

How Advanced Nuclear Got on the Map



Jackie Toth

Former Advisor for Policy and Content

[@JackieTothDC](https://twitter.com/JackieTothDC)



Jackie Kempfer

Former Senior Policy Advisor, Climate and Energy Program

[@JackieKempfer](https://twitter.com/JackieKempfer)

Advanced nuclear could play a critical role in getting the domestic and global electricity sector to net-zero emissions by 2050, decarbonizing industrial processes, and producing green hydrogen. These contributions from new nuclear technologies are possible, in significant part, because of the advocacy work that Third Way and its partners have performed since 2013. As a result of this collaboration, commitment, and leadership, a robust federal program supporting the demonstration of advanced nuclear is now in place. Innovators across dozens of companies in the United States and Canada, working with US national laboratories and the US Department of Energy (DOE), are at this moment developing these innovative carbon-free technologies.

This is the story of how advanced nuclear got on the map.

When We Started...

In 2013, Third Way and other climate and clean energy advocates confronted an energy and political landscape far different from 2010, when the Waxman-Markey cap-and-trade bill lost momentum.

The urgency to act on climate and reduce emissions remained as great as ever. Sweeping action by Congress, however, was not going to happen. And the United States' single largest sources of zero-emissions electricity—nuclear power plants—were struggling. Many nuclear reactors couldn't compete with cheap natural gas, which was coming online in unregulated markets at ever-faster rates. Wind and solar were also dropping in price and growing rapidly, which was a very promising development. However, Third Way, the Breakthrough Institute, and Clean Air Task Force (CATF), along with a small group of energy analysts led by now-Princeton University Assistant Professor Jesse Jenkins, did the math and found in an early analysis that wind and solar, while able to provide a critical component of a zero-carbon grid, vary in availability substantially by week and season. These energy sources would need to be complemented and supported by always-available "firm" energy sources like nuclear to keep costs down.

With congressional avenues for action exhausted for the time being, the Obama Administration worked on executive actions to address climate change. Still, its flagship emissions-cutting rule, the Clean Power Plan, was only a midway step to decarbonization. It correctly required power sources to clean up or go home without offering a clear way to do it, and it didn't address the problem that relying on natural gas and renewables alone is not a path to get to net-zero.

The failure of Waxman-Markey (which would have capped emissions at increasingly lower levels and required US utilities to produce more clean power), alongside the ascension of cheap natural gas, made it much more difficult for existing nuclear to compete in deregulated markets. Nuclear, nevertheless, continued to produce the bulk of the country's carbon-free electricity.

When Third Way looked at what technologies the country would require to decarbonize its electricity and industrial sectors, the organization kept returning to the potential of newer, advanced nuclear reactors.

One of the earliest voices urging Third Way to consider whether advanced nuclear technology could play a role in addressing climate change was Bill Budinger, a member of the Third Way Board of Trustees and founder and former CEO and chair of Rodel, Inc. "My objective was not nuclear," but rather "finding viable candidates that would allow us to close our dirty coal, oil, and gas plants," recalls Budinger. After extensive research, his "conclusion finally was that nuclear was the only technology with the demonstrated ability to do the job at scale."

Already, nuclear was providing on-demand, always-available carbon-free electricity. The new advanced designs were scalable to meet the needs of different customers—some of them small enough to power one industrial facility, others large enough to power a city. These were reactors with different coolants than water that, while posing new challenges for engineers, offered more opportunities for siting and even greater safety. Some designers were developing reactors to run on

spent nuclear fuel. Most importantly, advanced reactors offered new chances to create cheaper carbon-free energy.

Since then, a cohort of advocates, investors, innovators, and policymakers laid the foundation for a new generation of nuclear to show that their designs can successfully provide power, clean up our grids, and generate heat for our factories.

Portola Valley and the “Three ‘R’s”

In March of 2014, a group of venture capitalists, climate advocates, philanthropists, and technologists met at Ray Rothrock’s home in scenic Portola Valley, California. Their goal: Determine how to pave a path forward for advanced nuclear energy in the United States.

With about 30 people in attendance, “it was a who’s who of the movement at that point,” says Rothrock, a nuclear engineer by training who eventually left the industry and moved to what is now Silicon Valley. His venture capital firm, Venrock, had started looking at investment opportunities in energy in the 2000s. By then, the Intergovernmental Panel on Climate Change had already identified climate change as a dire global challenge.

That risk, both to humans and the environment, is of critical concern to Rachel Pritzker, a civil society philanthropist who cares “profoundly about how long it takes us to address climate change,” she says, in order to reduce human suffering and preserve existing ecosystems. Pritzker, who joined the 2014 meeting, calls it pragmatic to develop “as many options as we can to address this gigantic challenge that ultimately nobody knows how we’re going to solve”—whether that’s through advanced nuclear or other technologies.

Alongside Pritzker and Rothrock was Ross Koningstein, a multi-faceted engineer and early Google employee whose work for the tech giant included AdWords, data centers, renewable energy, energy modeling, and electric grids. His research with fellow engineer David Fork on Google’s effort to make renewable energy cheaper than coal had concluded that current technologies did not put humanity on a path to solving climate change. Together, they wrote “What It Would Really Take to Reverse Climate Change,” and Koningstein was planning to start a nuclear energy research and development (R&D) group at Google.

