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CLIMATE FINANCE TAXONOMIES AND NUCLEAR ENERGY: ROUNDTABLE REPORT

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On December 5, 2022, Columbia University's Center on Global Energy Policy hosted a high-level virtual roundtable on climate finance taxonomies and nuclear energy. Climate finance taxonomies list economic activities that could contribute to mitigating or adapting to climate change-related impacts. The event took place during an energy crisis that has led some groups that have historically opposed nuclear power to reconsider their position. Among the participants were representatives from major global banks, investment management firms, certification and rating agencies, and governmental finance institutions. This report summarizes the roundtable discussion, which occurred on a not-for-attribution basis under the Chatham House rule.

This event summary reflects the authors' understanding of key points made in the course of the discussion. It does not necessarily represent the views of the Center on Global Energy Policy. The summary may be subject to further revision.

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Nuclear Energy's Potential Role in the Energy Transition and Challenges Facing the US Nuclear Industry

The roundtable began by reviewing the International Energy Agency's (IEA) Net Zero by 2050 study, which included 616 gigawatts (GW) of new nuclear over the next 27 years at an investment of \$2.5 trillion.¹ As the participants discussed, the inclusion of nuclear power in decarbonization approaches would likely make net-zero emissions goals more attainable, less expensive, less land intensive, and less in need of new transmission lines²—the latter of which would be needed in large quantities for high penetrations of renewable energy but have proven challenging to build.

One participant commented that much of the world was comfortable with nuclear, and some Eastern European countries have indicated interest in deploying dozens of reactors based on US designs. The same participant expressed concern that certain countries in Africa and Asia would continue to burn coal if their preferred path of decarbonization involving nuclear power was unattainable.

Participants noted that momentum for new reactors in the US has slowed down tremendously. As they discussed, in the late 2000s there were over \$100 billion of new nuclear plants being developed. Today, the level of enthusiasm and risk-taking in the electric utility sector for new nuclear is very low. Additionally, whereas chief nuclear officers at utilities are very positive about Gen III+ and Gen IV nuclear power plants, chief financial officers (CFOs) and chief executive officers (CEOs) are reluctant to take these types of projects to their public service commissions.

Regarding the attempt by the United States to ascertain what to do with coal plants that are set to be retired in the 2030s, participants observed that they could be converted into nuclear plants, which would replace baseload capacity and make use of existing transmission lines. One participant stated that the number of coal plants slated to be shut down is 600 and estimated that 200 of these were “easy” conversions to nuclear while another 200 “might” be convertible to nuclear but require more study. The speaker noted that most coal plants were not expected to shut down until the 2030s and that the United States at least has a chance of getting nuclear right this decade.

As the participants discussed, the underlying reasons for utility CEO and CFO's lack of enthusiasm in signing off on new nuclear projects include low confidence in projects being delivered on time and on budget and in the readiness of the supply chain. One participant observed that the most recent nuclear plants in the US were built by a highly respected company overseen by highly respected people and that the projects did not go as any of them anticipated. Another participant found it hard to imagine an investor-owned utility (IOU) even contemplating a large-scale nuclear power plant at this stage. This individual wondered whether a new plant would have to be funded by the government or alternatively whether small modular reactors might be developed and pave a way forward. As the participant pointed out, investors would have to feel confident that a new plant could be built on time and on budget, and it would need the support of a broad swath of community members, legislators, regulators, and constituents to succeed.

On the other hand, participants observed that utilities are unsure how they will reach net-zero carbon emissions without firm low-carbon power like nuclear energy. Some participants noted that some IOUs have publicly stated that they will need clean, firm power to achieve decarbonization, but are concerned that any announcement to build a new nuclear plant will affect their stock price. Some participants observed that while there is general agreement that firm low-carbon power sources will be needed to decarbonize the US power grid,³ it is not widely understood that geothermal, small hydro, and biomass with carbon capture and sequestration by themselves are insufficient. One participant suggested that the public was perhaps being misled to believe that such sources need not include nuclear.

Why Nuclear Is or Isn't Included in Climate Finance Taxonomies

A roundtable participant noted that some countries (e.g., China and South Korea) include nuclear in their climate taxonomies, but most of the Global Systemically Important Banks around the world exclude nuclear from their green bond frameworks.

Some participants observed that one challenge to nuclear power's inclusion in the taxonomies is that countries struggle with the question of where to store spent fuel. As one participant noted, states like California are unwilling to evaluate new nuclear projects without a waste solution and the US plan for spent nuclear fuel disposal had been "Yucca Mountain or nothing," but the project was "politically near dead" and the likelihood of it moving forward was "remote." That individual believed that practical interim storage at low cost was achievable and that there may be an opening to realize it in the United States, which could also help to attract financing to nuclear.

Some participants suggested that having an answer to the waste problem might encourage the federal government to make a long-term commitment to nuclear, while others questioned whether the waste issue was actually what was holding nuclear back. They assessed that if there was really a chance that new nuclear units could be built on time, on budget, and in sufficient quantities, politicians would be willing to put political capital into dealing with the waste issue.

