## THE WORLD WANTS NEW NUCLEAR

Findings from a comprehensive evaluation of the world's understanding and support for advanced nuclear

In what is probably the most comprehensive recent multinational survey of public attitudes to nuclear energy, we find strong public support for advanced nuclear technologies and what they can bring.

This report describes the rigorous and objective study we undertook, the perceptions and misperceptions people share, and the top ten findings, which collectively lead to our conclusion that "the world wants new nuclear."

Potential Energy Coalition potentialenergycoalition.org

RePlanet replanet.ngo

Third Way thirdway.org

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## A Rigorous \& Objective Study

Our findings are based on a large-scale online quantitative survey across three continents among 13,500 members of the general public. We surveyed nationally representative samples for each of eight countries: the USA, France, Germany, Poland, Sweden, the UK, Japan, and South Korea, between November 2022 and January 2023. Between them, these countries represent a cross section of developed economies and cultures where advanced nuclear technologies may play a role.

We have used robust sample sizes and statistical methods to make comparisons between countries, and between segments of the population across countries. Rather than rely on stated answers to questions, we have used well-tested randomized controlled trials to reveal people's desire for different benefits of advanced nuclear by comparing a control group with test groups that are each shown a different narrative, with more than 2,000 people per group globally.

This research is a collaborative effort from a group of independent NGOs: Potential Energy Coalition, ClearPath, Third Way and RePlanet. Descriptions of these organizations are on the back page of this briefing. In designing the research, we were guided by extensive previous research on this topic, supplemented by interviews we conducted with government agencies, environmental organizations and commentators, nuclear industry bodies, and both established and new nuclear technology companies. The research was designed and executed by a team with deep experience of this approach to research and insight, from Potential Energy Coalition, Zero Ideas and Dynata.

## Scale

13,500 people

## Methodology

Statistically robust randomized control trials

## Reach

Eight countries in three continents

- USA
- France, Germany, Poland,

Sweden, UK

- Japan, South Korea


## Independence

Led by a group of
independent NGOs:

- Potential Energy Coalition
- ClearPath
- Third Way
- RePlanet


## Experience

Designed and executed by
leaders in research and insight:

- Potential Energy
- Zero Ideas
- Dynata


## The Under-Appreciated Clean Energy

In public policy, nuclear energy is widely recognized as an important technology in responding to climate change, for its ability to produce abundant quantities of clean, baseload electricity. We see this in its inclusion in the Inflation Reduction Act in the United States and the green taxonomy in the European Union.

In 2021, $26 \%$ of all carbon-free energy was produced by nuclear power' (second only to hydro power, and roughly equal to solar and wind combined). Since 2000, nuclear power generation worldwide has increased by $10 \%,{ }^{2}$ helping curb carbon emissions and thus keeping the window open to meaningfully change the course of climate change.

Yet in a comprehensive 2021 research report, The Breakthrough Institute summarized the general attitudes of the public when it comes to nuclear energy: "opinions on nuclear energy give every indication of being ill-informed and weakly held. ${ }^{3 "}$ Several surveys since the early 2000s demonstrate that nuclear energy and its benefits are not well understood by the public. ${ }^{2}$ In fact, in one 2012 US survey, respondents answered "unsure" more frequently than any other position on nuclear energy. ${ }^{4}$

Our research has confirmed the findings of previous research that there are significant misunderstandings and misperceptions about nuclear energy today - in particular that people largely don't see it as a clean energy source.

## 46\%

believe that nuclear power emits more carbon dioxide than wind or solar power

## 80\%

believe that greenhouse gases damage the ozone layer

## 57\%

believe that with renewables we are no longer dependent on other countries

[^0]Our current study confirms some big gaps in people's knowledge about the biggest benefits of nuclear: its carbon-free energy production and its abundance that can drive sustainable energy independence. It is hard for people to value the clean-energy role of nuclear when almost half the population ( $46 \%$ in our survey) believe that "nuclear power emits more carbon dioxide than wind or solar power." Other knowledge gaps, beyond nuclear itself, add to the challenge. There is a limited understanding of what drives climate change, with $80 \%$ of people believing that "greenhouse gases damage the ozone layer." And there is an arguably unrealistic confidence in how much we can rely on renewables, with most people (57\%) believing that "with renewables we are no longer dependent on other countries."

It's not easy to cast aside current perceptions of "dirty" vs "clean." In our survey, even the groups most alarmed about climate change were relatively unmoved by narratives about the role advanced nuclear can play in avoiding it.

But we should not be fixated on the most intractable misperceptions about nuclear energy. More broadly, our survey shows a high degree of openness to what advanced nuclear technologies can bring. The "weakly held" starting position that many people have acts less as hesitancy and more as open-mindedness. Support for advanced nuclear is already high, with relatively little opposition - and it gets significantly higher with more information.

The need to understand people's starting position, to respect it, and to meet people where they are, is what has informed the research study presented here.


1. There is strong support for advanced nuclear in every country tested, with an average of five supporters for every opponent.
2. Support is high everywhere (65-92\%) once people come off the fence.
3. Environmental group members are strong supporters of advanced nuclear.
4. The young are particularly receptive, with little opposition anywhere.
5. Support for advanced nuclear is not political and comes from almost all parties.
6. Most people see the need for and benefits of advanced nuclear, and are not put off by perceptions of cost, safety, or waste.
7. Four intuitive personas explain big country differences and the primary motivations behind support and opposition.
8. Most people value the roles advanced nuclear can play to secure our future and are open to hearing about the issues.
9. Almost all the opposition comes from a small, distinct segment whose members are older, skeptical about innovation, and unmovable in their views.
10. Most people are receptive to the "nuclear" name and hearing from the nuclear industry, as well as from environmental groups.

## 1. There is strong support for advanced nuclear in every country tested, with an average of five supporters for every opponent

In every country we tested, there is positive net support for advanced nuclear: That is, there is more agreement than disagreement with the statement, "I support the use of the latest nuclear energy technologies to generate electricity, alongside other energy sources" (Figure 1). While universally net positive, the degree of positive support varies a lot, from a ratio of $1.6 x$ (strongly or moderately agree divided by strongly or moderately disagree) in Japan to 10x in Poland.

Even when we take into account people who are neutral on nuclear, an absolute majority of people are positive on this statement (as opposed to either neutral or negative) in all but one country tested - Japan being the one exception.

There is relatively little strong opposition to advanced nuclear. Strong agreement also outnumbers strong disagreement everywhere, on average by a ratio of 5:1

It is well known that nuclear support skews male, and our findings confirm this, with $36 \%$ of men strongly supporting the statement on advanced nuclear above, across countries, compared with $19 \%$ of women (Figure 2). What is striking, however, is that

Figure I: Support significantly outnumbers opposition across the globe
"I support the use of the latest nuclear energy technologies to generate electricity, alongside other energy sources." (5-point scale from strongly disagree to strongly agree)


Question: To what extent do you agree or disagree with the following statement: "I support the use of the latest nuclear energy technologies to generate electricity, alongside other energy sources." Response options: Strongly agree / Somewhat agree / Neutral / Somewhat disagree / Strongly disagree Sample: Nationally representative $n=1,007$ Poland, 1,589 UK, 1,515 South Korea, 1,046 France, 1,013 Sweden, 4,250 USA, 1,586 Germany, 1,534 Japan

Figure 2: Lower support among women reflects neutrality more than opposition
Fewer women "support the use of the latest nuclear energy technologies to generate electricity, alongside other energy sources" - but more are neutral rather than strongly disagreeing.


[^1]the reverse is not true with strong disagreement. The level of strong disagreement was only marginally higher among women ( $8 \%$ vs. 7\%). Instead the difference is in the number of people that are neutral: $27 \%$ of women, compared with $15 \%$ of men. As a result, the net positive support for nuclear in every country applies to both men and women (Figure 3).

## 2. Support is high everywhere once people come off the fence.

Given the number of people with 'loosely held' views in previous surveys, or who opt for the neutral part of the scale in the question above, what happens when you ask people to come off the fence, on one side or the other?

We tested this with a yes-or-no question, with no middle option: Do you believe that advanced nuclear technologies should be an important part of the solution to our energy challenges? Almost two-thirds of people opted for 'yes' even in the least supportive country - Japan - rising to eight out ten people in most countries and nine out of ten in Poland (Figure 4).

We placed this question towards the end of our survey, once respondents had been prompted with many different characteristics of nuclear energy and advanced nuclear technologies, through earlier narratives and questions. This meant that they had

Figure 3: Net positive support among both men and women in all countries
For both genders in every country, support for advanced nuclear exceeds (or in one case is equal to) opposition.

(Strongly agree plus agree) divided by (Strongly disagree plus disagree)
Question: To what extent do you agree or disagree with the following statement: "I support the use of the latest nuclear energy technologies to generate ectricity, alongside other energy sources." Response options: Strongly agree / Somewhat agree / Neutral / Somewhat disagree / Strongly disagree Sample: Global $n=6,780$ male, 6,727 female, 33 other
been exposed to statements about the potential benefits from nuclear energy, regarding energy independence, clean innovation, climate action etc., as well as statements about cost, safety and waste. With everything out on the table in this way, support is strong.

