy is strongest amongst right-wing voters.

3.2.4. What the Public Wants

In general, it can be said that while support/opposition metrics provide a view of public sentiment they are a bad proxy for how the public wants governments to act. Within the group of respondents who say they tend to oppose nuclear energy's use, 54% do nonetheless support government policy to keep operating existing nuclear plants and 17% wish to build more nuclear plants. The public wants to keep using nuclear power and build new plants. Within nuclear-powered countries, over 3x more respondents want to keep using nuclear power rather than phase it out. Within the four countries without existing commercial reactors, 2x more respondents want to build new nuclear power plants rather than ban their use. The ESG fund managers risk losing investors by excluding nuclear stocks. In the US, 25% say they would prioritize socially responsible funds that include nuclear stocks, a greater share than the 20% who would prioritize funds that exclude nuclear. The public wants to see greater reliability from nuclear energy. The perceived reliability of nuclear energy is a key driver of its support. People who view nuclear energy as reliable have over 4x more support for its use. This support multiplier is larger than that seen in all other nuclear energy attributes, including safety and waste management.

Overall, then, it can be highlighted that: The more climate-concerned demographics tend to be the least supportive of nuclear energy's use; While support/opposition metrics

provide a view of public sentiment they are a bad proxy for how the public wants governments to act; Within the group of respondents who say they tend to oppose nuclear energy's use, 54% do nonetheless support government policy to keep operating existing nuclear plants and 17% wish to build more nuclear plants; and Within nuclear-powered countries, more than three times respondents want to keep using nuclear power than phase it out. Within the four countries without existing commercial reactors, twice as many respondents want to construct new nuclear power plants rather than ban their use.

3.3. Key Findings in Brazil

3.3.1. The Data Tables

The information regarding the profile of respondents in the country can be found in tables 2 to 7. In total, 1,006 Brazilians were interviewed.

Table 2: Gender and Age.

GENDER		**AGE**					
Female	Male	18-24	25-34	35-44	45-54	55-64	Over 65 years
523	483	139	211	207	171	136	144

Source: [7].

Table 3: Concern about global warming, member of environmental organisation, area type and if have children aged under 18.

Concern about global warming		**Member of environmen-tal organisa-tion**		**Area type**			**Children aged under 18**		
Concerned	Not concerned	Yes	No	Urban	Sub-urban	Rural	One	Multiple	None
938	68	185	798	805	172	31	301	208	500

Source: [7].

Table 4: Most senior education obtained.

Most senior education obtained						
No education	Primary school diploma	Lower secondary school license	High school diploma	University degree	Post-graduate degree	PhD and above
2	32	29	387	378	160	19

Source: [7].

Table 5: Region and Race / Ethnicity.

Region					Race / ethnicity						
North	Northeast	Southeast	South	Central-West	White	Pardo (mixed ethnicity)	Black	Asian	Indigenous Brazilian	Other group	Prefer not to say
83	266	434	147	78	534	334	101	11	14	6	8

Source: [7].

Table 6: Household income.

Household income (BRL)																	
Less than 4600	4600 to 9299	9300 to 13 999	14 000 to 18 999	19 000 to 22 999	23 000 to 27 999	28 000 to 32 999	33 000 to 36 999	37 000 to 41 999	42 000 to 46 999	47 000 to 69 999	70 000 to 93 999	94 000 to 116 999	117 000 to 175 999	176 000 to 234 999	235 000 to 349 999	350 000 to 469 999	470 000 or more	Prefer not to say
207	146	46	54	29	30	21	15	15	33	89	64	52	81	43	21	10	15	37

Source: [7].

Table 7: Political parties / groups.