Together, Ray, Rachel, and Ross had recently helped fund the 2013 feature-length documentary “Pandora’s Promise” from filmmaker Robert Stone, which chronicles several former skeptics’ evolution toward support for nuclear energy. Pritzker herself, like many of the individuals profiled in the documentary, had come to support nuclear after protesting against it in early life. After film showings, someone would inevitably raise the question: What needed to happen next? “We couldn’t answer that question, because no one had thought about it,” Rothrock says. None of them wanted the documentary to be the end of the conversation.

Koningstein credits Pritzker with having “a much more well-thought out longer-term” vision of how to fundamentally shift the discourse around nuclear—particularly with the distinction of advanced nuclear. That vision was informed by conversations between Rothrock, Pritzker, Koningstein, and other key players in this space that began at a 2012 Dialogue conference held by the Breakthrough Institute, as well as by a private scoping analysis that Mike Berkowitz, a senior advisor to the Pritzker Innovation Fund, had recently performed for Pritzker. Berkowitz had sought to identify which groups were looking at nuclear as a tool to address climate change. For those closest to this work in Washington, DC, he found, all of the interest centered around advanced nuclear. His scope also appeared to break through the still-prevalent myth, he says, that nothing could be done on nuclear in Washington until lawmakers solved the issue of spent fuel.

For Koningstein, being able to step past this myth was a relief: “Some people envision that nuclear will always be stuck in the 1960’s, but innovation, demonstration and value engineering gets us out of that rut.” For Pritzker, however, the report had also made clear that no connective tissue linked these advocacy groups together—that these “lone voices in the wilderness” either weren’t coordinating or were championing different, discrete nuclear technologies.

Through Pritzker and the Breakthrough Institute, Rothrock and Third Way’s energy program had already been introduced. Third Way, which had long participated in policy discussions about nuclear energy, had recently issued its PowerBook, a collection of more than 100 energy sector policies that, together, could have reduced US emissions in line with something like the Waxman-Markey cap-and-trade bill.

Third Way and the Breakthrough Institute had arranged a panel discussion in July 2013 between Rothrock, Nobel Laureate Burton Richter, Prof. Richard Lester of the Massachusetts Institute of Technology, and Dr. Leslie Dewan of MIT on advanced reactors for Capitol Hill staff, recalls Jeff Navin, then a visiting senior fellow with Third Way and a former acting chief of staff at the DOE. At the briefing, which Navin arranged with McKie Campbell (who, until January that year, had been Senate Energy and Natural Resources Committee staff director), Nordhaus and coauthors from the Breakthrough Institute presented their just-released report entitled, “How to Make Nuclear Cheap.” The next day, the Breakthrough Institute and Navin met with Pete Rouse and Heather Zichal at the White House to discuss including advanced nuclear as a climate priority for the Obama-Biden Administration.

In addition to Third Way’s Josh Freed, who joined by phone, other attendees in Portola Valley included Navin; Stone; Berkowitz; Kirsty Gogan, co-founder of the European nonprofit Energy for Humanity; Armond Cohen, co-founder and executive director of CATF; Joe Lassiter of the Harvard Business School, who joined by video; and others.

The meeting was “catalytic,” and the first bringing together environmental organizations that had both reached the conclusion that nuclear could be a critical tool in fighting climate change and had depth of capability to really execute to spread that message,” Cohen says.

Everyone at Rothrock's house recognized it was going to take more than regulation to solve climate change, and that the world still lacked some of the technologies necessary to address it. They also knew they needed to foster bipartisan buy-in: As Pritzker has articulated, solving climate change will require "advancing technologies that appeal on both sides of the political spectrum" that can be championed regardless of an individual's politics.

Three discrete strategies emerged over the course of the discussion. One involved focusing strictly on saving existing nuclear plants and preventing their closure to avoid a deep loss of zero-carbon generation. Another approach, led by Gogan, emphasized the need to increase societal buy-in for nuclear. The third tack, advanced by Third Way, argued that getting advanced nuclear off the ground was going to require changes to federal policy, modernized regulations, and an on-the-ground effort to inform the government about the gamut of technologies the industry was developing right under its nose.

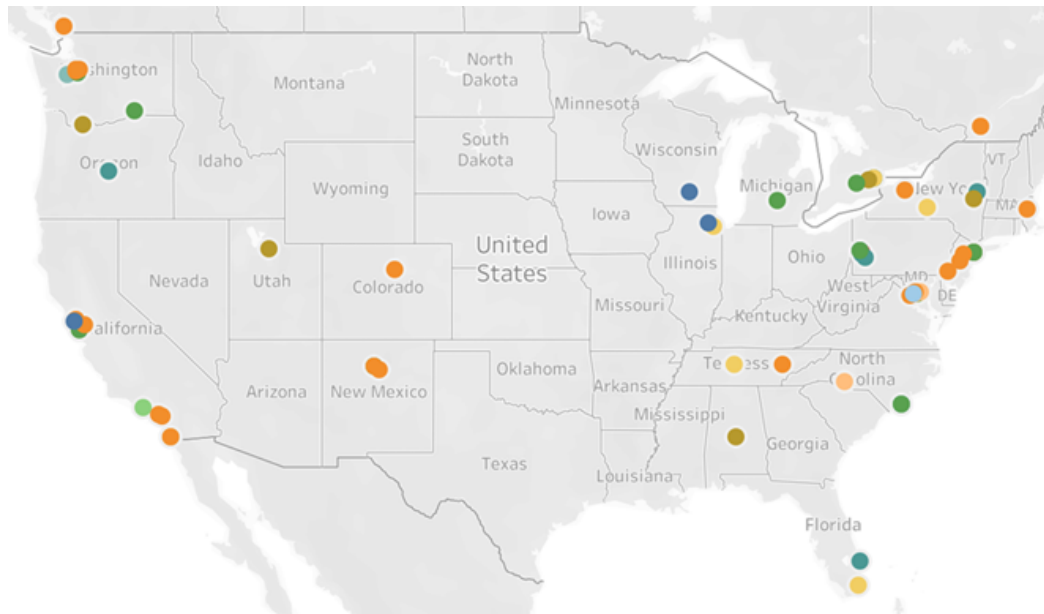
It grew clear to those present that this federal policy effort was best suited to occur in Washington, DC. California was too remote and, despite its technological reputation, still harbored a prevailing sentiment in favor of shutting the state's nuclear plants. With finite funding available at this stage to advocate for advanced nuclear, changing policy to put more technology options on the table—rather than changing public opinion—became the main focus.

