

Testimony of Richard J. Powell
Executive Director, ClearPath, Inc.
U.S. House Appropriations Subcommittee on Energy and Water Development, and
Related Agencies
“Strategies for Energy and Climate Innovation”
February 25, 2021

Good morning Chair Kaptur, Ranking Member Simpson, and other members of the Committee. My name is Rich Powell. I am the Executive Director of ClearPath, a 501(c)(3) organization devoted to accelerating breakthrough innovations to reduce emissions in the energy and industrial sectors. To further that mission, we develop cutting-edge policy solutions on clean energy and industrial innovation. ClearPath provides education and analysis to policymakers and collaborates with relevant partners to inform our independent research and policy development. An important note: we receive zero funding from industry.

Thank you for the opportunity to appear before you today and for holding this important hearing. Climate change is an urgent challenge that merits significant policy action at every level of government and the private sector. We need look no further than the events in Texas and across the Midwest to see the havoc extreme weather can have on the energy system. Preparing our grid to be reliable in the face of unique challenges is an important issue we will undoubtedly face moving forward.

In the case of Texas last week, we saw multiple forms of generation units go offline due to extreme cold and winter weather. At the height of the outages, the Electric Reliability Council of Texas (ERCOT) experienced more than 46 GW of generation shutdowns, including 29 GW of which were thermal gas or coal plants.¹ Wind and solar generation units also experienced weather-induced capacity loss of around 18 GW. Additionally, one of two nuclear reactors went offline at the South Texas Nuclear Power Station, knocking out about 1.4 GW of generating capacity.² Approximately 4.9 million people in Texas went without power as a result of the blackouts, and about half a million more across the Midwest similarly experienced a lack of power.³ As America modernizes our grids for the future, we must recognize the challenges each form of energy faces and utilize all technologies to ensure reliable energy at the system level. We must also consider ways to plan for extreme events and to strengthen our physical grid.

As this committee considers its part in a serious set of U.S. climate and clean energy policies, those solutions should be ambitious but also technology-inclusive, politically realistic, and substantively pragmatic. Policies must also support U.S. jobs and make sure American tax dollars are spent wisely. Too often, solutions are oversimplified to a set of false choices: renewable versus fossil, economy versus the environment, immediate action versus inaction. The reality is that solutions – as evidenced by Texas – must follow a comprehensive agenda to make the global clean energy transition cheaper, faster and more flexible. This will be essential for

¹ [Austin American Statesman, ERCOT leaders still cannot say when power will be restored to more than a quarter of Texans without](#)

² [South Texas Project Nuclear Operating Company](#)

³ [U.S. Department of Energy, Extreme Cold & Winter Weather | Update #6 - FINAL](#)

deep, global emissions reductions by mid-century, while also ensuring American competitiveness.

We believe this committee must continue to play a major role in America's response to the global climate challenge, building off recent successes. With this in mind, I will discuss:

- **Where we are today:** Since 2014, Congress has increased clean energy R&D funding by more than 54 percent – led in large part by this committee – with goals to turbocharge innovations across key technologies. These efforts, alongside the expansion of targeted financial incentives, are carrying cutting-edge designs through the basic and applied research phases, supporting vital engineering and design studies, and ultimately putting steel in the ground and creating jobs with commercial demonstrations across the country (see Appendix).
- **A potential roadmap:** The recently passed Energy Act of 2020, which builds on work that was done in this committee, can be a roadmap for a goal-oriented, public-private investment strategy.
- **The next horizon:** In 2020, for the first time, U.S. industrial emissions may have exceeded power emissions, and will likely be the top source in the future. ClearPath is expanding our work into clean steel, cement and hydrogen. We see an even greater need there for an innovation-based, affordable approach to decarbonizing industry.

I. Building on Your Clean Energy Innovation Success

Since 2014, you have significantly increased federal funding for clean energy R&D on breakthrough technologies in a number of applied offices – 268 percent for energy storage, 70 percent for nuclear energy, 52 percent for ARPA-E, and 33 percent for carbon capture and fossil energy.