## 3. Environmental group members are strong supporters of advanced nuclear

While many environmental groups may have anti-nuclear policies, their members and supporters are generally supportive of advanced nuclear technologies. As with the population at large, so with members of environmental groups: supporters of nuclear substantially outweigh opponents in every country (Figure 5).

In some countries, not only do advanced nuclear supporters outnumber opponents among environmental group members, but the level of support for advanced nuclear is higher among environmental group members than in the population at large. Figure 6 shows the data for the US. While the level of strong disagreement is also slightly higher among members, the dominant effect is the increased level of support and particularly of strong support.

Figure 4: Support is high everywhere once people come off the fence
A strong majority of people in every country tested believe that "advanced nuclear technologies should be an important part of the solution to our energy challenges" when given a yes/no choice.


Question: Do you believe that advanced nuclear technologies should be an important part of the solution to our energy challenges? Yes/ No Sample: Nationally representative $n=1,007$ Poland, 1,589 UK, 1,515 South Korea, 1,046 France, 1,013 Sweden, 4,250 USA, 1,586 Germany, 1,534 Japan

Figure 5: Among environmental group members supporters outnumber opponents Strong agreement/disagreement among environmental group members that "I support the use of the latest nuclear energy technologies to generate electricity, alongside other energy sources."

| Strongly disagree |  | Strongly agree |  | 13 x |
| :---: | :---: | :---: | :---: | :---: |
| Poland | -4\% |  | 52\% |  |
| USA | -9\% | 35\% |  | 4 x |
| UK | -8\% | 26\% |  | 3 x |
| France | -13\% | 25\% |  | 2 x |
| Germany | -15\% | 21\% |  | 1.4x |
| Sweden | -15\% | 21\% |  | 1.4 x |
| South Korea | -10\% | 20\% |  | 2 x |
| Japan | -11\% | 19\% |  | $1.7 x$ |

Question: Are you a member or supporter of any environmental organization (such as Greenpeace, WWF, Nature Conservancy)? Yes/ No/ Prefer not to say
Sample: Global n=1,982 member/ supporter including 133 Japan, 674 USA, 205 Poland, 208 Germany, 212 South Korea, 248 UK, 152 France, 150 Sweden
4. The young are particularly receptive, with little opposition anywhere

Previous studies have shown support for nuclear both growing and declining with age. Our research shows how both can be the case.

In general, we found that people's views on advanced nuclear technologies firm up with age and experience. Among 18-34s, only $28 \%$ of people have strong views one way or the other; this figure rises to $39 \%$ for the $55+$. While most of this growth is in those strongly agreeing, it is true that more older people strongly disagree with the case for advanced nuclear, as well as that more of them strongly agree (Figure 7.)

In most countries, where support for advanced nuclear is high overall, the net effect of this increased certainty is that support for advanced nuclear increases with age. Only in the least supportive countries - Germany and Japan - do we see it falling.

When we look at the extremes of strong support and strong opposition, we find an interesting asymmetry. Strong support grows with age almost everywhere, starting high with the youngest age group in the more supportive countries. There are substantial numbers of 18-34-year-olds strongly supporting advanced nuclear: $25 \%$ of that age group in the US, $34 \%$ in Sweden and $45 \%$ in Poland (Figure 8).

Figure 6: In the US, environmental group members are more supportive of advanced nuclear than non-members
Environmental group members and supporters more strongly agree that they support the use of the latest nuclear energy technologies to generate electricity, alongside other energy sources."


Question: Are you a member or supporter of any environmental organization (such as Greenpeace, WWF, Nature Conservancy)? Yes/ No/ Prefer not to say Sample: USA $n=674$ member/ supporter, 3,502 non-member/supporter, 74 prefer not to say

Figure 7: Age trend is towards certainty - both for and against
Older age groups more strongly agree, and also disagree, that they "support the use of the latest nuclear energy technologies to generate electricity, alongside other energy sources."


Question: To what extent do you agree or disagree with the following statement: "I support the use of the latest nuclear energy technologies to generate electricity, alongside other energy sources." Response options: Strongly agree / Somewhat agree / Neutral / Somewhat disagree / Strongly disagree Sample: Global $n=3,25918-34,4,885$ 35-54, 5,396 $55-$

Strong opposition, by contrast, comes only from the older age groups. There are no substantial numbers of 18-34-year-olds strongly opposing advanced nuclear in any country: Even in Japan and Germany fewer than $8 \%$ of this age group are strong opponents (Figure 9).

## 5. Support for advanced nuclear is not political and comes from almost all parties

Support for advanced nuclear technologies is cross-party in most countries: the majority of supporters of the major political parties from across the political spectrum are supporters of advanced nuclear. Only the two least supportive countries in our set Germany and Japan - have major political parties without a majority support for advanced nuclear (Figure 10).

Although the level of support for advanced nuclear is fairly uniform across the political spectrum, the motivation for that support varies significantly. In the USA, unsurprisingly, the strongest support on the political right is for reasons of energy independence and innovation, while on the left it is to stop climate change (Figure 11). However, the picture is strongly asymmetric, with the strong motivations apart from climate change working well on both sides.

Figure 8: Strong support among the young in the most supportive countries
Strong support grows with age almost everywhere, starting high with the youngest age group in the more supportive countries.
\% of each age group
agreeing that they
"strongly support the use
of the latest nuclear energy
technologies to generate
electricity, alongside other
energy sources"

Question: To what extent do you agree or disagree with the following statement: "I support the use of the latest nuclear energy technologies to generate lectricity, alongside other energy sources." Response options: Strongly agree / Somewhat agree / Neutral / Somewhat disagree / Strongly disagree Sample: Global $n=3,25918-34,4,88535-54,5,39655+$

Figure 9: Little strong opposition among the young in any country
Strong opposition comes from older age groups in the least supportive countries; it does not start high in the youngest age group anywhere.
\% of each age group
agreeing that they
"strongly disagree with the
use of the latest nuclear
energy technologies to
generate electricity,

[^2]Figure 10: Support for advanced nuclear is cross-party in most countries
Proportion of supporters of each political party who agree (strongly or moderately) that they
"support the use of the latest nuclear energy technologies to generate electricity, alongside other energy sources."


Figure II: Motivations for supporting advanced nuclear vary with politics
Preferred reasons for supporting advanced nuclear technologies vary across the political spectrum - but asymmetrically. Stated preference from a set of reasons to support advanced nuclear, cut by self-identified political ideology (US data).


[^3]6. Most people see the need for and benefits of advanced nuclear and are not put off by perceptions of cost, safety, or waste

Response to the specific attributes that advanced nuclear offers is broadly positive. Most people see the overall need for what advanced nuclear does: that we will need more energy, and that advanced nuclear can protect us from shortages and soaring costs. There is a net balanced view on whether "we can solve our energy issues without nuclear." And most people, when prompted, agree with the specific benefits that advanced nuclear offers, across climate, energy independence, technology leadership, good quality jobs, and the opportunity to replace coal (Figure 12).

Most people are not put off by cost: the view on whether nuclear is too expensive is evenly balanced, with a third agreeing, a third disagreeing and a third in the middle. The picture is similar for safety (Figure 13).

The one area we tested where most people have a concern with nuclear energy is about waste. And that is less a specific safety problem, and more a moral concern that "leaving nuclear waste behind is just wrong, however safe it is." Yet we find counter-intuitively that this concern is not strongly connected with whether or not people are supportive of advanced nuclear energy. Indeed, as most people do support advanced nuclear, and most people have a concern about nuclear waste, it is clear that the same person must be able to hold both of those views. We look at this issue in more detail in finding \#8.

## Figure 12: Overall, most people see the need and benefits

People agreeing vs. disagreeing with a range of statements about advanced nuclear technologies


Question: The statements below describe how some people feel about using nuclear energy to generate our electricity. To what extent do you agree or disagree with each statement?
Sample: Global $\mathrm{n}=13,540$
Figure 13: Most people are okay with nuclear cost and safety, but not waste
People agreeing vs. disagreeing with a range of statements about advanced nuclear technologies


[^4]7. Four intuitive personas explain big country differences and the primary motivations behind support and opposition

Behind these general support levels and demographic categories, there are big variations in how people relate to advanced nuclear, driven by some consistent patterns in what matters to people. The many individual statements we tested about advanced nuclear group statistically into three core factors. Each factor represents a set of statements that people tend to think about in the same way: if they agree with one, they are likely to agree with another in that set. The way statements group together reveals the core themes that people have in mind when thinking about nuclear energy. These themes are (Figure 14):
(a) Nuclear innovation can take us forward and solve our problems. This theme brings together the positive benefits of nuclear around technology leadership, jobs, energy independence, security, climate and abundance.
(b) Our need for nuclear overrides the issues that people have with it. This theme brings together the issues of safety, waste and cost and the necessity or otherwise of nuclear energy.
(c) We need to meet a growing demand for energy. This theme brings together the

Figure 14: Three factors and four segments describe how people think about advanced nuclear technologies
(a) Nuclear innovation can take us
forward and solve our problems


Figure 15: Segment sizes vary by country
Four segments (personas) as a proportion of the population


Question: To what extent do you agree or disagree with the following statement: "I support the use of the latest nuclear energy technologies to generate electricity, alongside other energy sources."
Sample: Nationally representative $n=1,013$ Sweden, 1,007 Poland, 1,046 France, 1,589 UK, 4,250 USA, 1,586 Germany, 1,515 South Korea, 1,534 Japan
need to build more energy for the future, not just use less.