In September 2014 Koningstein hosted a meeting at Google in Mountain View with guests including Ray, Rachel, Roland Pritzker, Freed, Navin, and Berkowitz. He recalls Third Way showed that "there's a lot more wiggle room in moving policy here than anybody might have thought," and Pritzker pitched the idea to "fund a bit of work in DC to see what's possible." Her pitch connected: The "three 'R's" became the initial funders of the organization's effort.

At that point, Third Way became the first think tank getting a ground game together in DC to move an advanced nuclear agenda, recalls Nordhaus. Much of the work would center around a core idea that Freed, Navin, Rothrock, and the Breakthrough Institute had developed: Instead of advocating for one reactor type or company, they needed a policy framework that would enable many advanced nuclear developers to have a chance at eventual demonstration: "multiple shots on goal," they called it.

In the years to follow, Third Way and its allies would have an outsized impact on the contours of the advanced nuclear discourse in Washington and the prospects of this US industry which, as everyone was about to learn, was much bigger than a lot of people realized.

Moniz and the Map



With a new, clear goal in mind, Third Way’s advocacy work shifted into high gear. Freed arranged a meeting with one of President Barack Obama’s domestic policy advisors, who asked of Freed, Rothrock, and the few others attending just how many companies were working on advanced nuclear in the United States. “I thought five or six at the time, because I had looked at investing in five or six,” Rothrock recalls. “It was such an obvious great question. We said, ‘We’ll get back to you.’”

At this time, few people in Washington understood the scale of investor interest circulating around advanced nuclear. Convincing policymakers of the viability of this industry was going to be difficult without hard data on the number of US companies working on these new reactors.

The DOE “didn’t know there were companies,” so they didn’t have any grant programs that advanced reactor designers could apply for and use to communicate with the department, says Navin.

Third Way “called up every company that we had a website for, or we heard word-of-mouth and validated that they were real; that they had some sort of government or private sector money; and that they were trying to develop either an advanced fission reactor, fusion reactor, or were doing fundamental research on it,” Freed says.

Ultimately, in 2015, Third Way found and mapped almost 50 such companies with over \$1.3 billion invested in the companies—by private investors, not by the US government, which was a novelty for US nuclear. “That’s when it became a real conversation, when we could point to hard evidence,” Rothrock said. “It was a compelling story that caught fire.” Those involved were increasingly invited to discuss the topic with more people.

The problem wasn’t money: These companies were obtaining capital from the private sector. It wasn’t the technology: The United States had explored many of these reactor concepts decades

prior, some in significant depth.

The issue lay with the existing nuclear business model, coupled with regulatory risk. The Nuclear Regulatory Commission had only ever licensed light water reactors, and the DOE was not set up to allow small companies to engage with the labs to test their designs.

Recently, at Deputy Energy Secretary Daniel Poneman's going-away party, Navin had spoken with then-Energy Secretary Ernest Moniz about the results of the mapping effort. Moniz was clearly skeptical.

Freed, Navin, Rothrock, Koningstein, and Pritzker arranged a meeting with Moniz in 2015. Koningstein recalls the secretary asking the "trick question of what type of advanced nuclear we prefer," and the group responding that "we're not playing favorites here. We want to have a horse race."

Third Way and the "three 'R's" had the company map in hand. DOE personnel "were dumbstruck," Navin recalls.

Koningstein posits that "if we would have gone in there with just a theoretical conversation, it wouldn't have been interesting. So the timing of having obviously real people working on real problems allowed a policy initiative to have immediate impact."

More high-level meetings followed. The group briefed a large group of DOE staff and started talking to people on the Hill. Freed organized a White House meeting between Rothrock, Pritzker, Koningstein, entrepreneurs, and officials from the DOE, the Nuclear Regulatory Commission (NRC), and the National Security Council (NSC). "We walked them through what exactly was going on in the advanced nuclear space already and said, 'What we need is access to the labs and a modernized NRC regulatory process,'" Freed says.

Rothrock says some of these officials were appropriately skeptical at the time that what they were seeing was real, but he and the others were steadily chipping away at the cynicism. Around this time, Rothrock was invited by Pete Lyons, then-assistant secretary for Nuclear Energy, to speak for 20 minutes at a meeting of the now-disbanded Nuclear Energy Advisory Committee. Lyons was ill and not in the room, but Rothrock received a note from Lyons to meet him for lunch. "He wanted to hear the pitch in person" that they'd given Moniz, Rothrock says.