While these investments are impressive, your strategy to make this less about the money and more about clear objectives in the programs is even more important. Money should follow those clear objectives and demonstrations through public-private partnerships, which is an essential step towards fulfilling our goal of America providing affordable clean energy technology to the rest of the world. In the cases where you have set moonshot goals and driven applied R&D, there are multiple instances that have led to front-end engineering design studies and in some cases – actual demonstrations are underway.

Program	Progress toward moonshot demonstration			Funding increase since FY14
	Applied research	FEED* studies	Demonstrations underway	
Energy Storage	✓	✓	✓	268%
Nuclear	✓	✓	✓	70%
Carbon Capture	✓	✓		33%
Geothermal	✓		✓	131%
ARPA-E	✓		✓	52%

*FEED stands for Front-End Engineering Design

Decisive action to support the development of the U.S.-based, flexible clean power supplies, energy storage technologies and associated supply chains present a crucial opportunity to enhance U.S. competitiveness as a critical component of our clean energy future. You have risen to this challenge by turbocharging clean energy RD&D at the world’s largest innovation engine – the Department of Energy – but even more is needed.

We often see America’s best and brightest engineers, researchers and developers come up with amazing clean energy technology solutions. But getting the technology from R&D, through the valley of death, to actual commercialization often requires robust public-private partnerships, as we had with the shale gas revolution.

There are multiple examples of where this is happening today. The moonshot goal of bringing advanced nuclear technology to market is part of the Advanced Reactor Demonstration Program (ARDP), a concept developed by appropriators. This landmark program may go on to be the latest example for how goal-oriented investments turn into a success story with tremendous return on investment. Lower-cost advanced nuclear technologies could provide reliable, scalable zero-emissions power and heat, while allowing the United States to better compete against Russia and China in global exports.

Another example is the Department of Energy’s moonshot program for energy storage, the Energy Storage Grand Challenge. The Grand Challenge is meant to catalyze the development of energy storage technology from basic research and development through commercialization. This includes the Grid Storage Launchpad, which will be a DOE test facility for de-risking and scaling alternative technologies to lithium-ion batteries, which rely heavily on imported materials from China. With strong funding in the FY21 federal funding law, the GSL needs continued support to complete the physical lab space.

By bringing together DOE and world-class researchers from the national labs and private-sector innovators, these will help develop the technologies needed to integrate more clean energy resources on the grid. It will also support U.S.-based manufacturing and supply chains for those technologies.

In order to be useful during an extreme event like the one last week in Texas, energy storage technologies will need to have much, much longer durations. Funding the breakthroughs needed to enable bigger, better batteries and other storage technologies is a bipartisan goal in Washington but one that requires greater prioritization.

These moonshot technology R&D investment goals will provide enhanced flexibility to the electric grid, including deploying demand response and energy storage technologies at scale. In other words, there will be buyers.

Some of America's largest publicly owned utilities and major corporations are taking action against climate change, both to reduce emissions and to adapt to natural changes. These companies must plan for the long-term, and the executives who lead these companies take climate threats seriously. Microsoft Corp, PepsiCo, and General Motors are among some of the largest American multinational corporations that have made ambitious net-zero commitments in recent years. America's largest electric utilities, including Georgia-based Southern Company, Minnesota-based Xcel Energy, North Carolina-based Duke Energy, and Michigan-based DTE have also committed to reaching net-zero emissions by 2050. According to the Smart Electric Power Alliance⁴, 68 percent of all electricity customer accounts in the country are now served by a utility with a significant carbon emissions reduction goal, and 19 of the 48 companies setting goals are for net-zero or carbon-free power by 2050.

Xcel Energy, whose territory extends across some of the windiest and sunniest regions of the country, has one of the most ambitious climate goals in the industry of 80 percent clean by 2030 and 100 percent clean by 2050. They have said that, even with their first rate access to wind and sun, existing technology is sufficient to reach only 80 percent clean, but not 100 percent clean:

“We need a suite of new, carbon-free resources that can be dispatched to complement our continued adoption of renewable energy, energy efficiency and demand response. Our research shows that these new resources will be the key to achieving a carbon-free generation fleet without a costly overbuilding of the energy grid...These technologies may include carbon capture and storage, power to gas, seasonal energy storage, advanced nuclear or small modular reactors, deep rock geothermal and others not yet imagined.”⁵