Intuitively, people who tend to agree with all of these three ideas are highly likely to be supportive of advanced nuclear today. We call them the Pro-Growth Established, reflecting both their viewpoints on these issues and who they tend to be demographically: older, generally well off, well educated, established in their position in life, politically leaning slightly right. They generally represent $28 \%$ of our eight-country sample. $91 \%$ of them support advanced nuclear today, and only 3\% oppose it.

Similarly, people who tend to agree with none of these three ideas are highly unlikely to be supportive of advanced nuclear today. We call them the Determined Sketipcs, reflecting their viewpoints on these issues and more broadly: it is ideology, more than demographics, that characterizes this segment of the population. They are well educated but not high-earning. They represent just 15\% of our eight-country sample. Only 13\% of them support advanced nuclear technology, and 63\% oppose it.

What is less intuitive is how people sit between these extremes. A statistical analysis of where people cluster on these three axes highlights two additional segments of the population.

The Concerned Professionals buy into the rationale for advanced nuclear, but feel concern about nuclear as a solution. Our name for them reflects not just this concern, but a broader concern for how to achieve
their ambitions for the world. Younger and well educated, they tend to be moderate politically, strongly concerned about climate change, and have the highest level of membership or support of environmental groups. They represent $27 \%$ of our eight-country sample. $71 \%$ of them support advanced nuclear technology today, and only $7 \%$ oppose it.

The Hard-Working Pragmatists are somewhat the opposite. They don't have the same concerns about nuclear energy, but they also don't feel the driving need for it. They are focused on the immediate challenges they face in making their lives work, relatively unengaged in politics, and reluctant to take a stand on big issues outside their daily experience. They are the least comfortable discussing nuclear energy with friends. They represent $30 \%$ of our eight-country sample. $43 \%$ of them support advanced nuclear technology today, and $15 \%$ oppose it, leaving more than $40 \%$ of them in the middle.

Reducing the near-infinite variety of people in the world to just four personas is a simplification that is inevitably imperfect. Most of us don't exactly fit one of these four types. But it is a potentially useful simplification, because it goes beyond a one-dimensional high/medium/low scale, and captures the big motivations for different people behind support and opposition.

We will look at insights about those motivations in the next two findings. But before we apply these personas, we need to be confident that they are not an over-simpli-fication. To test their validity, we can use them
to predict what overall level of support for advanced nuclear we would expect to see in different countries. The size of the four different segments - the prevalence of the four personas - varies significantly between countries (Figure 15). The personas are not defined by their level of support for nuclear; they are defined by a wide set of views about nuclear and advanced nuclear technologies. But as we have seen, they do show widely different levels of support, from 13\% (Determined Skeptics) up to $91 \%$ (Pro-Growth Established). So if we know the relative size of each segment in each country, and we know the (eight-country aggregate) level of nuclear support in each segment, we can model the overall level of support we should expect to see in each country. And that modeled support is closely correlated with what we actually measure (Figure 16).
8. Most people value the roles advanced nuclear can play to secure our future and are open to hearing about the issues

The levels of support for advanced nuclear that we have quoted so far for each segment - e.g. $91 \%$ for the Pro-Growth Established, $13 \%$ for the Determined Skeptics - relate to a control group in our survey, who answered this support question at the start of our survey, without having seen any stimulus to prompt them about the benefits of advanced nuclear.

In a Randomized Controlled Trial, we asked the same question to other groups, after showing them a short narrative about one particular rationale for advanced nuclear technologies. In summary they focus on how advanced nuclear technologies could help to, respectively: deliver energy independence; boost clean innovation; stop climate change; preserve our land; and bring opportunity and prosperity.

Most people who see one of these narratives show a higher level of support for advanced nuclear than the control group. Figure 17 shows the uplift in support, in percentage points, for each segment in response to each narrative.

No narrative achieved a statistically significant uplift in support from the Determined Skeptics. For the other segments, the biggest uplift came from the narratives

Figure 16: Segment mix well explains the differences in national support
Modeled vs. actual level of support for advanced nuclear technologies by country


Question: To what extent do you agree or disagree with the following statement: "I support the use of the latest nuclear energy technologies to generate electricity, alongside other energy sources." Actual is the proportion of people answering this question with $4-5$ on 5 -point scale. Modeled is the estimated electricity, alongside other energy sources. Actual is the proportion of people answering this auestion with $4-5$ on 5 -point scale. Modeled is the Sample: Nationally representative $n=1,013$ Sweden, 1,007 Poland, 1,046 France, 1,589 UK, 4,250 USA, 1,586 Germany, 1,515 South Korea, 1,534 Japan

Figure 17: The uplift in support from narratives on the benefits of advanced nuclear show how most people value its role in securing our future
Support for advanced nuclear from people in each segment who are primed with a narrative on specific benefits, relative to a control group (difference in percentage points)

| Narrative tested: | Energy independence | Clean innovation | Climate goals | Land use | Opportunity <br> \& Prosperity |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1. <br> Pro-Growth Established | +3.7 | +3.5 |  | +3.7 | $+3.5$ |
| $\begin{gathered} 2 . \\ \text { Concerned } \\ \text { Professionals } \end{gathered}$ | +7.6 | +5.9 | +6.0 | +6.3 | +9.4 |
| 3. Hard-Working Pragmatists | +7.8 | $+7.1$ | +5.9 |  |  |
| 4. Determined Skeptics |  |  |  |  |  |

about energy independence, clean innovation and opportunity and prosperity. The individual narratives were purposefully narrowly focused, for comparability. Together, these uplifts suggest that most people value how advanced nuclear can secure our future: a blend of independence, clean innovation and opportunity.

These narratives tested people's response to the potential benefits of advanced nuclear technologies. Separately, we also tested people's response to a narrative about the often-cited concerns about nuclear energy regarding safety and waste.

We asked people to read the following statement, which seeks to make the case for how advanced nuclear addresses these issues, without shying away from people's concerns - even making reference to nuclear meltdowns:

Nuclear energy is already one of the safest ways to generate electricity. Worldwide, for every ten terrawatt-hours of energy they have produced, coal has caused 250 deaths (mainly through local air pollution); oil has caused 180; natural gas has caused 30; wind, solar and nuclear have each caused less than one.

Advanced nuclear technologies build on this track record with designs that cannot overheat even if the facility loses power. Redesigned fuel systems also completely eliminate the possibility of nuclear meltdowns.

The waste these facilities produce is safe,
tiny, and recyclable. It is made up of solid pellets to ensure that waste cannot leak. If your whole life was powered only by nuclear energy, the total waste produced would fit in a can of soda. And much of that can be safely re-used in other nuclear power stations.

We then asked for people's personal response to this statement. Did they already know most of this? Was it mostly new to

Figure 18: Most people are open to hearing about waste and safety


[^5]Sample: International $\mathrm{n}=2,469$ Pro-Growth Established, 2,528 Concerned Professionals, 2,814 Hard-Working Pragmatists, 1,479 Determined Skeptics
them - and if so, was it a surprise? Or, having read it, are they still not convinced by or don't believe the statement (Figure 18).

Among the Determined Skeptics, a majority are not convinced. But in the other three segments, very few are not convinced, and not many say they already knew it. A substantial majority - varying by segment between 71 and $79 \%$ - don't know it and are open to hearing it.
9.

## Almost all the opposition comes from a small, distinct segment of people that are older, skeptical about innovation, and unmovable in their views

Of our four personas (Finding \#7), only one - the Determined Skeptics - is opposed to advanced nuclear technologies. This persona is the least prevalent of the four, at $15 \%$ of our eight-country sample. $63 \%$ of people in this segment oppose advanced nuclear, amounting to less than $10 \%$ of the whole population (Figure 19).

The opposition to advanced nuclear within this segment is firm. None of the narratives we tested moved the needle on this segment's support for advanced nuclear (Finding \#8, Figure 17). And our narrative on safety and waste was doubted or disbelieved by most people in this segment (Figure 18). But this one immovable segment accounts for most of the opposition to advanced nuclear, and makes up less than one sixth of our eight-country sample.

The public attitude to advanced nuclear is not balanced between support and opposition. It is majority supportive, and otherwise mostly neutral and open-minded. The anti-nuclear sentiment is concentrated in one relatively small but determined group of people.

Figure 19: Opposition to advanced nuclear is concentrated in one small segment of the population
Share of each segment that supports and opposes advanced nuclear technologies, showing segments in proportion to their size in our eight-country sample


Question: To what extent do you agree or disagree with the following statement: "I support the use of the latest nuclear energy technologies to generate lectricity, alongside other energy sources.
Oppose = Strongly disagree / Somewhat disagree; Neutral = Neutral; Support = Strongly agree / Somewhat agree for the control group who do not see any narrative before answering; Support after narrative = Strongly agree / Somewhat agree for the group that see the narrative with the strongest performance for that segment
Sample: Global $n=13,540$
10. Most people are receptive to the "nuclear" name and hearing from the nuclear industry, as well as from environmental groups.

Because the level of anti-nuclear sentiment is often assumed to be bigger than our research shows that it actually is, some organizations have avoided publicly talking about nuclear, and turned to alternative language that avoids the "nuclear" word. Do people respond more or less favorably to different terminology?