Third Way's advanced nuclear map "became quite famous," notes Rothrock. At an October 2015 event at the Hoover Institution at Stanford University, Moniz presented a DOE-branded map of the United States showing all of the advanced nuclear companies.

About a year after Rothrock's lunch with Lyons, the DOE and the Obama White House announced a new initiative that would start directly addressing one of the critical problems facing advanced nuclear reactors: how to access the wealth of knowledge and resources brimming at many of the nation's national laboratories.

GAIN-ing Congressional Support

The DOE's national labs have long performed stellar research, but they are commonly criticized for being shut off to industry. Masters at technical research, they did not have many tools to shepherd the innovations they developed to commercialization, nor were their resources easily accessible for private industry collaboration.

For Todd Allen, a former US Navy submarine officer and nuclear engineering PhD with a long career at the labs, it was clear that while the labs do a lot of neat work on nuclear, "it was very hard to see that it was driving towards anything." Kelly Beierschmitt, then-deputy laboratory director for operations at the Idaho National Laboratory (INL) and now deputy director of operations at Los Alamos National Laboratory, advocated heavily around this time for INL to return the lab to its historical use as a demonstration site, Allen adds.

In 2015, while deputy laboratory director for science and technology at INL, Allen spoke with and encouraged Lyons to look for ways to better encourage nuclear energy innovation. These conversations led to a series of six simultaneous, geographically dispersed innovation workshops among the national labs, universities, reactor developers, academics, NGOs, and sometimes NRC officials to answer one overarching question: How could the United States actually make progress in nuclear innovation and turn the labs into a better asset for supporting commercialization?

By this time, Freed and Allen had met at a lunch convened by Glen Tait, who ran federal affairs for INL. Third Way helped recommend invitations to the workshops. Comments collected from participants at these workshops culminated in a report indicating that to make progress on nuclear, the labs' role needed redefining. Stakeholders had to determine how to turn the labs from leading actors into supporting actors for developers—and how to increase flexibility at the NRC.

Freed and Navin eventually approached the White House about hosting a summit on advanced nuclear. On November 6, 2015, informed by the report from the workshops, the Obama-Biden Administration launched the Gateway for Accelerated Innovation in Nuclear (GAIN). The initiative connects nuclear developers with the national labs and their vast R&D capabilities, giving them access to simulation and demonstration infrastructure they cannot easily get anywhere else. Memos that Allen worked on at Third Way would later inform GAIN's funding opportunity announcements and voucher process.

"The government responded, and we started to see the labs open up their access," Freed said.

A lot of additional key players in the nuclear space have been involved in running the initiative. Kemal Pasamehmetoglu, then-associate lab director at INL who now directs the versatile test reactor program at the lab, oversaw much of the ramp-up and hiring of GAIN. Rita Baranwal served as the first director of GAIN before moving to DC as the previous administration's second assistant secretary for Nuclear Energy.

GAIN's value is political as well as technical, says Allen, now a senior visiting fellow at Third Way and chair and professor of the University of Michigan Nuclear Engineering and Radiological Sciences Department. The initiative, he explains, has helped to flip the narrative from the national labs handling this work with ramifications only for the states and districts where the labs sit, to a much broader industry issue touching companies around the country in search of commercial deployment. Creating GAIN made the advanced nuclear industry's work feel more real to a wider set of people.

The labs, through GAIN, began working with the industry to identify what companies need from the laboratories. GAIN has created an "intersection between the scientists and the public policy people to move how we do nuclear development in a different direction," Allen says.

At the American Nuclear Society Winter Meeting in 2015 that kicked off with some small events a day after the announcement of GAIN, a collection of people, including Suzy Baker (on detail in the DOE's Office of International Nuclear Energy Policy and Cooperation); Allen; and Rachel Slaybaugh, now associate professor of nuclear engineering at UC Berkeley and division director at Lawrence Berkeley National Laboratory's Cyclotron Road, met to discuss how to make sure GAIN would be effective. In part out of that conversation, Slaybaugh had the idea for a nuclear incubator or accelerator of sorts; the following year, she developed what would be the first annual Nuclear Innovation Boot Camp at UC Berkeley, with input from many in the early startup community, including Cyclotron Road, a DOE-supported clean energy incubator. The bootcamp helps young entrepreneurs and nuclear engineers learn how to bring innovation to the nuclear sector.

Many of those Cyclotron Road contacts were former ARPA-E employees. At the time, ARPA-E was looking to start its first nuclear program, Slaybaugh says, recognizing wind and solar's growth as well as continually-corroborated research showing that in a few short decades, the country was "going to need a firm resource that doesn't emit carbon. Nuclear is one." Slaybaugh would go on to help implement ARPA-E's first nuclear fission programs.

With the Washington conversation on advanced nuclear heating up, it was no time to slow down. In January 2016, in partnership with the Idaho, Argonne, and Oak Ridge national laboratories, Third Way held its first Advanced Nuclear Summit and Showcase. The event brought together then-Senate Energy and Natural Resources Chairman Lisa Murkowski (R-AK), Sens. Cory Booker (D-NJ), Sheldon Whitehouse (D-RI), Mike Crapo (R-ID), and other key players in the nuclear, climate, energy and labor communities. It was the first of three such summits that helped raise advanced nuclear's profile and convene an ever-growing group of supporters to show that advanced nuclear was real and to discuss its future.