II. The Goal-Oriented Funding Strategy Road Map

In November 2019, I testified before this committee, and Ranking Member Simpson brought up a very insightful question — what's the plan? Ranking Member Simpson made the point that

⁴ [Smart Electric Power Alliance. Utilities' path to a carbon-free energy system by 2050](#)

⁵ [Xcel Energy. Building a Carbon-Free Future](#)

Congress hears from every industry who needs federal funding, and in the past, industries would make the case that increased funding is a national security interest; now, the requests are all related to climate change. However, many approaches to addressing climate change lack focus and are spread too thin. Both Ranking Member Simpson and Chair Kaptur spoke passionately and eloquently about putting cost filters in place to avoid wasted or unnecessary spending, setting goals, and making it clear what outcomes will look like. While getting that strategy just right may seem overwhelming, in December 2020, you passed an omnibus package that included the Energy Act of 2020 — a roadmap for goal-oriented clean energy investing going forward.

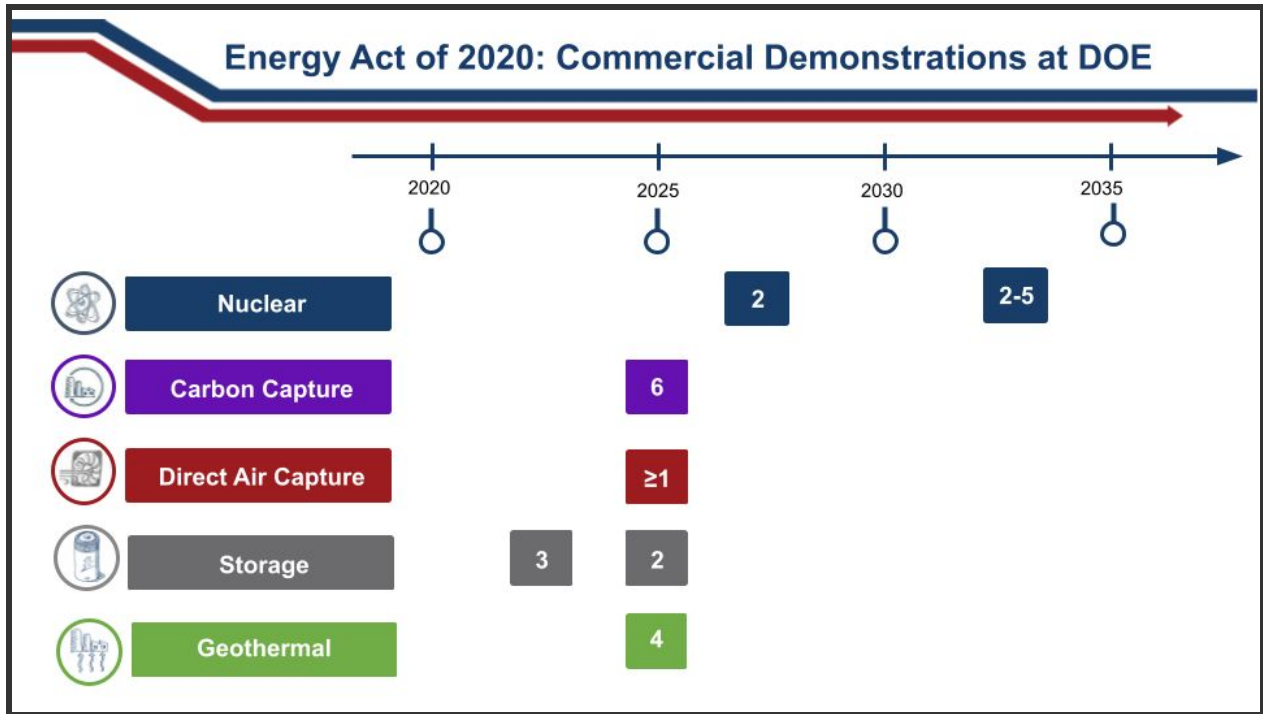
The Energy Act was the most significant, bipartisan non-funding energy legislation we have seen in over a decade, making commonsense updates to all areas of research and development policy for the first time in 13 years – a time before the widespread affordable energy abundance that has been provided by hydraulic fracturing and low-cost renewable energy. It refocuses DOE to meet the most pressing challenges of this decade.