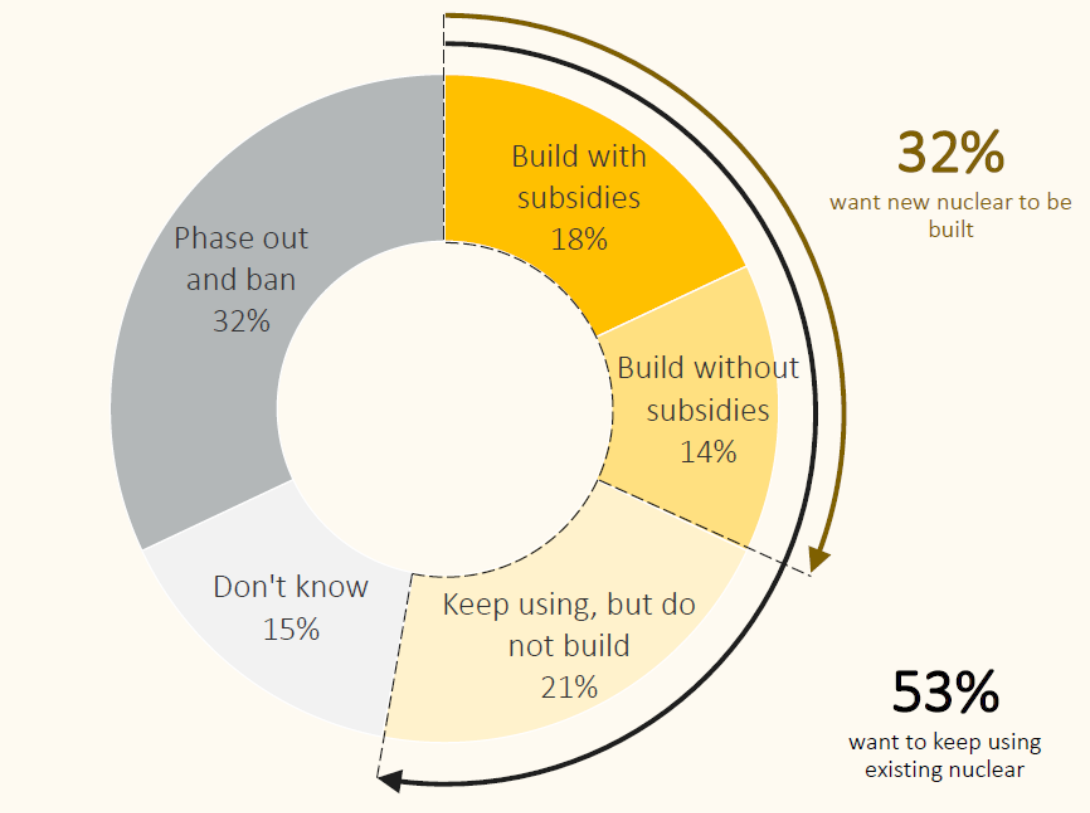
Political parties / groups														
MDB, PSD, REPUBLICANOS, PODE, PSC	PL	PT, PCdoB, PV	União Brasil	PP	PSDB, CIDADANIA	PDT	PSB	PSOL, REDE	AVANTE	SOLIDARIEDADE	PATRIOTA	NOVO	Other	Prefer not to say
33	177	296	24	8	58	42	23	20	5	13	28	30	66	184

Source: [7].

3.3.2. The Brazilian Opinion

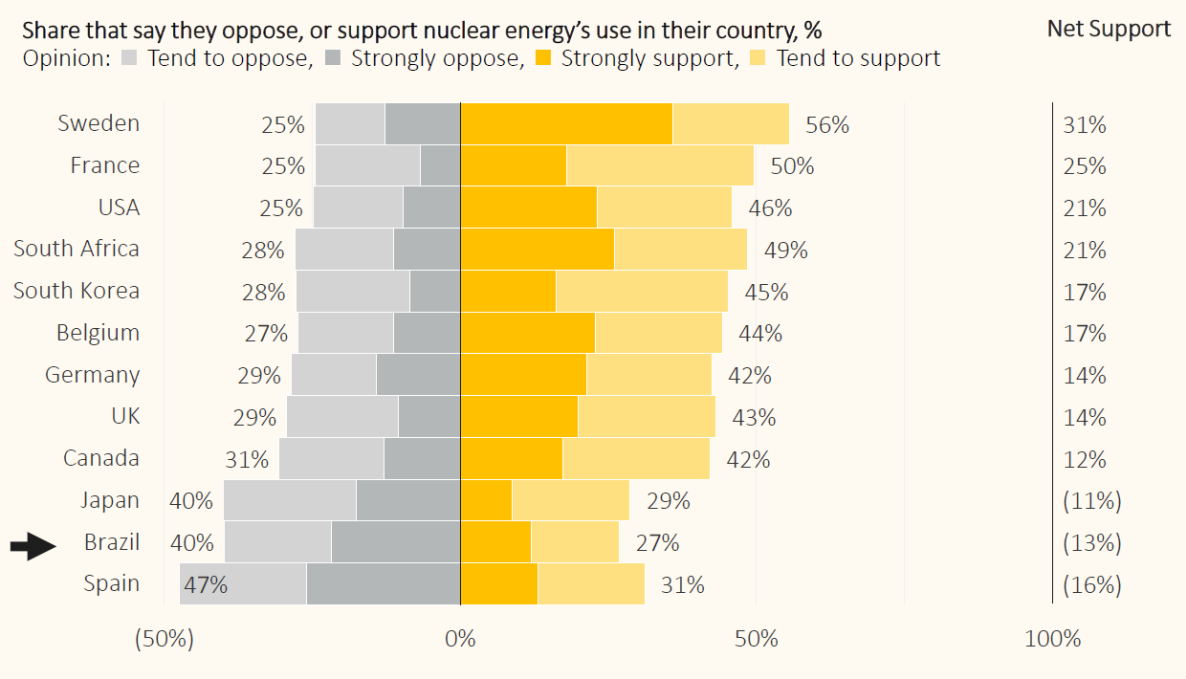
A majority of Brazilians want to keep using nuclear energy, with as many wanting more to be built as wanting it banned (figure 2). The support for nuclear in Brazil is low compared to international peers (figure 3). Encouragingly, the gender gap in nuclear support is relatively low in Brazil compared to international peers (figure 4). While there is a large age gap in nuclear support, it is the younger demographics that are most nuclear supportive (figure 5). Moreover, there is relatively little political divide in nuclear support (figure 6), and members of environmental NGOs are most supportive of nuclear's use, more so than in other countries (figure 7).