The efforts formulated back in 2014 in Portola Valley to change the advanced nuclear conversation had started bearing fruit: By November 2016, the Obama-Biden Administration's report detailing its mid-century goal to reach an economy-wide net emissions reduction of 80% by 2050 included advanced nuclear energy.

Over the Hill

That same month, Donald Trump was elected US president. While some less attuned nuclear watchers assumed Trump would be good for nuclear due to Republicans' long-running support for light water reactors, these assumptions quickly proved wrong: The first budget Trump proposed “would have just completely eviscerated all innovation,” recalls Freed.

Thankfully, the small but powerful and bipartisan set of senators who had attended Third Way's advanced nuclear summit continued to champion advanced nuclear. By this point, Sen. Murkowski and her talented core staff, who included policy advisor Benjamin Reinke, led much of the advanced nuclear advocacy effort in the chamber from the right. From the left, Sens. Whitehouse and Booker advocated for these technologies as a critical zero-carbon tool for addressing climate change. These policymakers approached nuclear with an “open-mindedness and recognition that climate change requires a new approach,” says Freed.

Joyce Connery, now chair of the Defense Nuclear Facilities Safety Board who served in the National Security Council under both Bush and Obama, gives Sens. Murkowski, Whitehouse, and Booker in Congress—and former Sen. Pete Domenici, whose staff included Lyons—much of the credit for moving advanced nuclear legislation in Congress. “Relationships mean a lot, and particularly when you can get people on the Hill that can work together and not have a lot of acrimony and have a consensus vision...is absolutely pivotal.”

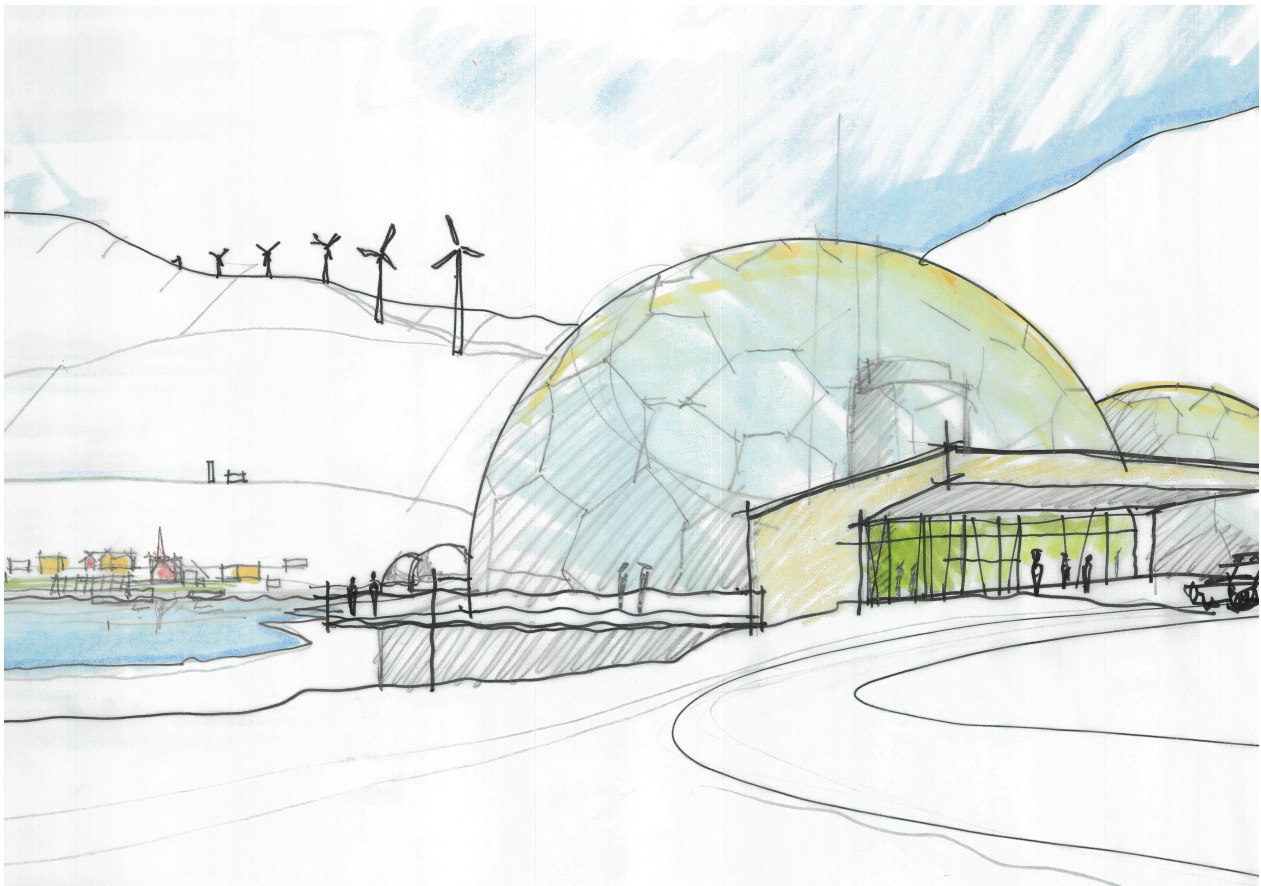
On the Republican side, the conservative clean energy advocacy group ClearPath had started leading the charge to “try to demonstrate a role that Republicans can have in climate change,” says Spencer Nelson, now ClearPath's senior research director. A series of interviews that Nelson conducted with nuclear industry leaders mid-decade uncovered a similar set of hurdles that the rest of the advocacy community was trying to tackle: NRC fees posed challenges, the regulatory barrier stood too high, and the DOE needed more funding for nuclear energy. Day trips at several national labs in 2016 made it clear to the group that advanced nuclear reactors had to be demonstrated by 2025. They worked with then-Sen. Jeff Flake (R-AZ) on an advanced nuclear demonstration bill that would ultimately be marked up out of committee in 2018 but at that point lacked the momentum to advance, Nelson says.