Most importantly, the new law lays the foundation for a comprehensive, clean technology commercialization strategy that focuses the world-class American innovation engine around key technologies the International Energy Agency (IEA)⁶ has identified as essential to meeting deep, global decarbonization goals. The legislation establishes aggressive demonstration programs for technologies long in the works like grid scale energy storage, carbon capture and enhanced geothermal systems.

Specifically, it launches initiatives to support:

- The Advanced Reactor Demonstration Program, to demonstrate two new nuclear designs in the next six years, and another wave of two to five designs by the mid-2030s;
- Six carbon capture demonstrations (at least two for coal, two for natural gas, and two for industrial) by 2025;
- An Air Capture Technology Prize Competition for at least one project by 2025;
- Three demonstrations of innovative new storage technologies by 2023 and two more by 2025 as part of the DOE-U.S. Department of Defense joint long-duration storage initiative; and
- Four enhanced geothermal projects in diverse geographic areas by 2025.

⁶ [IEA, Tracking Clean Energy Progress](#)



In addition, it authorizes new programs for innovative technologies such as a carbon dioxide removal X-Prize at the Environmental Protection Agency, critical minerals supply chain RD&D, the clean industrial technology program, and a milestone-based fusion energy program.

Lastly, the Energy Act updates America’s policies on energy efficiency, technology transfer and grid modernization. For example, it formally empowers the Office of Technology Transitions – DOE’s program office dedicated to commercialization which appropriators have supported for years – to ensure DOE-developed technology makes it to the market.

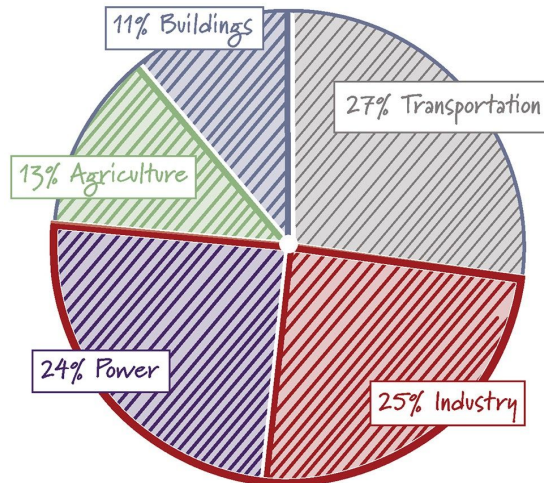
These programs will create more U.S. jobs and private-sector investments for cutting-edge breakthroughs. They will ensure the United States remains the leading clean energy technology provider to the world.

While that is the case, and, in many cases, the programs build on work that you have started, we recognize that the job you have is very different from the job of the authorizing committees. The 302(b) allocation you will receive limits your available resources, and while these programs and this commercialization strategy deserve your strong consideration, funding this important work will require either larger 302(b)s or tough choices – or both. We look forward to working with you as you craft your FY22 bill.

III. Next Challenge: Clean Industrial Innovation

At ClearPath, reducing power-sector emissions has been our primary focus; however, this year, we are excited to work with the industrial sector in a more holistic way. Combined with the power sector, this expands our scope from tackling a quarter of U.S. carbon emissions to half.

Preliminary 2020 U.S. Greenhouse Gas Emissions



Source: Rhodium Group

Our mantra in power-sector work has been that the U.S. will not meaningfully reduce emissions without more clean and affordable technologies. This is perhaps even truer in the industrial sector. The U.S. natural gas revolution and its dramatic impact on reducing U.S. emissions demonstrate the immense potential of clean energy abundance. Fortunately, we're not starting from scratch in industry. A number of clean power technologies can be readily translated to the industrial sector, including energy efficiency, carbon capture, and clean heat resources, like advanced nuclear, geothermal, and hydrogen.