Figure 2: Share that say they align with each policy approach on nuclear's use in their country.



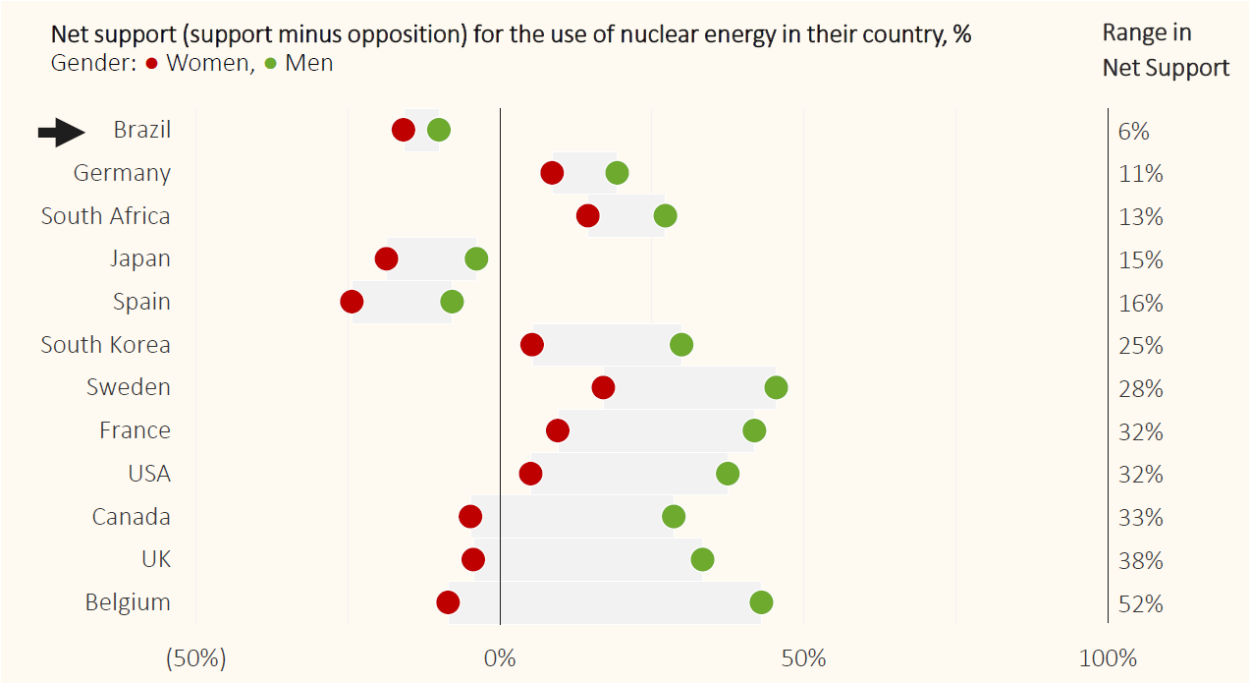
Source: [7].