We tested people's response to a variety of names and imagery that could describe advanced nuclear technologies. Respondents were shown names and symbols in combination, displayed like brand logos, and asked to choose which logo they preferred on each of several choice screens. From their choices we modeled the attractiveness of each name and each logo to each respondent, and therefore to each segment, using conjoint analysis (Figures 20 and 21 ).

Most people respond positively to the "nuclear" word: "Nuclear Energy" is among the more attractive names in our list, and "New Nuclear" (shown in green where first or first equal) tops the list. (Note that we did not test "Advanced Nuclear" because we used the phrase in our questions and narratives.) Only the Determined Skeptics had a significant preference for a "non-nu-

Figure 20: People respond well to "nuclear," to new, and to more human than tech
Relative attractiveness of different names for advanced nuclear technology ("utility" scores in conjoint analysis)


Figure 21: Softer, organic imagery outperforms sharper, techy designs
Relative attractiveness of different symbols as logos for advanced nuclear technology ("utility" scores in conjoint analysis)

| 1. | 2. | 3. | 4. |
| :---: | :---: | :---: | :---: |
| Pro-Growth | Concerned | Hard-Working | Determined |
| Established | Professionals | Pragmatists | Skeptics |


clear" name ("Elemental Energy", shown in orange where first or first equal), which aligns with their firm opposition to nuclear itself (Finding \#9). Those people who are open to the idea of advanced nuclear, are generally receptive to the "nuclear" name.

Beyond the word itself, there is a pattern to the hierarchy of names in Figure 20. The most attractive names tend to be softer, more accessible, with a more human feel. The least attractive names tend to be harder, more edgy, with a more technical feel. The current industry-preferred technical descriptor "small modular reactor" (shown in black) performs worst of all.

There is a similar pattern to the hierarchy of symbols in Figure 21. The most preferred designs tend to be softer, rounded, with a more organic feel. The least preferred designs tend to be harder, sharper, with a more mechanical feel. The much-used imagery of cooling towers performs worst of all.

The openness that most people show to the nuclear name extends also to the nuclear industry as a messenger. When we ask people who they would particularly like to hear from about advanced nuclear technologies, nuclear industry representatives are the first choice for the Pro-Growth Established, the equal first choice for the Concerned Professionals, and the equal second choice for the Hard-Working Pragmatists (Figure 22). Only the Determined Skeptics have a strong preference elsewhere.

Environmental organizations are the other preferred source, rating first by a big margin for the Determined Skeptics, by a smaller margin for the Hard-Working Pragmatists, and equal first for the Concerned Professionals. (They are not a preferred source for the Pro-Growth Established.) Given this receptiveness, and the supportive stance on advanced nuclear from members and
supporters of environmental organizations (Finding \#3), their voice on advanced nuclear matters.

Based on these findings, the advanced nuclear technology industry can be confident in telling its story, and saying its name.

Figure 22: People want to hear about advanced nuclear from environmental organizations and the nuclear industry itself
Stated preferences for who people most want to hear from about advanced nuclear


Question: "Below are some people who are, or could be, talking about next-generation nuclear electricity and the technology that creates it. Please pick up to three you would particularly like to hear from."

## Personas

## I. Pro-Growth Established

The Pro-Growth Established are defined by their tendency to believe that l) nuclear innovation can take society forward and solve energy challenges, 2) the need for nuclear energy outweighs concerns people may have with it, and 3) we need to meet a growing demand for energy. Their overall support for advanced nuclear energy is aligned with this pattern. Among our four personas, the Pro-Growth Established have the highest support for advanced nuclear ( $91 \%$ ) and the lowest opposition (3\%).

As people, they place a high value on fairness and are comfortable taking a strong stance on how society and government should function. They are resistant to egalitarian redistribution and welfare programs. These moral leanings drive a slight skew toward rightwing/populist political parties.

The Pro-Growth Established are more likely to be male and higher income. Compared across personas, they have the highest median age (56), and (in the US where we measure it) the lowest Minority (12\% non-white) proportion. Their relative comfort and established stance in society allows them space to contemplate long term societal growth and progress.

The Pro-Growth Established have the highest proportion of strong support for advanced nuclear ( $61 \%$ ) and the highest proportion of individuals comfortable talking to their friends about nuclear energy (71\%). At 91\% support already there is limited upside, but our Randomized Controlled Trials show the Pro-Growth Established are significantly moved by most of the narratives we tested - by Energy Independence (increases support by 3.7 percentage points), Land Use (also 3.7), Clean Innovation (3.5) and Opportunity and Prosperity (3.5). They are not moved by the narrative related to climate goals. Climate concern is a relatively low priority for them, with just 27\% Alarmed about climate change, using the classification from the Yale Program on Climate Change Communication. When it comes to the Pro-Growth Established, they support advanced nuclear because it promotes innovation and growth, more than because it provides carbon-free energy.

Supporters: Opponents

Segment Size: Share of population sampled


How they think about advanced nuclear


What they value (uplift in support, \%pts)

5.0\%
$7.5 \%$

## Who they want to hear from (top 4)



## What defines them

Nuclear innovation solves problems
Nuclear need
overrides issues
Energy demand keeps growing

## Who they are

Global mid point
Persona mid point


## Preferred narrative



How they think more broadly


## 2. Concerned Professionals

The Concerned Professionals are a future-focused group. In terms of defining nuclear beliefs, they strongly feel that nuclear innovation can take society forward and solve energy challenges and accept that we need to meet a growing demand for energy. Where they are most distinct from the Pro-Growth Established is in the strength of their concern about nuclear. They see the rationale for advanced nuclear, but feel concern about nuclear as a solution. While 71\% of the Concerned Professionals "support the use of the latest nuclear energy technologies to generate electricity, alongside other energy sources," those who do not are wary of safety concerns.

The "Concern" portion of their name reflects a broader concern for how to achieve their ambitions for the world. Younger, well educated, they tend to be moderate politically. Concerned Professionals have the highest rate of currently employed people across personas and are most likely to live in a major city. They are tied with the Determined Skeptics for highest proportion of people Alarmed about climate change (44\%) and have the highest level of membership or support of environmental groups (22\%). This group is most likely to have a child living in the home ( $40 \%-8$ percentage points above the next highest persona). Their concern and ambitions for the future may be driven by the desire to create a better world for their children.

In conjunction with their status as parents, the Concerned Professionals are guided by a mix of traditional and progressive moral values. In terms of traditionalism, they believe children should respect authority and are likely to label certain actions as right or wrong.

Simultaneously, they believe that progress (societal change, science, and technology) will help to create a better world for today's children. They align with egalitarian values, believing that resources should be divided equally and that the government can play a role in redistribution.

Our Randomized Controlled Trials show a high level of upside in support, recognizing the starting position of $71 \%$. They are significantly moved by all the narratives we tested - particularly by Opportunity and Prosperity (increases support by 9.4 percentage points) and Energy Independence (7.6). Also significant are Land Use (6.3), Climate Goals (6.0) and Clean Innovation (5.9).

## 10.1:1

Supporters: Opponents

Segment Size: Share of population sampled


## 2. Concerned Professionals

How they think about advanced nuclear


Who they are


## Preferred narrative



How they think more broadly


## 3. Hard-Working Pragmatists

The Hard-Working Pragmatists are preoccupied with the struggles and realities of their day-to-day lives. They do not have big concerns about nuclear energy, but they also don't feel a driving need for it. They are focused on the immediate challenges they face in making their lives work, relatively unengaged in politics, and reluctant to take a stand on big issues outside their daily experience.

Hard-Working Pragmatists are not comfortable taking a strong stance on moral judgements or making grand statements about what is most important for society. They are least aligned with the Fairness moral dimension, disinclined to agree with statements like "the number one principle should be ensuring that everyone is treated fairly." It is not to say they are against fairness; rather, they may see a range of values are more or equally important depending on a real-world situation. Morally, the Hard-Working Pragmatists are most aligned with the Egalitarianism dimension, recognizing that they may generally stand to benefit from a redistribution program.

Hard-Working Pragmatists tend to be younger, skew female, and have the highest Minority (non-white, US) proportion among the personas. They have the highest proportion of single-person households (45\%) and about a third of them have a child in the household. They are not defined by their politics and consistently
lead the personas on highest percentage of 'prefer not to say' responses across a variety of political, ideological, lifestyle, and attitudinal items. The Hard-Working Pragmatists are the least likely persona to have a bachelor's degree (44\%) or own a home (57\%).

Given the heads-down, make-ends-meet reality of the Hard-Working Pragmatist, it is unlikely they will have or want to have strong opinions on nuclear energy. While $43 \%$ of them support advanced nuclear technology and $15 \%$ oppose it, more than $40 \%$ of them sit in the middle. When exposed to nuclear narratives in our research, however, there is significant upside in support from three of the five narratives we tested: Energy Independence (increases support by 7.8 percentage points), Clean Innovation (7.1) and Climate Goals (5.9). The narratives on Land Use and Opportunity and Prosperity had no significant uplift.