At the end of the year, Congress also provided a legislative head start. You included more funding at the Office of Fossil Energy for both research and front-end engineering, and design studies for industrial carbon capture. The Advanced Manufacturing Office within the Office of Energy Efficiency and Renewable Energy (EERE) has enjoyed strong bipartisan support in recent years, with annual funding rising from \$257 million in 2017 to \$395 million in 2020, a 53 percent increase in three years. Given how crucial manufacturing is to our economy, this is the type of targeted, goal-oriented federal investment lawmakers of both parties can support. And, tucked inside of the Energy Act were measures to phase out industrial super pollutants⁷, create clean industrial technology research and demonstration programs⁸, and improve permitting processes.

As the Committee looks to build on these successes and accelerate both American manufacturing job growth and industrial emission reductions, we recommend the following three key points.

First, we need more RD&D on reducing and capturing emissions from existing heavy industry, reducing the cost of clean fuels that can be incorporated into their production, and establishing cutting-edge new processes that make the materials the world needs with fewer emissions.

⁷ [Scientific American, Congress Passes Major Climate Legislation in Year-End Omnibus](#)

⁸ [Senate ENR Committee, Murkowski, Manchin, House Colleagues Reach Agreement on Energy Package for Year-End Appropriations Bill](#)

Second, we should create conditions for U.S. manufacturers to thrive. Some industries operate on very low margins and face immense international competition. We cannot disadvantage American industry by saddling them with extra compliance costs or more expensive technologies that drive more manufacturing overseas.

And third, let's set realistic goals. Many industrial sectors are relatively clean. Two-thirds of U.S. steel, for example, is already produced using recycled steel and an all-electric process.⁹ Even with that progress, steel remains one of the largest sources of industrial emissions. Many industries need extra hot heat and can't be electrified with renewable energy, produce emissions as byproducts, or have recently built manufacturing plants that will remain in operation for decades. Thus, it's unrealistic to expect the industrial sector to fully decarbonize by mid-century. Similar to how the U.S. scaled up solar power with DOE's SunShot Initiative, or is working to commercialize energy storage and advanced nuclear with the Energy Storage Grand Challenge, Grid Storage Launchpad, and Advanced Reactor Demonstration Program, let's apply our talents for creating market-driven goals to commercialize innovative technologies that will reduce industrial sector emissions.

Manufacturing and heavy industry have been America's backbone since our industrial revolution. More than 10 million hardworking Americans are employed in these essential sectors, and ensuring those jobs stay in America must remain a priority. Industrial decarbonization cannot undermine U.S. competitiveness.

Even more so than in the power sector, trade-exposed industries will need highly affordable options to decarbonize their operations. Without them, calls for decarbonization are more likely to lead to so-called "leakage" of that manufacturing activity to less environmentally friendly countries abroad. Not only will we lose out on industrial jobs and economic activity, but we may do more harm than good on carbon emissions as the industry abroad has poorer controls, or relies on more carbon intensive electricity. Technological breakthroughs are needed to make clean industrial technologies cost-competitive with existing processes.

In fact, to reduce emissions, we should focus on just the opposite approach, not risking that leakage, but creating a welcoming business climate here in the U.S. and return to American manufacturing where environmental standards are tougher than in China. Chinese industrial exports on average have much higher embedded emissions than the U.S., something which is not in the best interest of America or the world.

Conclusion

This Committee has been at the forefront of Congressional efforts on clean energy innovation for a number of years. You have dramatically increased clean energy RD&D and focused efforts at the Department of Energy to ensure that funds were spent in a more meaningful manner. You have asked the Department to set ambitious goals to help commercialize technologies. And, you have made sure that America does not fall behind in the race to provide clean energy to the rest of the world.