Another participant assessed that nuclear has engendered bankruptcies at every cycle, resulting in CEO firings, including some in the recent past. If companies cannot be on time and on budget, this individual reasoned, nuclear will never be financed. The same speaker cited examples from the US Department of Energy's Environmental Management program as evidence that nuclear projects can be delivered on time and on budget.

Another participant suggested that waste was an issue, though a manageable one, that waste in nuclear supply chains should be included in assessments of Scope 3 emissions, and that one bad accident might mean that there would not be another nuclear development phase. This participant also believed that taxonomies will continue to evolve, that much learning is needed, and that positions on nuclear will change as the market matures.

How Much Does Nuclear Energy's Inclusion in Taxonomies Matter to Its Deployment by 2050?

Some participants argued that climate taxonomies do not matter. In their view, what really matters to nuclear power's future is building projects that are reasonably on time and on budget. If the US nuclear industry cannot do so, then it might experience a second failed renaissance regardless of how much nuclear power is needed to address climate change. One participant contended that whether a country or group convinces a bank or investor group not to include nuclear in its ESG category is not so important. In this participant's view, as soon as there are profitable companies in the nuclear supply chain, people will demand that they be included in ESG categories.

Another participant noted that the green markets had increased to \$1.3 trillion in 2019 and are projected to grow to \$5 trillion by 2023, meaning the scale of money moving into the space was significant. In this participant's view, the taxonomies may matter less for the early phase projects, but more for later reactors. Similarly, another participant noted that there are not enough nuclear projects to finance right now, making the taxonomy a "down the road" issue when the challenge will be scaling 100-200GW by 2050. To this person's view, a committed order book of financeable projects was needed first before any of the taxonomy issues became worrisome.

One speaker contended that green taxonomies were a catalyst rather than a gating event for adoption. That individual saw tremendous momentum stemming from the EU's statement and joint scientific studies, which motivated people who had previously blacklisted the technology to reconsider it. This momentum was accelerated by the Ukraine crisis and the market need it created. According to this individual, cases in South Korea, the UK, and Canada show that macro events can overcome taxonomies, and taxonomies usually lag behind the demand signal and forecast use case.

Another participant considered taxonomies important because everyone is committed to them. As this participant pointed out, banks have also made sustainable finance commitments, which raises the question of what is sustainable—answers to which come from taxonomies. Drawing on conversations with others in the banking world, this individual said that nuclear will count when certain environmental groups say it counts because the banks do not want to be accused of greenwashing. One speaker pointed out that the French power company EDF updated its green bond framework to include nuclear, but noted that for the purposes of transparency EDF would disclose to investors whether proceeds from a bond issuance would be used for nuclear.

Another participant noted that some banks have institutional commitments regarding carbon intensity that have implications for financing activities in the oil, gas, and power sectors. The participant pointed out that banks can, in that way, be incentivized to support nuclear energy in order to lower their financed emissions.

A different participant stated that taxonomies matter, particularly if a company is trying to raise financing through the debt markets. That individual cited the Green Bond Principles defined

by the International Capital Market Association (ICMA) and noted the ambiguity around how ICMA defines green projects. The participant noted that because ICMA cautions that its list of eligible projects—which does not include nuclear—is not comprehensive and that taxonomies vary by country and region, it leaves the position on nuclear open to interpretation. Second party opinion providers, who supply views on individual frameworks, must then take a position on whether to include nuclear in a given framework. Finally, the participant noted that many development banks categorically exclude nuclear due to objections from donor nations, preventing these countries from accessing financing for nuclear energy.

Another participant argued that taxonomies matter due to the importance of having a unified voice and the reality that sustainable decarbonization is impossible with renewables alone. But this participant also noted that nuclear's inclusion in taxonomies can make up for neither cost overruns nor the lack of incentives available to nuclear for being dispatchable power.

Participants also discussed “partially green” categories for nuclear, with some opining that it is useful to think of nuclear as lying somewhere between a renewable and a fossil energy source. One participant saw risk in partially green certifications, especially from second party opinions, which could monopolize the market and claim full authority over what qualifies as “medium” versus “dark” green. As this participant noted, taxonomies in and of themselves carry the risk of greenwashing, and are there to guide but not necessarily decide or direct financing and capital allocation. Some groups such as Principles for Responsible Investment have been outspoken on nuclear, while others have maintained an ambiguous or undecided position. The participant assessed that if widely used frameworks were to be supportive, that would signal to the market and all investors the need to change their own frameworks.

Another participant stated that “green labeling” is sometimes misleading because it forces all views and activities into either a “green box” or a “not green box,” which is not a very useful exercise for nuclear since it is neither a fossil fuel energy source nor a renewable energy source.

Which Developments Can Change the Status Quo?

One participant noted that a key lesson from Vogtle is the need to achieve 100 percent complete design before beginning construction, and expressed concern that some advanced reactor companies have not integrated that lesson. As this participant pointed out, the EPCs of the world need to be able to wrap their heads around these designs and have confidence that they can build them.