## 2.9:1

Supporters: Opponents

Segment Size: Share of population sampled


How they think about advanced nuclear


## What they value (uplift in support, \%pts)



Who they want to hear from (top 4)


## What defines them

Nuclear innovation solves problems
Nuclear need overrides issues
Energy demand keeps growing


## Who they are

 Global mid pointPersona mid point


Climate change (\% alarmed)


## Preferred narrative



## How they think more broadly



## 4. Determined Skeptics

The Determined Skeptics are the one persona that holds strong opposition to advanced nuclear energy. They are defined by their strong disbelief that nuclear innovation can take society forward and solve energy challenges and that the need for nuclear energy outweighs concerns about it. They weakly believe that there is growing demand for energy, but they are unequivocally opposed to using nuclear energy to meet that demand. This pattern of underlying belief drives their low support for advanced nuclear energy to produce electricity (13\%). For every person who supports advanced nuclear in this persona, there are close to five who oppose it. No other persona comes close to this level of opposition. They account for just $15 \%$ of our overall eight-country sample, but $57 \%$ of those opposing advanced nuclear.

The Determined Skeptics are strongly pro-government and place a high value on egalitarianism and fairness in society. They are likely to support government redistribution programs. In many ways, they are the foil of the Pro-Growth Established. When it comes to willingness to take a stance on how society and government should function, both groups have their strongly held beliefs on how the world should be. The Determined Skeptics oppose tradition and are unlikely to conform to societal norms or express strong feelings of national pride. They are deeply engaged with climate issues (equal to Concern Profession-
als with $44 \%$ Alarmed about climate change). They are politically Leftist, with the strongest political lean of the personas. Demographically, they skew older (median age of 55) and female (58\%). They are highly educated but not high earning.

Their nuclear opposition appears largely unmovable. When presented with our narrative on safety and waste, a majority of Determined Skeptics (54\%) said they were not convinced or did not believe the statements. The highest number doubting the statements among the other personas was 13\%, for the Hard-Working Pragmatists. Similarly, when presented with six reasons for supporting advanced nuclear technologies and asked which they prefer, $65 \%$ of Determined Skeptics said they "would not support advanced nuclear technologies for any of these reasons." Again, the Hard-Working Pragmatists were next highest in this category with just $12 \%$. And none of the five narratives we tested drives any statistically significant increase in support from the low baseline of $13 \%$.
0.2:1

Supporters: Opponents
Segment Size: Share of population sampled


How they think about advanced nuclear


## What they value (uplift in support, \%pts)



Who they want to hear from (top 4)


## What defines them

Nuclear innovation solves problems
Nuclear need overrides issues

Energy demand Energy demand
keeps growing

## Who they are

Global mid point
Persona mid point


## Preferred narrative



80\%

How they think more broadly


## France

Support vs. opposition'


## Support by...

| Gender |  | Income |  | Political Affiliation |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Men | 74\% | Low income (under 20k EUR) | 59\% | ECR | 76\% |
| Women | 65\% |  |  | Greens/EFA+ID | 56\% |
| Age |  | Medium income (20k-40k EUR) | 69\% | GUE/NGL | 66\% |
| 18-34 | 61\% |  |  | S\&D | 74\% |
| 35-54 | 72\% | High income (40k+ EUR) | 76\% | S\&D | 74\% |
| 55+ | 72\% |  |  |  |  |

## Preferred narratives ${ }^{4}$

(\% selected)


## Persona mix



## Top 5 nuclear sentiments ${ }^{3}$

(\% agree)

| We need nuclear energy in the mix, along with renewables, if we are <br> to meet our climate goals. | $\mathbf{6 9 \%}$ |
| :--- | :---: |
| Advanced nuclear energy could protect us from the sort of crisis of <br> energy shortages and soaring costs we are experiencing right now | $\mathbf{6 9 \%}$ |
| We need a way to produce more and more energy for our economy <br> to keep growing | $\mathbf{6 8 \%}$ |
| We should use advanced nuclear energy to reduce our dependence <br> on other countries | $\mathbf{6 8 \%}$ |
| Leaving nuclear waste behind is just wrong, however safe it is | $\mathbf{6 6 \%}$ |

Preferred messengers ${ }^{5}$
(\% selected)


[^6]
## 5:1

support to opposition ratio for advanced nuclear

## 69\%

believe nuclear is essential to meet climate goals

## 61\%

believe nuclear energy is safer than fossil fuels

## 69\%

believe advanced nuclear can help avoid energy shortages and price hikes

## 10:9

male to female support ratio

Today, nearly 70\% of people in France support advanced nuclear, with a $5: 1$ ratio of supporters to opponents ( $15 \%$ oppose). The country's support is 8 pp higher than the global average level of support. In fact, $55 \%$ believe it should the first choice for energy (+14 pp vs. global average).
$69 \%$ of people in France see advanced nuclear as an essential part of the energy mix to stopping climate change (+8 pp vs. global average). Environmental members are also supportive of advanced nuclear (61\% support), but a smaller share of them believe nuclear is essential to meeting climate goals (55\% vs. $72 \%$ of non-members)
$61 \%$ of people in France believe that nuclear energy is safer than fossil fuels ( +12 pp vs. global average). This ranked second-highest among the countries in our study (next to Poland). Proximity to and awareness of nuclear energy within France may contribute to this belief: $68 \%$ of people in France are aware of Europe's large nuclear capacity (+ll pp vs. global average).

69\% of people in France believe advanced nuclear could protect their country from energy shortages and high costs ( $+11 \%$ vs. global average). This may contribute to France's preference for energy independence as the main reason to support advanced nuclear (34\% selected, +6 pp vs. global average).

France has the second-lowest margin in support between men and women next to Poland (9 pp differential). France is one of three countries where at least $60 \%$ of women support advanced nuclear, with Poland and UK taking the other two spots

## Germany

## Support vs. opposition'



## Support by...

| Gender |  | Income |  | Political Affiliation |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Men | 58\% | Low incom | 46\% | AfD | 62\% |
| Women | 43\% | (under 20k EUR) |  | CDU | 65\% |
| Age |  | Medium income (20k-60k EUR) | 51\% | Free Democrats | 63\% |
| 18-34 | 56\% |  |  | Social Democrats | 46\% |
| $35-54$ $55+$ | 48\% <br> $51 \%$ | High income (60k+ EUR) | 55\% | The Greens | 34\% |
|  |  |  |  | The Left | 43\% |

## Preferred narratives ${ }^{4}$

(\% selected)


## Persona mix



## Top 5 nuclear sentiments ${ }^{3}$

(\% agree)

| We need a way to produce more and more energy for our economy <br> to keep growing | $\mathbf{6 6 \%}$ |
| :--- | :--- |
| Leaving nuclear waste behind is just wrong, however safe it is | $\mathbf{6 4 \%}$ |
| Nuclear waste can never be made safe enough | $64 \%$ |
| We need to be building capacity for more energy, not just trying to <br> use less | $61 \%$ |
| Advanced nuclear energy could protect us from the sort of crisis of <br> energy shortages and soaring costs we are experiencing right now | $57 \%$ |

## Preferred messengers ${ }^{5}$

(\% selected)


[^7]
## 2:1

support to opposition ratio for advanced nuclear

## 51\%

of environmental members support advanced nuclear

## 55\%

of strong opponents of advanced nuclear are in the 55+ age cohort

## 32\%

see energy independence as the strongest narrative

## 66\%

believe we need to produce more energy for the economy to grow.

Today, more than $50 \%$ of people in Germany support advanced nuclear. Despite their relatively low ranking among other countries in terms of absolute support, supporters outweigh opponents by a factor of 2 to 1 .

Environmental group members and supporters in Germany are just as likely to support advanced nuclear as non-members of environmental groups in Germany. About 15\% of environmental members in Germany strongly oppose advanced nuclear. Non-members follow closely with $13 \%$ strongly opposing.

Strong opposition in Germany is concentrated among the 55+ cohort, making up 55\% of all strong opponents. Even in this cohort, however, only 17\% of people strongly oppose advanced nuclear. Within the 18-34 and 35-54 age cohorts, the proportion of strong opponents drops to $13 \%$ and $8 \%$, respectively.

Energy independence is seen as the strongest reason to support advanced nuclear by 11 pp . That is 4 pp higher than the global average for preference of energy independence. Opportunity and prosperity is the second most popular reason to support advanced nuclear ( $21 \%$ selected, +5 pp vs global average).

About 2 out of 3 people in Germany see the need for greater energy production to fuel economic growth. This was the most popular sentiment among people in Germany. Demands for greater energy capacity may contribute to an openness to advanced nuclear, despite strong attitudes on nuclear waste.

## Japan

## Support vs. opposition'



## Support by...

| Gender |  | Income |  | Political Affiliation |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Men | 54\% | Low income (under 4M JPY) | 39\% | CDP | 38\% |
| Women | 33\% |  |  | Communist | 25\% |
| Age |  | Medium income (4M JPY-8M JPY) | 49\% | DPP | 57\% |
| 18-34 | 50\% |  |  | JIP | 53\% |
| 35-54 | 48\% | High income ( $8 \mathrm{M}+\mathrm{JPY}$ ) | 58\% | JP |  |
| 55+ | 39\% |  |  | LDP | 68\% |

## Preferred narratives ${ }^{4}$

(\% selected)


## Persona mix



## Top 5 nuclear sentiments ${ }^{3}$

(\% agree)

| Leaving nuclear waste behind is just wrong, however safe it is | $\mathbf{7 2 \%}$ |
| :--- | :---: |
| We need a way to produce more and more energy for our economy <br> to keep growing | $\mathbf{6 3 \%}$ |
| Nuclear waste can never be made safe enough | $\mathbf{5 9 \%}$ |
| We need to be building capacity for more energy, not just trying to <br> use less | $\mathbf{5 6 \%}$ |
| We need to be using less energy, not building more | $\mathbf{5 3 \%}$ |

## Preferred messengers ${ }^{5}$

(\% selected)


[^8]
## 1.6:1

support to opposition ratio for advanced nuclear

## 55\%

of environmental members support advanced nuclear

## 60\%

of strong opponents of advanced nuclear are in the 55+ age cohort

## 3 out of 5

of the top agreed statements are on energy production

## 8:5

male to female support ratio
$45 \%$ of people in Japan support advanced nuclear. Though the country has the lowest relative ranking of absolute support among the countries we surveyed, there are firmly more supporters than there are opponents of advanced nuclear (29\% oppose).

