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Fission And CHIPS: The Case For Coal-To-Nuclear Transitions

By **Ryan Lighty** (August 15, 2022, 5:48 PM EDT)

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Now more than ever, energy industry participants are seeking creative pathways to minimize the cost and schedule for deployments of carbon-free electric generation facilities. In particular, one strategy is getting a lot of attention: coal-to-nuclear transitions.

Congress supercharged this approach last week when it passed the Creating Helpful Incentives to Produce Semiconductors, or CHIPS, and Science Act, authorizing a new program to foster the deployment of next-generation nuclear facilities at depowered coal sites.

Electricity Supply and Demand: Carbon Matters

If you follow the energy industry, you probably know that nearly 1,000 coal plants have been retired over the last two decades — a trend that is expected to continue in the foreseeable future.

A driving force behind these retirements is the push toward decarbonizing the electric grid, with sustained momentum from a combination of government action (e.g., clean energy targets), corporate pronouncements (think: environmental, social and governance) and consumer preferences for carbon-free electricity.

Meanwhile, projections for electricity demand are ever-increasing, propelled by various factors, such as the rising popularity of electric vehicles, which will move transportation-based energy demands onto the grid.

As a general matter, nuclear power plants are the only carbon-free source of baseload electricity. Not your father's nuclear plants, modern designs are smaller, modular, safer and less capital-intensive than the existing large light-water fleet, making them attractive investment options.

In contrast, solar and wind generation are intermittent sources — they only generate electricity when the sun shines or the wind blows. And recent studies have shown that the costs of pairing renewable generation with significant battery storage can make such projects financially unworkable.

To meet modern electric supply and demand trends, today's project sponsors are directing significant investments to deployments of new nuclear facilities and other ventures that include advanced reactors or a combination of nuclear, solar and wind facilities. But, for any capital-intensive project, cost and

schedule are everything.

So developers are considering how they can minimize the scope and complexity of required regulatory and environmental reviews, reduce the litigation risk profile for projects, and mitigate the possibility that environmental matters become a critical path.

In recent years, one approach for deployment of new carbon-free electric generating assets is gaining significant attention in the marketplace: repurposing retired coal sites.

Political Common Ground

As a general matter, bipartisan federal and state support for this approach continues to grow. For example, the state of Wyoming recently passed legislation to enable a depowered coal site to be used for the deployment of a new advanced reactor.

Montana and Indiana passed similar coal-to-nuclear legislation. And more than a dozen other states have taken action in the past year to enable nuclear projects, repeal statutory moratoriums, or convene significant studies and task forces.

Part of the political impetus for this support is the devastation to the local economy that otherwise might occur from the closure of a large coal-fired power plant. A report prepared last year by energy consulting firm ScottMadden Inc. explores the role of small modular reactors, or SMRs, in reenergizing communities after a coal plant closes.[1]

The authors note that nuclear facilities may be a drop-in replacement, due to the similar profile of the facilities, and their ability to leverage an existing craft workforce. By reusing the coal plant site and retaining the coal plant workforce, closure impacts can be minimized, and the community can retain local tax contributions and symbiotic economic ties for decades to come.

For these same reasons, the local community may be more welcoming of a new nuclear project. In other words, the NIMBY, or "Not in my back yard," project detractors of old may be replaced by a new generation of PIMBY project supporters: "Please, in my back yard!"

Possible Project-Related Benefits of Repurposing Retired Coal Sites

In addition to community support, there are many other reasons why deploying new nuclear generation assets at depowered coal sites may yield cost and schedule benefits.

First, it may be possible to demonstrate a net positive environmental benefit. This outcome could ease the way for National Environmental Policy Act reviews and other federal, state and local approvals. At a minimum, replacing a carbon-emitting coal plant with a carbon-free nuclear energy source provides a beneficial environmental narrative.

Second, it may be possible to leverage existing environmental site characterizations and "need for power" analyses to streamline environmental and other regulatory reviews. To be sure, the availability of high-quality records may vary from site to site. But any cost or schedule advantage that such records can provide is value added.

Third, existing high-voltage electrical transmission lines, switchyards and transportation infrastructure

can preclude the need for greenfield construction of such facilities and avoid the additional costs and regulatory and environmental approvals associated therewith. This benefit alone makes depowered coal sites an attractive siting option for developers.

Fourth, it may be possible to transfer existing environmental permits from the previous coal facility to the new nuclear facility, which could prove beneficial from a schedule standpoint. Outstanding state permits have caused significant delays in past energy infrastructure projects.

To be sure, coal sites also may present some unique environmental considerations. After all, these are brownfield sites, which entail questions of liability, indemnity and other potential complications that must be carefully considered. But various public-private partnerships are already working through these issues.

For example, on June 14, the Maryland Energy Administration announced a partnership between a state university and an advanced reactor designer to evaluate the benefits of repurposing a coal-fired electric generating facility with an SMR.[2] The analysis will consider the feasibility of, and siting considerations for, a coal-to-nuclear project.

As the agency's announcement notes:

> The potential use of an SMR deployment to repurpose existing electricity generation assets and meet growing generating needs could reduce stranded asset costs, allow for well-paying jobs to remain in the region, provide business opportunities for the manufacturing and construction sector during the construction and maintenance phases, and provide for more flexible, lower-cost electricity to the state's residential and business consumers.

On a related note, the Southern Ohio Diversification Initiative, which received a grant from the U.S. Department of Energy in 2020 to consider advanced nuclear opportunities for reuse of the former Portsmouth Gaseous Diffusion Plant, is expected to issue a report by the end of 2022.

This case study is expected to include a generic template for developing a U.S. Nuclear Regulatory Commission application to site and construct an advanced reactor on a brownfield industrial site.

CHIPS and Science Act

In addition to state-level action and public-private partnership activities, Congress approved legislation last week directing the DOE to establish a program to fund the research, development and demonstration of advanced nuclear reactors.

Notably, Congress directed the DOE to prioritize applications proposing to "carry out projects at ... fossil fuel electric generation facilities that are retired or scheduled to retire."

This program initially was proposed in stand-alone legislation known as the Fission for the Future Act, H.R. 7360 and S. 3428, with bipartisan sponsorship in both houses. Following some procedural maneuvering in late July, Congress migrated those proposals into the broader legislative package known as the CHIPS and Science Act.[3]

The bill — which is over 1,000 pages — covers a wide range of matters, including semiconductor production, space nuclear capabilities and security measures for U.S. Supreme Court justices. Bipartisan

majorities in the U.S. House of Representatives and U.S. Senate approved the package, and President Joe Biden signed the legislation on Aug. 9.[4]

This important program is expected to provide $800 million over the next five years to support demonstration projects for coal-to-nuclear transitions.

The Bottom Line

As global demand for carbon-free baseload electricity increases — and the trend of coal plant retirements continues — the political, economic and environmental benefits of coal-to-nuclear transitions may prove an attractive option for technology vendors, utilities, investors, developers and other project sponsors.

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[1] https://www.scottmadden.com/content/uploads/2021/10/ScottMadden_Gone_With_The_Steam_WhitePaper_final4.pdf.

[2] https://news.maryland.gov/mea/2022/06/14/mea-announces-partnership-with-x-energy-and-frostburg-state-university/.

[3] https://www.congress.gov/bill/117th-congress/house-bill/4346/text.

[4] https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/09/fact-sheet-chips-and-science-act-will-lower-costs-create-jobs-strengthen-supply-chains-and-counter-china/.