Another participant assessed that having a constructor work with the reactor designer as early as possible—rather than assume they are designing a constructable reactor—is essential. This participant also identified the need for integrated project management for these projects, observing that the United States is out of practice after not having built nuclear plants for 30 years, and expressed a concern about project management for the ongoing set of advanced reactor projects. The participant went on to state that the United States really needs an order book before the demonstrations are completed, and that a wait and see approach is inadequate because the United States will reach a point where it will not be able to put enough GWs on the grid. If all utilities reach the same conclusion in 2030 on the need for new clean firm power, demand may exceed supply, while right now there are not enough nuclear projects to finance.

One participant observed that the first order of new reactors would likely be light—some plants in Europe and Asia as well as public power entities in the United States and Canada—barring unforeseen developments. The participant noted that equity investment is needed to progress reactor design development, in addition to some kind of “push” or “pull” to facilitate initial orders. The same individual wondered whether a bigger federal initiative involving federal entities such as the Tennessee Valley Authority (TVA), the Western Area Power Administration (WAPA), the Bonneville Power Administration (BPA), or the Department of Defense (DOD) was needed to reduce financing risk, and assessed that many in the markets do not understand the need for clean firm power and that investor education was needed.

Another speaker recalled conversations with IOUs who were happy that public power entities were leading on nuclear, and felt that if those early projects hit their milestones then IOUs could go back to their investors and public service commissions and be a later customer (e.g., for the 11th or 12th plant); in other words, these IOUs didn’t want to be the first plant. Another individual wondered whether nuclear energy’s path forward might be similar to LNG plants, which can be modular in nature and do not involve the major risk of being 99 percent complete and not generating any output.

One participant identified the need for more equity de-risking by the federal government and the US Nuclear Regulatory Commission to approve licenses in less than five years. This participant speculated whether a creative step at WAPA, BPA, TVA, or DOD was needed. As the participant pointed out, the federal government was the original customer for nuclear—it would not have taken off otherwise; perhaps a federal take or pay approach with TVA, for example, would sufficiently bolster financing. Another speaker wondered if cost overrun insurance might be a viable strategy going forward, observing that utilities are afraid of overrun rather than the overall capital required for nuclear plants.

A different individual noted that it was not just the capital cost and cost overruns that were challenging nuclear power, but also the power market structures that do not adequately value its reliable, dispatchable, low-emission power. As this participant discussed, solar and wind are not currently penalized for being intermittent and neither is natural gas penalized for its carbon emissions. Nuclear has fallen out of favor because natural gas has undercut it on cost. This participant asked: “How do we not have a world where we care about reliability of power markets?” This individual thought that regardless of whether nuclear is included in green taxonomies, the rhetoric from the Executive Branch matters and more voices saying it must be part of the solution are important, even if “everyone knows it” already.

Conclusion

In general, participants agreed that for nuclear power to make a meaningful contribution in the United States and other Western countries, finding ways of keeping more or less on schedule and on budget will be key. Some felt strongly that more education about the importance of low-carbon firm options to achieving deep decarbonization goals and the corresponding need for government support is needed for the public in general and the investor community in particular.

Notes

1. Stéphanie Bouckaert, Araceli Fernandez Pales, Christophe McGlade, Uwe Remme, and Brent Wanner, “Net Zero by 2050: A Roadmap for the Global Energy Sector,” International Energy Agency, May 2021, <https://www.iea.org/reports/net-zero-by-2050>.
2. Eric Larson, Chris Greig, Jesse Jenkins, Erin Mayfield, Andrew Pascale, Chuan Zhang, Joshua Drossman et al., “Net-Zero America: Potential Pathways, Infrastructure, and Impacts,” Final Report Summary, Princeton University, October 29, 2021, <https://netzeroamerica.princeton.edu/>.
3. Nestor A. Sepulveda, Jesse D. Jenkins, Fernando J. de Sisternes, and Richard K. Lester, “The Role of Firm Low-Carbon Electricity Resources in Deep Decarbonization of Electric Power Generation,” *Joule* 2, no. 11 (2018): 2403–2420, <https://doi.org/10.1016/j.joule.2018.08.006>.

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Dr. Bowen has written reports on federal and state policies to encourage advanced reactor development, and has also published papers on reforming U.S. nuclear export controls. During the Obama Administration, he was an Associate Deputy Assistant Secretary in the Office of Nuclear Energy and a Senior Advisor in the Office of Nonproliferation and Arms Control at the U.S. Department of Energy (DOE). Previous to working at DOE, he was an AAAS/APS Science Fellow for Senate Majority Leader Harry Reid. Dr. Bowen received a Bachelor of Science degree in physics from Brown University and a Ph.D. in theoretical physics from the University of Washington, Seattle. He has held positions at the National Academies with the Board on Physics and Astronomy, the Board on Energy and Environmental Studies, and the Division on Engineering and Physical Sciences.

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