Attachment—Additional Questions for the Record

Subcommittee on Energy
Hearing on
"A Smarter Investment: Pathways to a Clean Energy Future"
Thursday, February 18, 2021

Mr. Richard J. Powell, Executive Director, ClearPath Inc.

The Honorable Cathy McMorris Rodgers (R-WA)

1. We should build on the benefits of our shale revolution not walk away from them, would you agree and why?

RESPONSE:

I agree. America's energy policy should maximize the benefits of the shale revolution and the abundance of clean, domestic natural gas. According to the Energy Information Administration, natural gas has reduced the power sector carbon emissions more than any other resource or technology over the past decade. New natural gas technologies, such as carbon capture, can drive even further emission reductions. Leading technology developers and utilities, such as Southern Company and BASF, are actively exploring how to install carbon capture technologies at new and existing power plants. Outside the power sector, natural gas can also play a large role in reducing transportation and industrial sector emissions through the use of natural gas-derived hydrogen and other chemicals.

2. One challenge facing massive build out and reliance on wind and solar is the need for extensive transmission, which can take years and face significant local opposition. And there are other obvious limits to these technologies.

a. In Washington state, innovators like TerraPower and X-Energy are looking to demonstrate a new generation of nuclear reactors, promising exciting benefits and economic opportunity for future energy systems in the United States and around the world.

b. Would you explain some of the potential benefits of these small modular reactors and some of the new designs and how they can be sited in places that may not be so reliant on massive new transmission infrastructure?

RESPONSE:
Today, there are dozens of U.S. companies designing the next generation of advanced nuclear reactors. These designs range in size from microreactors, which provide single digit megawatts of electricity, to larger designs that provide 100s or even 1000 megawatts of electricity. These advanced reactor designs also operate at higher temperatures, allowing them to provide both

clean electricity and process heat that can support industrial decarbonization. This variety provides a new flexibility on siting that historically has not been an option for utilities or communities.

Since these designs will also have a small footprint, there is an opportunity to site them near existing nuclear plants which have extra space, effectively expanding the output of clean electricity from a current site. This is similar to X-energy, which will build its reactor near the operating Columbia Generating Station in Richland, WA through the Department of Energy's Advanced Reactor Demonstration Program (ARDP). Decommissioned nuclear sites can also be an option as Holtec is considering building it's small modular reactor at the Oyster Creek site in New Jersey.[1] In all of these cases, a new advanced reactor can leverage the existing power generation and transmission facilities, easing the siting restrictions required to build new transmission. More importantly, these new reactors can leverage the skills and expertise of the surrounding community.

Internationally, there is also a significant market for nuclear energy, which is currently dominated by China and Russia. If the United States lacks a cost-competitive reactor design to sell abroad, we will continue to cede our global leadership on nuclear energy.

As you stated, innovators like TerraPower and X-Energy are looking to demonstrate their designs in Washington state through the ARDP. This moonshot program has the potential to reinvigorate the U.S. nuclear industry, provide utilities and states cost-competitive nuclear options when considering new clean energy resources, and make U.S. nuclear technologies available for the global market. It is important to maintain support for the ARDP and our nation's nuclear innovators as they develop the next generation of technologies.

3. The Majority is pursuing a massive buildout of incumbent wind and solar over the next 14 years. Does this rushed approach—which of course is very expensive and challenging to achieve—risk creating a *disincentive* for private investment in other low-carbon technologies such as advanced nuclear or CCUS?

RESPONSE:
Effective government policy should be as outcome oriented (i.e. emissions) and technology-inclusive as possible, and should not pick one technology over another. Government policy should be clear and focused on specific aspects of affordability, reliability, and sustainability, ultimately letting the market decide which individual projects should be built. Dispatchable, low-carbon technologies like advanced nuclear and CCUS are critical for creating an affordable clean energy system. Nuclear and CCUS allow affordable clean heat, which is necessary to reduce emissions from industrial and building sectors.

a. How does the United States develop truly world-changing technologies if it at the same time it removes incentives for deployment of that technology in the United States?

[1] https://www.ans.org/news/article-2530/holtec-smr-could-be-built-at-site-of-former-one-in-nj-ap-news-reports/

RESPONSE:
Energy innovation is a continuum ranging from basic research and development (R&D) on fundamental science, to applied R&D regarding engineering, commercial demonstration of early stage technologies, and finally to larger scale innovations in manufacturing in deployment. In order to reap the benefits of the U.S. R&D investment into world-changing technologies, appropriate support at each stage of that continuum. Only investing in basic R&D without ensuring its transition to the U.S. marketplace means that we are investing in technologies that other countries can then profit from. The key to success is ensuring that the government supports new technologies until they gain their footing, but without overwhelming the marketplace.