Support for advanced nuclear is 10 pp higher among environmental group members than among non-members. Opposition among environmental members is also 3 pp lower than that of non-members ( $26 \% \mathrm{vs}$. $29 \%$, respectively). Over half (51\%) of environmental members see nuclear energy as essential to meeting climate goals (+8 pp vs. non-members). This belief likely contributes to the overall favorability of advanced nuclear among environmental supporters in Japan.

Strong opposition in Japan is highly concentrated among the $55+$ cohort, with 3 in 5 strong opponents coming from the 55+ cohort. The 55+ cohort has over twice the proportion of strong opponents ( $18 \%$ ) as the 18-34 and $35-54$ age cohorts ( $7 \%$ and $9 \%$, respectively).
$63 \%$ of Japanese respondents believe that we need to produce more energy for the economy to keep growing. $56 \%$ also think we needed to keep building more capacity, rather than using less. This core belief on the need to increase energy production likely contributes to support for advanced nuclear, despite the country's waste concerns.

Japan has the highest male to female support ratio with over a 20 pp difference in support (54\% vs. 33\%). Safety and waste perceptions may contribute to this difference - $70 \%$ of women in Japan believe nuclear waste cannot be stored safely (vs. $56 \%$ of men).

## Poland

## Support vs. opposition'



## Support by...



## Preferred narratives ${ }^{4}$



## Persona mix



## Top 5 nuclear sentiments ${ }^{3}$

(\% agree)

| We need a way to produce more and more energy for our economy <br> to keep growing | $\mathbf{8 5 \%}$ |
| :--- | :---: |
| We need nuclear energy in the mix, along with renewables, if we are <br> to meet our climate goals | $\mathbf{7 8 \%}$ |
| Advanced nuclear energy could protect us from the sort of crisis of <br> energy we are experiencing right now | $\mathbf{7 8 \%}$ |
| We need to be building capacity for more energy, not just trying to <br> use less | $\mathbf{7 8 \%}$ |
| We should use advanced nuclear energy to reduce our dependence <br> on other countries | $\mathbf{7 6 \%}$ |

## Preferred messengers ${ }^{5}$

(\% selected)


 people who are, or could be, talking about next-generation nuclear electricity and the technology that creates it. Please pick up to three you would particularly like to hear from.'

## 10:1

support to opposition ratio for advanced nuclear

## 43\%

strong support for "local electricity company to use advanced nuclear'

## 39\%

see improved local air
quality / health as a top benefit of advanced nuclear

## 78\%

believe nuclear is necessary to hit climate goals

## 75\%

believe advanced nuclear can provide good, local jobs

More than $80 \%$ of people in Poland support advanced nuclear. With fewer than $10 \%$ of people opposing advanced nuclear, Poland's 10:I support to opposition ratio is the highest across all countries surveyed. In addition, $63 \%$ of people believe nuclear should be the first choice for energy (+22 pp vs. global average)

More than $40 \%$ of people in Poland strongly support their local electricity company using advanced nuclear technologies. That is the highest level of support across all 8 countries surveyed (+17 pp vs. global average). Including moderate support, $82 \%$ of people in Poland support local use of advanced nuclear.

Nearly 40\% of people in Poland see "improved local air quality / health" as a main benefit of advanced nuclear. That is the highest level of support across all 8 countries surveyed ( +17 pp vs. global average). The clean energy advantages of advanced nuclear tend to resonate strongly with people in Poland - $40 \%$ also saw "no carbon / greenhouse gas emissions" as a main benefit (+6 pp vs. global average).

Along with seeing the carbon-free energy production as a core benefit, $78 \%$ of people in Poland also believe that nuclear energy is necessary to meet our climate goals. That level of agreement ranks highest among the countries surveyed (+17 pp vs. global average).

3 out of 4 people in Poland believe that advanced nuclear energy can provide good, local jobs to their communities. This is the strongest level of agreement observed in our study (+2l pp vs. global average).

## South Korea

## Support vs. opposition'



## Support by...

| Gender |  | Income |  | Political Affiliation |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Men | 70\% | Low income (under 40M KRW) | 58\% | Democratic Party | 51\% |
| Women | 56\% |  |  | Justice Party | 62\% |
| Age |  | Medium income (40M-70M KRW) | 67\% | People Power Party | 88\% |
| 18-34 | 63\% |  |  |  |  |
| 35-54 | 60\% | High income ( $70 \mathrm{M}+\mathrm{KRW}$ ) | 66\% |  |  |
| 55+ | 69\% |  |  |  |  |

## Preferred narratives ${ }^{4}$

(\% selected)


## Persona mix



## Top 5 nuclear sentiments ${ }^{3}$

(\% agree)

| We need a way to produce more and more energy for our economy <br> to keep growing | $\mathbf{7 6 \%}$ |
| :--- | :---: |
| Leaving nuclear waste behind is just wrong, however safe it is | $\mathbf{7 4} \%$ |
| Nuclear waste can never be made safe enough | $\mathbf{6 7 \%}$ |
| We need to be building capacity for more energy, not just trying to <br> use less | $\mathbf{6 2 \%}$ |
| We need nuclear energy in the mix, along with renewables, if we are <br> to meet our climate goals | $\mathbf{5 8 \%}$ |

## Preferred messengers ${ }^{5}$

(\% selected)


[^9]
## 5:1

support to opposition ratio for advanced nuclear

## over 2x

the percentage of strong supporters age 55+ vs 35-54

## $+8 \%$

selected clean innovation as the top reason to support advanced nuclear vs. global average

## $-7 \%$

difference in support
for local use vs general support for advanced nuclear

## $74 \%$

believe "leaving nuclear waste behind is just wrong"

More than 60\% of people in South Korea support advanced nuclear. In fact, nearly 40\% of people in South Korea believe that nuclear power should be their first choice for energy. With only $13 \%$ opposing advanced nuclear, South Korea has a support:opposition ratio of 5:1.

Strong support for advanced nuclear jumps significantly in the oldest cohort: 35\% of 55+ South Koreans strongly support advanced nuclear vs $15 \%$ of $18-34$ year olds and $16 \%$ of $35-54$ year olds. This comes from solidifying opinions - only $15 \%$ of the 55+ cohort is on the fence with advanced nuclear.

28\% of people in South Korea see clean innovation as the top reason to support advanced nuclear energy (vs. $20 \%$ globally). More than half of people in South Korea (55\%) see nuclear's energy production as clean as renewables'. That ranked 3rd highest among countries surveyed, which may contribute to the value placed on clean innovation.

While 63\% of people in South Korean support the use of advanced nuclear to generate electricity, only $56 \%$ of South Koreans "would be happy for [their] local electricity company to use advanced nuclear." This is the largest gap between support of general vs local use of any country studied.

People in South Korea are concerned about nuclear waste: $74 \%$ agree leaving nuclear waste behind is wrong, no matter how safe it is. This is the highest agreement of any country studied. The same is true for the $67 \%$ of South Koreans who believe that nuclear waste can never be made safe enough.

## Sweden

## Support vs. opposition'



## Support by...

| Gender |  | Income |  | Political Affiliation |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Men | 76\% | Low income <br> (under 300k SEK) | 59\% | ECR | 83\% |
| Women | 61\% |  |  | EPP | 85\% |
| Age |  | Medium income (300k-500k SEK) | 69\% | Greens/EFA+ID | 68\% |
| 18-34 | 63\% |  |  | GUE/NGL | 42\% |
| 35-54 | 71\% | High income (500k+ SEK) | 79\% | Renew Europe | 76\% |
| 55+ | 71\% |  |  | Renew Europe | 76\% |
|  |  |  |  | S\&D | 66\% |

## Preferred narratives ${ }^{4}$

(\% selected)


## Persona mix



## Top 5 nuclear sentiments ${ }^{3}$

## (\% agree)

| We need a way to produce more and more energy for our economy <br> to keep growing | $\mathbf{7 3 \%}$ |
| :--- | :---: |
| We need to be building capacity for more energy, not just trying to <br> use less | $\mathbf{7 2 \%}$ |
| We need nuclear energy in the mix, along with renewables, if we are <br> to meet our climate goals | $\mathbf{6 8 \%}$ |
| Advanced nuclear energy could protect us from the sort of crisis of <br> energy shortages and soaring costs we are experiencing right now | $\mathbf{6 8 \%}$ |
| We should use advanced nuclear energy to reducfe our dependence <br> on other countries | $\mathbf{6 6 \%}$ |

## Preferred messengers ${ }^{5}$

(\% selected)


## 51\%

believe nuclear power should be our first choice for energy

## +20pp

increase in support for adv. nuclear in highest vs lowest income bracket

## I out of 3

nuclear opponents are members / supporters of environmental organizations

## 8th

out of 8 in ranking for concern on safety of nuclear waste

## $68 \%$

believe nuclear energy is necessary to meet climate goals

Today, more than half of people in Sweden see advanced nuclear as the first choice for energy generation. $51 \%$ believe nuclear should be the first choice for energy since it is safe, secure, and abundant. This is +10 pp over the global average.