Nuclear trade groups were also evolving to meet the shifting needs of the industry. Around early 2015, David Blee, who headed the US Nuclear Industry Council (USNIC) educational advocacy group before passing away unexpectedly in 2020, asked Jeff Merrifield, a partner at Pillsbury Winthrop Shaw Pittman LLP and former NRC commissioner, to chair USNIC's new Advanced Reactor Task Force.

Advocates' focus transitioned around 2016 from simply informing policymakers on the Hill that some regulatory changes were needed at the NRC to making the case for why advanced reactor developers needed more resources, Merrifield says. “Third Way and ClearPath and others were really

able to marshal the grassroots support to start to bring those changes about.... They all come at it from a different angle, but they collaborate well with each other, and they spur each other on.”

By 2017, Freed says, Third Way had identified another core hurdle: “We were talking about advanced nuclear, but no one had a concept of what it looked like.” To address that problem, then-Third Way Communications Advisor Suzy Baker conceived of and oversaw the Nuclear Reimagined project, a collaboration between Third Way and sustainable design firm Gensler to render a series of first-of-a-kind images of what advanced nuclear reactors could look like in various locations, from remote Arctic landscapes to industrial facilities, naval bases, and city centers. Much of the nuclear community has since repeatedly used these images.



Through the work of advocates in keeping lawmakers informed about advanced nuclear and providing feedback on legislation, the president signed the Nuclear Energy Innovation Capabilities Act (NEICA) in September 2018. NEICA had first been introduced in 2015 by then-Ranking Member and now Chairwoman of the House Science, Space, and Technology Committee Eddie Bernice Johnson (D-TX), and Rep. Randy Weber (R-TX). The bill began to address one of the key needs that advanced nuclear advocates identified years prior: It further opened up the facilities, resources, and expertise of the national labs to private nuclear developers through public-private partnerships.

Congress’ passage of NEICA was monumental as the first advanced nuclear bill to get on the president’s desk, but it also showed how historical opposition to nuclear energy, especially from the left, had softened. Lawmakers increasingly recognized the safety, security, geopolitical, economic,

and climate benefits that advanced nuclear energy could offer, if nuclear companies got a chance to license and demonstrate their designs. Not only did NEICA pass: The Senate passed it by voice vote under unanimous consent, and House members enacted the bill under suspension of the rules, which meant the bill raised no great concerns for any member.

By now, the ecosystem of clean energy advocacy organizations working on advanced nuclear issues had more firmly established itself. These organizations were both regularly collaborating and carving out their own space—Third Way hosting public summits and developing policy; CATF developing policy ideas and modeling energy system requirements to demonstrate the need for firm power such as nuclear; ClearPath working with clean energy-minded Republicans on innovation issues; and others ideating and shaping the policy conversation on nuclear. The groups that had long recognized that all clean energy technologies would be necessary to address climate change began holding formalized conversations about how to clear the path for clean energy resources beyond renewables to contribute to a net-zero economy. The Bipartisan Policy Center’s “deep decarbonization” convenings began in October 2018, alongside Third Way, CATF, Center for Climate and Energy Solutions, and the World Resources Institute, where the groups discussed the roles that nuclear and carbon capture could play in getting to zero.

Connecting to environmental organizations

At the same time that clean energy advocacy organizations made deep decarbonization understandable for policymakers, these groups also brought “the science to other environmental organizations who didn't really have a close connection to it,” says Ashley Finan, founding executive director of the Nuclear Innovation Alliance who now directs the National Reactor Innovation Center.

Third Way and allied advocacy groups have “helped move the conversation,” says Freed, creating social license for other organizations to accept nuclear, if not outright support it, by following what the science says we will need to reach net-zero and showing that a handful of these technologies are likely to be ready to deploy around the middle of this decade—not as late as the 2040's, as the DOE and others had previously estimated.

“At the start, many who dislike nuclear simply refuse to consider the actual data for existing nuclear,” says Budinger. “The most success I’ve had in changing that attitude has come after initially talking about the promise of advanced nuclear and why it is a completely different animal. Once folks become open to things like non-water-cooled SMRs, I have found that they are then willing to consider data on existing nuclear and even accept that we have to keep the fleet running until it can be replaced by advanced technologies.”

While early on, it was very controversial to push back against 100% renewables, “I think a lot of us have done a lot of work to kind of de-escalate that conflict,” Nordhaus says.