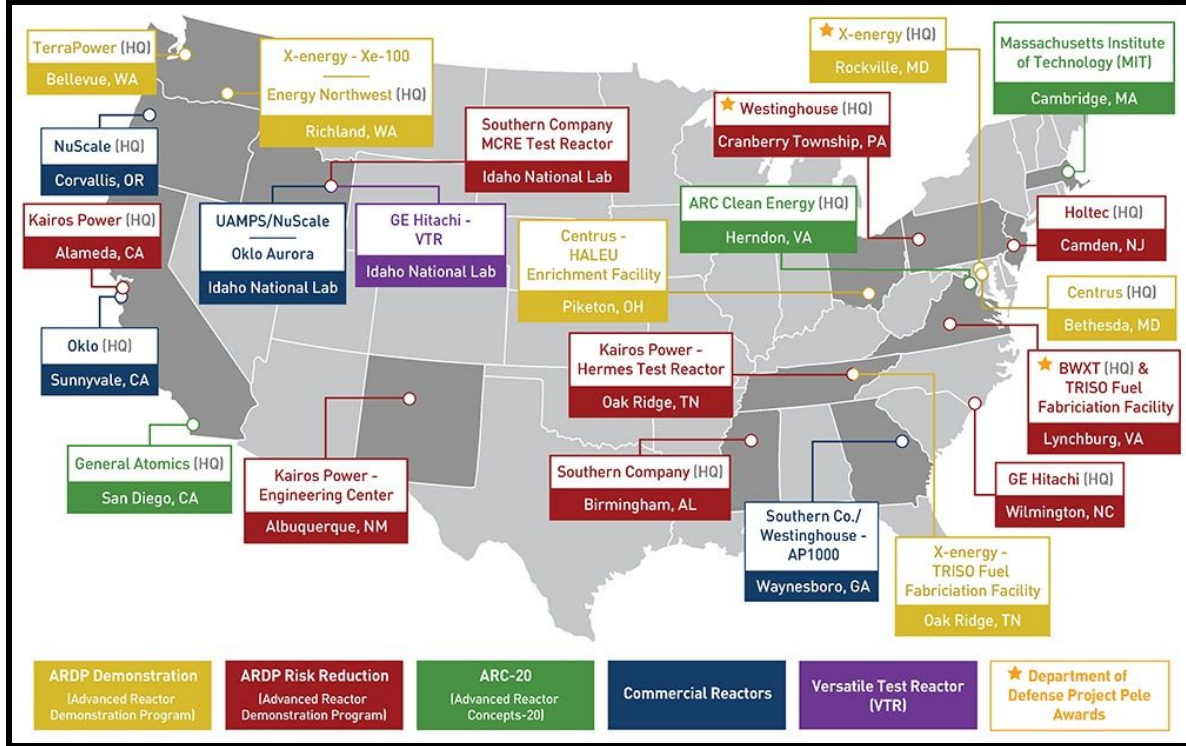
⁹ [U.S. DOE, Steel Industry Profile](#)

The close of 2020 saw exciting progress in both the Energy and Water Appropriations bill and the Energy Act. And, 2021 provides us with many exciting opportunities to continue the progress that has been made. We appreciate the work that has already been done and look forward to working with you to help advance the important work ahead.

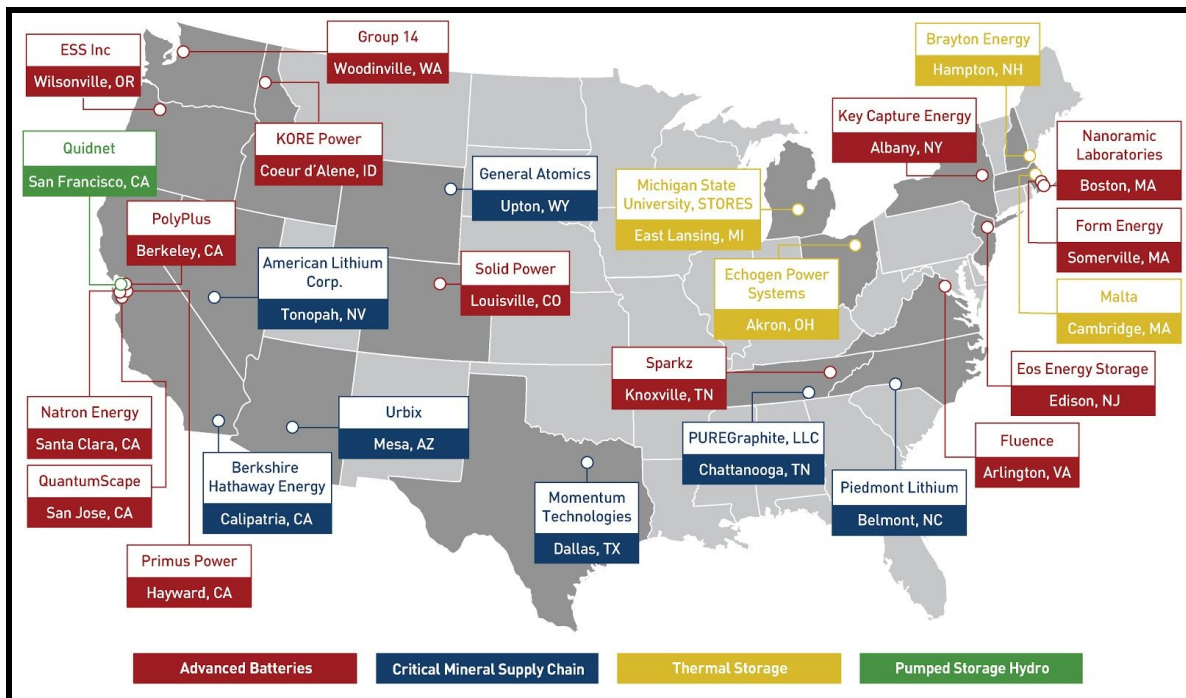
Thank you again for this opportunity, and I look forward to the discussion.