Nuclear support trends upward with income in Sweden. The data show a IOpp jump in support with each income bracket increase: $59 \%$ of people with household income under 300k SEK/year support advanced nuclear energy vs $69 \%$ making $300 \mathrm{k}-500 \mathrm{k}$ SEK vs $79 \%$ making $500 \mathrm{k}+$ SEK. This is the sharpest support by income increase of any country in the study.

Though only 13\% of people in Sweden oppose advanced nuclear energy, 32\% of opponents are supporters or members of an environmental organization. This is the largest share of environmental organization-affiliated opponents among countries studied.

People in Sweden are least put off by the waste issue of any country studied. Only 45\% of people in Sweden believe nuclear waste can never be made safe (-l0pp vs global average). Sweden is the only country where less than half of people agree that leaving nuclear waste behind is wrong.

People in Sweden see advanced nuclear as essential to limit the worst effects of climate change: 68\% believe we need nuclear in the energy mix to hit our climate goals. Of the countries surveyed, Sweden has the highest proportion of strong agreement that we need nuclear to meet climate goals (37\%).

## Support vs. opposition'



## Support by...

| Gender |  | Income |  | Political Affiliation |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Men | 75\% | Low income (under 30k GBP) | 65\% | Conservative Party | 78\% |
| Women | 60\% |  |  | Green Party | 57\% |
| Age |  | Medium income (30k-60k GBP) | 69\% | Labour Party | 67\% |
| 18-34 | 61\% |  |  | Liberal Democrats | 74\% |
| 35-54 | 67\% | High income (60k+ GBP) | 74\% | Liberal Democrats | 74\% |
| 55+ | 72\% |  |  |  |  |

## Preferred narratives ${ }^{4}$

(\% selected)


## Persona mix



## Top 5 nuclear sentiments ${ }^{3}$

(\% agree)

| We need a way to produce more and more energy for our economy <br> to keep growing | $\mathbf{7 7 \%}$ |
| :--- | :---: |
| We need nuclear energy in the mix, along with renewables, if we are <br> to meet our climate goals | $\mathbf{6 6 \%}$ |
| We need to be building capacity for more energy, not just trying to <br> use less | $\mathbf{6 3 \%}$ |
| Advanced nuclear energy could protect us from the sort of crisis of <br> energy shortages and soaring costs we are experiencing right now | $\mathbf{6 2 \%}$ |
| We should use advanced nuclear energy to reduce our dependence <br> on other countries | $\mathbf{6 2 \%}$ |

## Preferred messengers ${ }^{5}$

(\% selected)


 box agreement; 4) \% of respondents who chose each narrative as the strongest reason to support advanced nuclear technologies (excluding those who did not support any reason)
people who are, or could be, talking about next-generation nuclear electricity and the technology that creates it. Please pick up to three you would particularly like to hear from."

## Over 5:1

support to opposition ratio for advanced nuclear

## 66\%

believe nuclear energy is necessary to meet climate goals

## +llpp

support in 55+ age cohort vs
18-34 cohort

## -8pp

below the global average on agreement that nuclear waste can never be made safe enough

## 56\%

want to hear from government scientists on advanced nuclear

Today, 68\% of people in the UK support advanced nuclear. Further, 44\% of people believe that nuclear power should be their first choice for energy. With only $13 \%$ opposing advanced nuclear, the UK has one of the highest support:opposition ratios at over 5:l. Local support is also strong with $67 \%$ of people reporting that they would be happy for their local electricity company to use advanced nuclear.

Two-thirds of people in the UK believe "we need nuclear energy in the mix, along with renewables, if we are to meet our climate goals" ( +5 pp vs global average). Climate is the 2 nd preferred narrative (behind energy independence).

Nuclear support trends upward with age in the UK. In the UK, $61 \%$ of the 18-34 cohort supports advanced nuclear. That jumps to $67 \%$ support in the $35-54$ cohort, and finally, to $72 \%$ support among the $55+$ cohort. A similar trend is seen with income bracket increases.

Waste, safety, and cost are not top of mind concerns. Less than half of people in the UK believe nuclear waste can never be made safe enough (-8pp vs global average). Across all nuclear perceptions we tested, those related to nuclear being unsafe and too expensive to build had the lowest level of agreement among people in the UK (34\% agreement for both).

56\% of people in the UK want to hear about advanced nuclear from government scientists. Outside of South Korea, this is the largest share of people who want to hear from government scientists of the countries studied (+10pp vs global average). Relative to other countries, people in the UK had little interest in hearing from mega tech or new technology entrepreneurs.

## Support vs. opposition'



## Support by...

| Gender |  | Income |  | Political Affiliation |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Men | 73\% | Low income (under 50k USD) | 52\% | Democrat | 61\% |
| Women | 50\% |  |  | Independent | 60\% |
| Age |  | Medium income (50k-100k USD) | 60\% | Republican | 66\% |
| 18-34 | 58\% |  |  |  |  |
| 35-54 | 62\% | High income (100k+ USD) | 70\% |  |  |
| 55+ | 62\% |  |  |  |  |

## Preferred narratives ${ }^{4}$

(\% selected)


## Persona mix



## Top 5 nuclear sentiments ${ }^{3}$

(\% agree)

| We need a way to produce more and more energy for our economy <br> to keep growing | $\mathbf{7 6 \%}$ |
| :--- | :---: |
| We need to be building capacity for more energy, not just trying to <br> use less | $\mathbf{6 3 \%}$ |
| We need nuclear energy in the mix, along with renewables, if we are <br> to meet our climate goals | $\mathbf{6 0 \%}$ |
| Leaving nuclear waste behind is just wrong, however safe it is | $\mathbf{5 9 \%}$ |
| We should use advanced nuclear energy to reduce our dependence <br> on other countries | $\mathbf{5 8 \%}$ |

Preferred messengers ${ }^{5}$


[^10]
## 4:1

support to opposition ratio for advanced nuclear

## 60\%

or more of each political party supports advanced nuclear

## 14pp

increase in support with energy independence narrative

## 49\%

believe that nuclear power emits more $\mathrm{CO}_{2}$ than renewables

## 57\%

of Americans believe we need nuclear to meet climate goals

Over 60\% of Americans support advanced nuclear technologies. That puts the US even with the global average rate of support (among the 8 countries we surveyed). With just over $15 \%$ of Americans opposing advanced nuclear, there is a $4: 1$ support to opposition ratio. Support is equally strong for local use: $61 \%$ of Americans agree they would be happy for their local electricity company to use advanced nuclear technologies.

At least 60\% of Republicans, Independents, and Democrats support advanced nuclear. There is only a 5pp difference between support for advanced nuclear among Democrats and Republicans, showing a fairly nonpartisan environment for advanced nuclear in the US.

Among the 4200+ US respondents, the energy independence narrative creates the highest lift in support (14\%) versus the control group. In fact, 54\% of Americans (inclusive of all narrative groups) believe we should use advanced nuclear energy to reduce our dependence on other countries.

Despite relatively high support for advanced nuclear, about half of Americans believe that the technology emits more $\mathrm{CO}_{2}$ during energy production than renewables. This is equal to the highest proportion among any country in our survey, and it is 8 pp higher than the global average support for that belief.

Even with lower knowledge about the technology's emissions benefits, Americans still see nuclear as a necessary energy source in a climate context. The clean air benefit seems to resonate with Americans under the "clean innovation" narrative as well, which creates a 9pp lift in support versus the control group.

## Survey Methodology

The results presented here are derived from an unbranded Internet-based quantitative survey fielded by independent panel-provider Dynata between November 25, 2022 and January 5, 2023.

The project was conceived and funded by the Potential Energy Coalition. The approach was designed and delivered by Potential Energy in conjunction with Zero Ideas. The approach builds on learnings from previous surveys, mostly at country level, by Bisconti, Gallup, Pew, YouGov and others, and on the synthesis of previous studies by the Breakthrough Institute, Nuclear Cognition: Public attitudes, elite opinion, and the next generation of nuclear energy communications. In addition to these published sources, we interviewed people from a range of nuclear industry bodies, technology companies and environmental organizations, and industry commentators and advisors.

## Research Design

Target populations \& sample sizes In total 16,300 respondents completed our survey. This report is based on the findings from 13,500 respondents from eight countries across three continents (see table), nationally representative by age and gender distribution. Within the US we used quotas to ensure nationally representative distributions also for region and ethnicity, and additionally surveyed a boost sample of 2,800 respondents who live in retiring coal communities, identified by ZIP code.

The median length of the survey for each respondent was 19 minutes. To ensure we kept respondents' attention we included a series of attention measures and checks throughout the survey, and disqualified
respondents whose responses to these was not meaningful.