Environmental groups have largely stopped urging the closure of existing nuclear plants. If they did not publicly call for enactment of the advanced nuclear legislation signed into law over the last few years, they kept quiet over the bills' passage. Only one Democratic candidate for president in 2020 ruled out nuclear, and Rep. Alexandria Ocasio-Cortez has said the Green New Deal leaves the door open to nuclear.

"We're seeing a shrinking set of people who are adhering to technological rigidity or ideology," adds Freed.

Koningstein observes that "Pushing advanced nuclear technology to demonstration provides a great basis for new kinds of conversations with environmental organizations, based on a new suite of energy options to consider together."

By January 2019, Congress had enacted its second comprehensive advanced nuclear legislation, the Nuclear Energy Innovation and Modernization Act (NEIMA)—again by voice vote in the Senate and under suspension of the rules in the House. This time, the House votes were tallied: 361 in favor and just 10 against (61 members did not vote). NEIMA directed the NRC to modernize its fee assessment and licensing practices to take the needs of nascent advanced nuclear technology into account.

With the enactment of NEICA and NEIMA, Congress had lifted two key hurdles facing advanced nuclear. In March that year, Sen. Murkowski, with 14 original, bipartisan cosponsors, introduced the Nuclear Energy Leadership Act (NELA) to take care of the third key hurdle: actually demonstrating these reactors. Reinke in Sen. Murkowski's office, Nelson says, had picked up work on Sen. Flake's bill that ClearPath had championed, expanding it from just demonstrations. NELA was to authorize a test reactor, call for a national strategic plan for nuclear energy, and secure a domestic source of key advanced nuclear fuel. Twenty-two senators would ultimately cosponsor NELA, including Sens. Booker, Whitehouse, and seven other Democrats, alongside long-time nuclear champion, former Sen. Lamar Alexander (R-TN). Nuclear advocates celebrated its introduction and the commitment of policymakers to move the bill.

Around the same time, Democratic advocates of advanced nuclear were emerging in the House. In June 2019, Rep. Elaine Luria (D-VA), a first-term Member from Virginia Beach, VA, took up the NELA mantle and introduced it, alongside Rep. Conor Lamb (D-PA) and two Republicans.

Third Way and others also recognized that conversations about the security and safety considerations of advanced nuclear had to happen as soon as possible—in tandem with the design and licensing processes, not afterward. In early 2017, Third Way brought on Laura Holgate, former US representative to the Vienna Office of the United Nations and the International Atomic Energy Agency and current vice president at the Nuclear Threat Initiative, to consult on developing a process to increase communication between the nuclear security, non-proliferation/safeguards,

and advanced reactor communities. Third Way Senior Policy Advisor Jackie Kempfer, with Holgate's help, launched the Resource Council for Advanced Reactor Developers in the spring of 2019 to identify people in the non-proliferation world who were or would be open to advanced reactors. Their intention is to facilitate more conversations on how to tighten the connections between developers and non-proliferation experts, and ensure that security and safeguards considerations are baked into the development and commercialization of advanced reactors as much as possible.

In October 2019, the DOE established the National Reactor Innovation Center mandated under NEICA to accelerate the demonstration and deployment of these technologies—including building at least two reactors by the end of 2025—and addressing the ballooning costs and schedule overruns that have historically been a problem for the industry.

Then, in December 2019, Congress took its biggest step to date in support of advanced reactors: It enacted a spending bill that included \$230 million for the Advanced Reactor Demonstration Program (ARDP) envisioned under NELA. Funding for ARDP marked the first, historic investment in advanced nuclear to build reactors by the second half of this decade. Nuclear advocates had now met their target to enable “multiple shots on goal” for advanced nuclear. The DOE went on to launch the ARDP in May 2020 and selected two companies in October 2020—TerraPower and X-energy—each to receive an initial \$80 million to build their reactors.

Nearly all climate policies languished from 2017 through 2020, but nuclear legislation was one bright spot. Congress passed NEICA and NEIMA with bipartisan support: “If they had been purely Republican bills, we wouldn't have been able to get it done very easily. And if they had been purely Democratic bills, they definitely wouldn't have gotten anywhere, because of full Republican control of Congress at that time,” Nelson says.

Policymakers' bipartisan commitment to American nuclear energy continued apace: In December 2020, Sens. Whitehouse and Booker, alongside Sen. John Barrasso (R-WY) and two other Republican cosponsors, introduced the American Nuclear Infrastructure Act which, in addition to supporting the country's existing nuclear reactors, would establish prizes to cover the licensing costs of the first advanced reactor which the NRC licenses, as well as the first that uses isotopes from nuclear waste or that provides heat for non-electric uses.

And that month, Congress surprised even the most clued-in energy observers by passing a comprehensive package of energy innovation and R&D bills within its end-of-year spending and COVID-19 relief measure, which included much of the authorizing language of NELA and provisions from other important advanced nuclear bills, such as the Nuclear Energy Research and Development Act from Rep. Lamb. The package fully authorized the ARDP with billions of dollars in funding over several years. The foundational nuclear programs that the advocacy community helped the Obama administration craft had succeeded in creating a path forward for at least two commercially viable, US-made advanced reactors.

These were less flashy climate wins than something on the scale of Waxman–Markey, but the three advanced nuclear innovation bills—NEIMA, NEICA, and NELA—further set the stage for the United States to play a key role in reaching net-zero emissions by 2050—not just domestically, but globally.