Figure 3: Support for nuclear in Brazil.



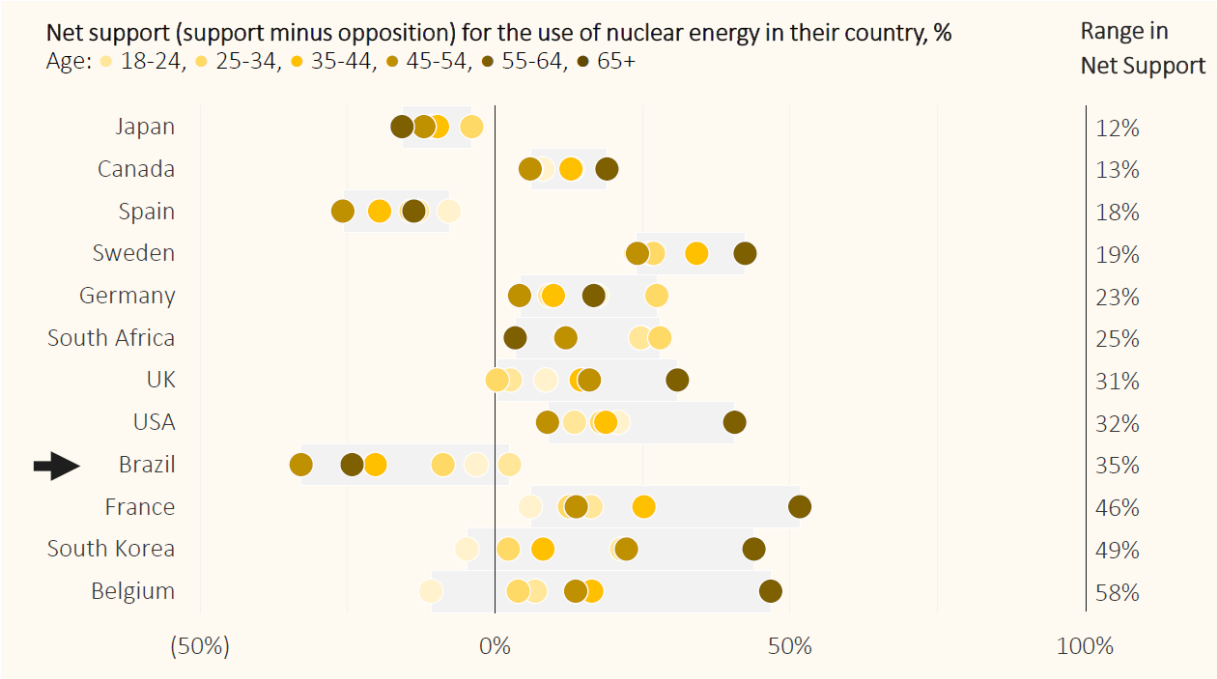
Source: [7].

Figure 4: The gender gap in Brazil.