The sample sizes were chosen to support Randomized Controlled Trials, which compare responses from people who we expose to one of several short narratives on advanced nuclear energy, with responses from a control group not exposed to a narrative. We used a total of six groups (five different narratives and a control), so globally our sample of 13,500 gives us about 2,250 respondents per group. At a country level outside the US, our sample sizes (1,000 to 1,500 ) were designed to provide robust results when profiled and segmented, but not to support Randomized Controlled Trials.

| Country | Respondents |
| :--- | ---: |
| US | 4,250 |
| UK | 1,589 |
| France | 1,046 |
| Germany | 1,586 |
| Poland | 1,007 |
| Sweden | 1,013 |
| Japan | 1,534 |
| South Korea | $\mathbf{1 , 5 1 5}$ |
| Total | $\mathbf{1 3 , 5 4 0}$ |

## Measuring support for advanced nuclear

Many of the findings in this report' derive from one core question that tests a respondent's support for advanced nuclear. Respondents were asked to what extent they agree or disagree with the statement: "I support the use of the latest nuclear energy technologies to generate electricity, alongside other energy sources." They answered on a five-point scale:

1 I strongly disagree with this
2 I somewhat disagree with this
3 Neutral
4 I somewhat agree with this
5 I strongly agree with this
The wording of the question was informed by findings from previous studies, to give respondents the context that (a) this is a solution for generating electricity, and (b) the question is about using nuclear as part of the mix, complementing other energy sources rather than necessarily competing with them. The "latest nuclear energy technologies" was to keep the focus on advanced nuclear - which was also the focus of the narratives we tested. The question appeared at the start of the survey.

The five-point scale is particularly important in this study, recognizing that many people's views on nuclear are "weakly held," as the Breakthrough Institute's Nuclear Cognition report puts it. Our scale distinguishes strongly held and weakly held views, and allows people to take a neutral
position, which we know from previous studies that may people do. In some parts of the questionnaire we purposefully used binary options (yes/no, true/false) to force people to choose, but in most cases we wanted to see the more nuanced response. As a complementary measure of support, we asked the question in a binary way, to force people to choose: "Do you believe that advanced nuclear technologies should be an important part of the solution to our energy challenges?" Respondents could answer either Yes or No. This question appeared at the end of the survey, when respondents had been exposed to a whole range of issues about nuclear energy, including both benefits and concerns.

Profiling support and understanding its drivers
In addition to asking about support, and the contrasting narratives we tested, our questionnaire covered the following to explore what different people value:

- Attitudes to and understanding of nuclear energy, including true/false questions to identify misconceptions, and more subjective questions on how people feel about different aspects of nuclear energy (these formed the basis of our segmentation, see below);
- Questions on the benefits of advanced nuclear, complementing our Randomized Controlled Trials with considered, stated preferences;
- Reactions to various names and imagery that are or could be used to communicate about advanced nuclear, and different types of organizations that communi-
cations could come from;
- A wide range of psychographic and demographic questions used to profile different segments and other groups of respondents.


## Analysis Methodologies

Randomized Controlled Trials
We used Randomized Controlled Trials to test reactions to various narratives each describing a benefit of advanced nuclear as a breakthrough technology to solve a described problem. The analysis compares the degree of support for advanced nuclear on the question detailed above between people exposed to a particular narrative and a control group. The methodology allows us to observe directly the impact that a narrative has on a group of respondents, which may be different from what the same respondents tell us (or even think themselves) when asked to state a preference.

## Conjoint analysis

Similarly, we wanted to test names and imagery for nuclear in context, rather than asking people directly which name or icon they liked best. To do this, we used a choice-based conjoint exercise in which we combined names and icons randomly into "logos," so they were always presented in combination like a brand identity, with the pairing of names and icons varying between screens and between respondents.

By learning respondents' preferences among the pairs tested, we can statistically estimate the "utility" of each name and each icon for each respondent, and model the preference the respondent would have for combinations they didn't get to see. This approach allows us to quantify the relative value of prospective names and icons, identify the relative importance of name vs. icon in explaining preferences, and find the best-received logos (name/icon combinations).

## Segmentation

The four segments that feature in many of this report's findings (Figure 14-22) are built in three stages.

First we performed an Exploratory Factor Analysis of the many different perception questions we asked about nuclear energy to uncover the small number of latent beliefs that drive these perceptions. The factor analysis groups together aspects that are correlated, meaning that people tend to see each of them in much the same way (if they agree with one, they are likely to agree with another in the set). In this case the analysis produced three clear factors.

We then used $k$-means clustering and silhouette analysis on these factor scores to group respondents into four distinct segments (personas).

Finally, we profiled each of these segments based on a range of demographic and psychographic questions, including political
persuasion, association with environmental groups, and a set of seven moral tensions. The moral tensions were themselves the result of a separate Exploratory Factor Analysis of 29 preference statements in our questionnaire designed to capture respondents' moral leanings, reflecting the moral foundations proposed by Jonathan Haidt. ${ }^{2}$ They allow us to profile on respondents' moral position on responsibility, tradition, fairness, the role of government, egalitarianism, progress and sanctity.

[^11]
## The Organizations Behind the Study

CLEARPATH
ClearPath's mission is to develop and advance policies that accelerate innovations to reduce and remove global energy emissions. To advance that mission, we develop cutting-edge policy solutions on clean energy and industrial innovation. An entrepreneurial, strategic nonprofit, ClearPath (501(c)(3)) collaborates with public and private sector stakeholders on innovations in nuclear energy, carbon capture, hydropower, natural gas, geothermal, energy storage, and heavy industry to enable private-sector deployment of critical technologies.

Potential Energy Coalition is a data-driven, marketing nonprofit that aims to dramatically increase public support for clean energy and climate solutions using the most advanced marketing, analytics, customer insight, and creative techniques from the private sector. Potential Energy Coalition has developed an advanced communications capability that significantly increases and broadens public will for clean energy at the lowest possible cost. The firm's campaigns create a foundation of educated citizens that enables large-scale action on the energy transition.

RePlanet is a grassroots network of like-minded organizations who are driven by science-based solutions to climate change, biodiversity collapse and the need to eliminate poverty. As a new global citizens movement, we demand a rethink of how we shape the future. We follow the evidence, and advocate solutions with real impact. We fight for radically better land use and rewilding, to create the space for all life on Earth to flourish.

## THIRD WAY

Third Way's Climate \& Energy Program designs and advocates for policies that will drive innovation and deployment of clean energy technologies, and deliver the emissions cuts we need to win the fight against climate change. The more low-carbon options we have to work with, the better our chances of success. That's why we're proud to be part of a large and growing community promoting evidence-based solutions to the climate challenge that include advanced nuclear and carbon capture technology, as well as renewables, hydropower, existing nuclear, carbon removal, energy storage, and efficiency.


[^0]:    'BP Statistical Review of World Energy, 2022
    2"Who Has Become More Open to Nuclear Power Because of Climate Change?" (Truelove and Greenberg, 2013)
    ${ }^{3}{ }^{4}$ Nuclear Cognition: Public attitudes, elite opinion, and the next generation of nuclear communications" (The Breakthrough Institute, October 2021)
    4"Knowledge, Risk, and Policy Support: Public Perceptions of Nuclear Power" (Stoutenborough, Sturgess, and Vedlitz, November 2013)

[^1]:    Question: To what extent do you agree or disagree with the following statement: "I support the use of the latest nuclear energy technologies to generate electricity, alongside other energy sources." Response options: Strongly agree / Somewhat agree / Neutral / Somewhat disagree / Strongly disagree Sample: Global $n=6,780$ male, 6,727 female, 33 other

[^2]:    Question: To what extent do you agree or disagree with the following statement: "I support the use of the latest nuclear energy technologies to generate electricity, alongside other energy sources." Response options: Strongly agree / Somewhat agree / Neutral / Somewhat disagree / Strongly disagree Sample: Global $n=3,259$ 18-34, 4,885 35-54, 5,396 55+

[^3]:    Question: Which one of the following do you personally find the strongest reason for supporting advanced nuclear technologies?
    Cut by question: Using the following scale, how would you describe yourself politically? Very conservative/Somewhat conservative/Moderate, middle of the cut by question: Using the following
    road/Somewhat liberal/Very liberal
    Sample: USA $n=4,250$.

[^4]:    Question: The statements below describe how some people feel about using nuclear energy to generate our electricity. To what extent do you agree or disagree with each statement?
    Sample: Global $\mathrm{n}=13,540$

[^5]:    Question: Which of the following best describes your reaction to this narrative.

[^6]:    
     people who are, or could be, talking about next-generation nuclear electricity and the technology that creates it. Please pick up to three you would particularly like to hear from."

[^7]:    
     people who are, or could be, talking about next-generation nuclear electricity and the technology that creates it. Please pick up to three you would particularly like to hear from."

[^8]:    
     people who are, or could be, talking about next-generation nuclear electricity and the technology that creates it. Please pick up to three you would particularly like to hear from."

[^9]:    
     people who are, or could be, talking about next-generation nuclear electricity and the technology that creates it. Please pick up to three you would particularly like to hear from."

[^10]:    
     people who are, or could be, talking about next-generation nuclear electricity and the technology that creates it. Please pick up to three you would particularly like to hear from."

[^11]:    ${ }^{1}$ Figures $1,2,3,5,6,7,8,9,10,16$, 17, and 19
    ${ }^{2}$ Jonathan Haidt, The Righteous Mind, 2012