There are clear market signals the government can send to establish new technologies without disrupting private finance. Recent examples of these market signals include the expanded 45Q carbon capture tax credit, and the initial market for High Assay low-Enriched uranium enacted in the Energy Act of 2020. Tax incentives and government procurement, such as proposals in this Committee to enhance the government's ability to enter into longer-term power purchase agreements for clean electricity, are useful market signals that can be used to aid technology commercialization while avoiding government mandates.

b. **You can't innovate on cleaner coal or gas generation if other policies essentially flood the market for alternatives, can you?**

RESPONSE:
Electricity markets are a very challenging environment with low-cost natural gas and renewable energy. Limited incentives can help demonstrate novel and game-changing technologies in a traditionally-slow moving sector. Technology specific incentives, particularly for already commercially successful technologies, distort market signals.

At the same time, Congress has funded a significant number of initiatives through the Department of Energy on lower-emission coal and gas generation. If appropriated, the carbon capture and high efficiency turbines demonstrations authorized in the Energy Act of 2020 would further lower the cost of cleaner fossil energy technologies. Multiple analyses show that the availability of dispatchable clean energy technologies, such as fossil energy with carbon capture, significantly improves the economics and probability of achieving deep decarbonization. The carbon capture demonstration authorization supports a portfolio of applications, from coal, natural gas and industrial facilities on a timeline consistent with the sunset of the federal carbon capture tax credit. Leveling the playing field between technologies incentives could help reduce disparities in the rate of deployment between fossil and renewable energy technologies.

c. What happens to that industrial knowledge base? Doesn't it just go to Asia where the use of fossil energy continues? How does that help American interests or the climate?

RESPONSE:
Nearly a quarter of all global carbon emissions are "traded" between countries in the form of embedded emissions in manufactured products, with a significant share of these emissions

originating in Asia. Policies that encourage offshoring of American industries to higher polluting countries is not beneficial for our interests or the climate.

The shale gas revolution, and the resulting abundance of low-cost natural gas, has encouraged companies to invest in new manufacturing facilities in the United States. For example, modern direct reduced iron and steel facilities have been built that produce cleaner commodities than conventional processes. These facilities can also be equipped with carbon capture to further reduce emissions. If fossil fuel production in the United States is curtailed, associated production and manufacturing costs in the United States will increase with unclear impacts on the international carbon emission balance.

d. How should policymakers approach this dilemma?

RESPONSE:
The most effective policy is to focus on supporting the quality of energy desired, such as cleanliness, affordability, and reliability, rather than penalizing the source of energy. Incentives to make fossil fuels and industrial processes cleaner in an affordable way can help reduce emissions without those facilities closing.

4. Hydropower provides 70 percent of the power in my home State of Washington, which is why we have some of the lowest electric rates in the world.

a. Expanding this emissions-free resource offers great potential for clean energy and also provides good job opportunities for skilled craft workers.

b. What are some of the challenges you see to expanding hydro, and which of those might Congress address?

RESPONSE:

Hydropower is known as America's first and most reliable renewable resource. By harnessing the force of flowing water to create electricity, hydropower has provided a flexible, baseload source of renewable power for more than a century. Until recently, hydropower was also America's largest renewable resource, but due in part to the bureaucratic federal licensing process, new hydropower development has stalled in recent years. To get new projects approved, developers must navigate a licensing process that can take between 6 to 10 years or more, spanning multiple state and federal agencies.[2] The Department of Energy (DOE) estimates that the U.S. could add 50 GW of hydropower by 2050, a 50% increase over current capacity,[3] but that won't happen without the types of licensing reform efforts you have spearheaded over multiple Congresses.

[2] https://clearpath.org/energy-101/hydropower-101/
[3] https://www.energy.gov/sites/prod/files/2018/02/f49/Hydropower-Vision-021518.pdf

Pumped storage hydro is another reliable, renewable American resource. At over 21 GW of installed capacity, pumped hydro is the largest source of energy storage on the grid, making up over 95% of the market today.[4] Pumped storage hydro works like a large battery that can be charged by pumping water uphill and discharged by letting the water flow back down across a generator. With more intermittent renewables such as wind and solar power coming online, pumped storage can provide flexible, long-duration electrical storage to balance the grid.

The bipartisan energy package includes multiple provisions on hydropower and pumped storage hydro. The bill updates DOE authorizations for research, development, and demonstration programs with an emphasis on grid reliability and resilience, including through technologies that facilitate new market opportunities, such as ancillary services, for water power. The package also authorizes RD&D to advance efficient and reliable integration of hydropower and pumped storage systems with the electric grid. The bill also extends hydropower production incentives to facilitate new hydro development. With smart policies that invest in innovation, America's hydropower and pumped storage hydro can play a key role strengthening grid reliability and modernizing the U.S. energy system.

[4] https://www.energy.gov/eere/articles/get-pumped-about-pumped-storage