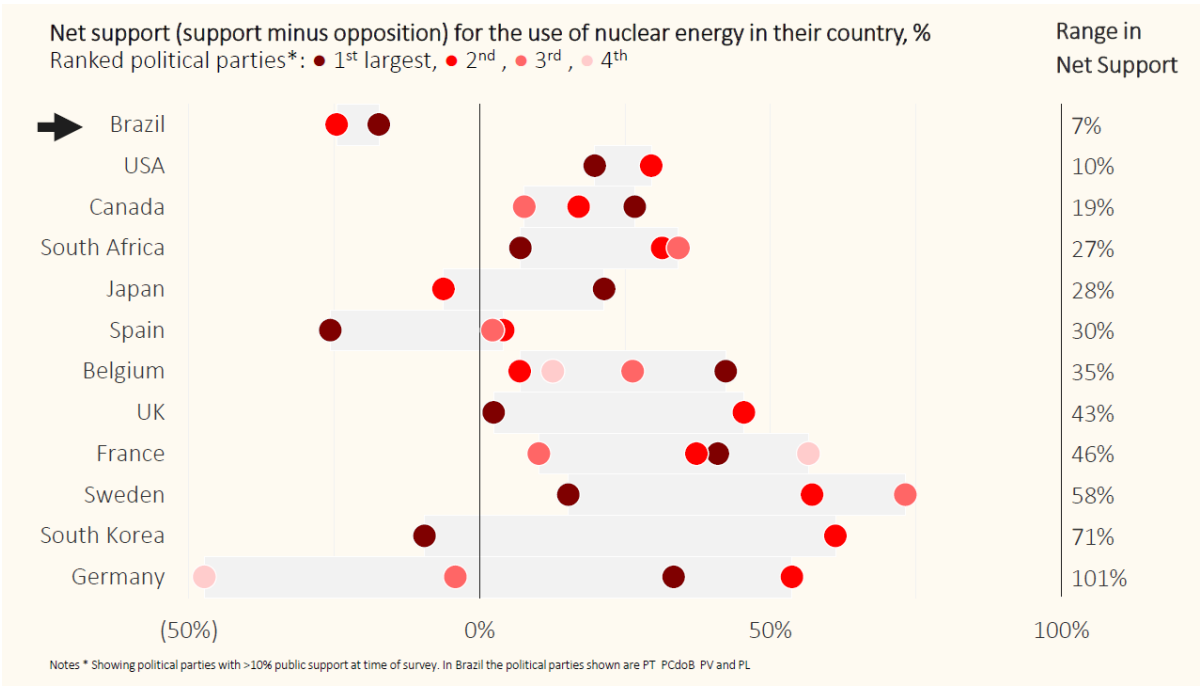
Source: [7].

Figure 5: Age in nuclear support.



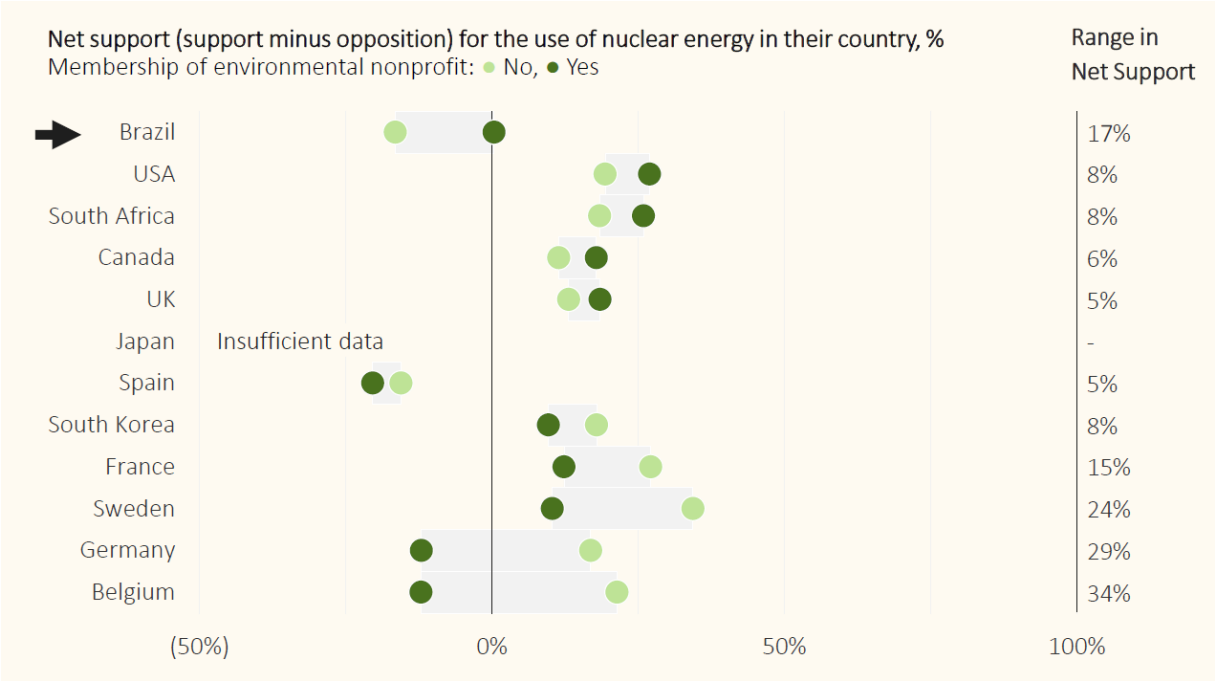
Source: [7].

Figure 6: Political divide in nuclear support.



Source: [7].

Figure 7: Members of environmental NGOs.



Source: [7].