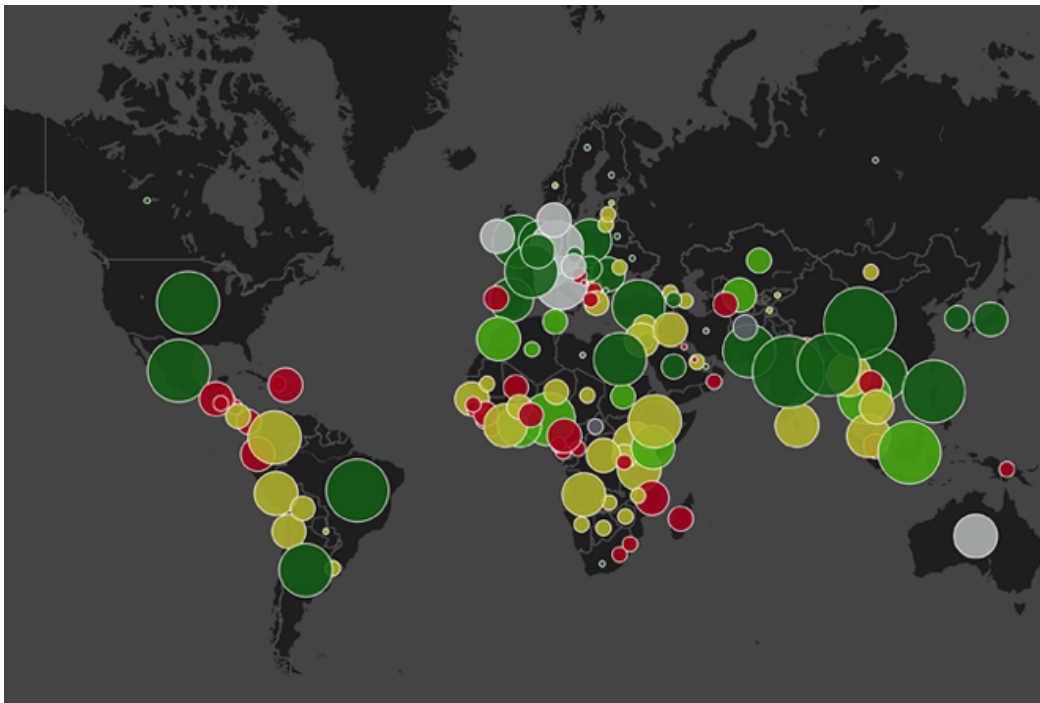
The Future of Advanced Nuclear

From 2014–2019, domestic advanced nuclear advocates focused on demonstrating the rationale and feasibility of developing and deploying US advanced nuclear designs, and shaping legislation that would create opportunities for multiple US nuclear developers to license and build their designs.

“I think it’s remarkable how few people and how little resources it took to make the amount of progress made,” Pritzker says.

The approach differed from the giant public advocacy campaigns that industry groups run, which largely urge people to write and call their representatives. What is important in this alternate kind of campaign, says Berkowitz of the Pritzker Innovation Fund, is determining where the policy changes you want to happen are, who needs to make the changes, and what their interests are.

By 2020, Third Way’s focus naturally shifted toward making sure the policy wins the organization and its allies have achieved are delivered on time and on budget—and showing that global demand for nuclear energy is growing for a variety of uses. To do that, Third Way, with the Energy for Growth Hub, mapped the global advanced nuclear market, finding potential markets for advanced nuclear in every region of the world and across all income groups. Meanwhile, Third Way’s latest advanced nuclear map took its survey global, tallying 130 designs under development around the world.



The advanced nuclear community also successfully advocated for the end of a federal ban on providing funding assistance for nuclear energy to countries abroad. The newly created US Development Finance Corporation, a federal development bank, can now support US-led nuclear power projects in other countries. At the same time, more foreign nations are starting to understand the benefits of advanced nuclear for secure and clean power.

Critically, Americans elected Joe Biden and Kamala Harris as their president and vice president. During his campaign, Biden explicitly included advanced nuclear as one of the tools his administration will invest in to help reduce emissions. He selected, as secretary of the DOE, Jennifer Granholm, who has iterated publicly that investments in clean energy like nuclear are investments in good-paying jobs. Granholm has also committed to supporting the government’s work “to empower the [US] nuclear industry to develop, demonstrate, and export American-made nuclear technology.”

Many questions remain unanswered about whether advanced nuclear will play a major role in addressing climate change and energy security. The regulatory transformations at the NRC initiated under former Chairman Kristine Svinicki are not yet baked into processes at the agency. Funding must continue, and the new reactors getting built through the ARDP needed to be finished on time and on budget. And particularly with Sen. Alexander’s retirement, the old guard of Republicans that could cross the aisle is quickly disappearing at a time when bipartisanship may still be crucial for the progression of advanced nuclear.

But in a few short years, a technology that no one in Washington believed in has moved from being ignored to the brink of the construction of two reactors, with many more behind it. Advanced nuclear has now persevered across three administrations and both Democratic and Republican control of Congress. These successes have resulted from the work and commitment of many climate and clean energy organizations and advocates, whose “lone voices in the wilderness” came together to make advanced nuclear part of the climate conversation and help to enact policies that clear the path forward for these innovative technologies to support significant reductions in carbon dioxide production.

TOPICS

NUCLEAR 199

TECHNOLOGY 6

POLICY 4

REGULATION 3