Appendix

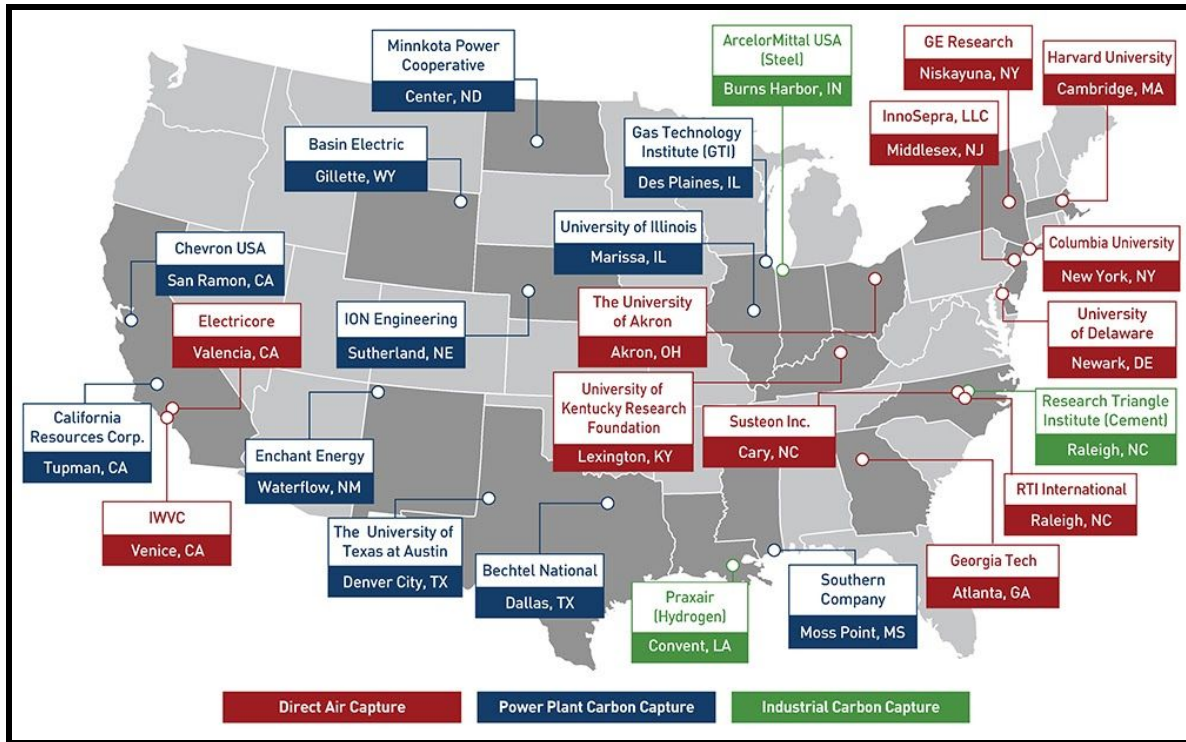
Advanced Nuclear Energy Companies and Related Projects



Energy Storage Companies and Related Projects



Select Carbon Capture and Removal Technology Developers and Projects



Low-Carbon Industry Projects