Furthermore, it can be said that in Brazil: Public opposition to nuclear energy exceeds support (40%); The large-scale solar farms (39%) and onshore wind farms (32%) are the preference (nuclear energy is 7%); Reliability, Health & Safety and Climate Change (60%) are seen as an important energy attribute by a greater share of the public than any other attribute (self-sufficiency, natural resource use, waste management, well regulated industry, All-in-Cost and Well Paid Jobs); 42% of respondents see nuclear energy as creating a fair amount or a great deal of greenhouse gas emissions. In Brazil, 17% net support for nuclear energy is significantly higher among environmental non-profit members than non-members; The younger demographics are most supportive; The gender supportive is practically the same; Those who self-identifying as most knowledgeable about how nuclear energy works are consistently the most supportive of nuclear energy's use; 18% want to keep using and subsidize new builds; and 21% supports for nuclear's ESG inclusion.

4. CONCLUSIONS

The world is living at a time involved in a highly competitive globalization process, in which the dominance of S&T has become vital for the development, sovereignty and economic survival of nations. Thus, scientific literacy must begin at an early age and continue throughout life, constituting a continuous process, since S&T is in constant development and the individual needs to keep up with technological innovations.

Therefore, public participation is fundamental in socio-environmental decision-making processes and it is clear that the absence or neglect of this participation in processes involving the nuclear area leads to problems that could be resolved more easily with effective risk.

It is understood that the role of the media in informing the public about the nuclear option is fundamental for the future. However, the information must dispel fears, have a historical perspective and be based on basic scientific knowledge. The public needs to understand how medical, environmental, economic and psychological issues are conveyed through the media, both in times of crisis and routinely in public education.

Governments that abandon nuclear energy now face a backlash from their voting citizens. It is surprising that the four countries with the largest phase-outs of nuclear power are now countries where public opinion overwhelmingly views nuclear power as being low-cost, even more so than wind and solar power.

In Brazil, organizations in the nuclear area do not consider the complexity of risk perception when developing their policies and establishing relationships with their stakeholders. Especially in the area of nuclear energy, organizations tend to carry out specific research around power plants to generate local public involvement in social activities and therefore increase public acceptance of nuclear energy. The lack of knowledge and fear on the part of the population in relation to the nuclear area, on the one hand, and the lack of effective communication of risks by organizations in the nuclear area, on the other, make the perfect combination so that debates on the topic they do not go beyond the walls of universities, companies and research institutes.

ACKNOWLEDGMENT

This research was supported by Richard Ollington from Radiant Energy Group.

REFERENCES

[1] CGEE. Centro de Gestão e Estudos Estratégicos. Ministério da Ciência, Tecnologia e Inovação (MCTI). **Percepcão Pública da C&T no Brasil**. 2019. Disponível em: https://www.cgee.org.br/web/percepcao. Acesso em: 17/06/2024.

[2] RAZUCK, F. B.; RAZUCK, R. C. S. R. A relação entre popularização da ciência e a abordagem CTS: a importância para a educação científica. **Cadernos de Pós-graduação,** São Paulo, v. 23, n. 1, p. 299-306, jan./jun., 2024.

[3] RAZUCK, F. B. ; RAZUCK, R. C. S. R. A importância da Filosofia no ensino de ciências. **Dialogia**, 2011.

[4] ROMANINI, V. ; CALDAS, P. Opinião pública e tecnologia: os impactos do Big Data nos estudos de opinião pública sob o olhar do pragmatismo. **Trans/Form/Ação**, Marília, v. 44, n. 4, p. 375-398, Out./Dez., 2021.

[5] LEVY, D. S.; PASSOS, I. S. Education and communication to increase public understanding of nuclear technology peaceful uses. **International Joint Conference RADIO**, 2014.

[6] AYLLÓN, R. M.; CASTRO, A. A. ; ROMERO, F. C.; , LEITE, L. O. C. ; FARIAS, L. A. The Neglected Role of Education in Brazilian Research Regarding Nuclear Theme versus Scientific and Technological Knowledge, Perception and Risk Communication. **An. Acad. Bras. Ciênc**., 94 (1), 2022.

[7] PACE. Public Attitudes toward Clean Energy 2023 - Public Attitudes toward Clean Energy 2023 - Nuclear. **Radiant Energy Group**, 2023. Disponível em: https://www.radiantenergygroup.com. Acesso em: 17/06/2024.