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Inside the Audacious Plan to Reopen Three Mile Island's Nuclear Plant

AI's thirst for energy sealed the deal between Microsoft and Constellation on the plant, where memories of a partial meltdown in 1979 still resonate

Three Mile Island, site of a 1979 nuclear accident, sits in the Susquehanna River near Middletown, Pa.

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| Photographs by [Matt Roth](#) for WSJ

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At a small gathering for CEOs last year, OpenAI co-founder Sam Altman made a stunning pronouncement: Future data centers for some artificial-intelligence models would require as much power as a large city.

Among those taken aback in the group gathered at Microsoft's headquarters was Joe Dominguez, the chief executive of Constellation Energy, which produces more than a fifth of U.S. nuclear power.

"My first reaction is, 'Wow, these guys are going to be in for a rude awakening about how much power is actually going to be available,'" he said. "It was like a lightning bolt hit me."

Dominguez returned to Baltimore after the May 2023 meeting with an audacious idea: What if his company restarted the undamaged reactor at Three Mile Island, the site of the country's most infamous nuclear-power accident?

Reopening an existing nuclear plant could address several problems, Dominguez thought. Tech companies need power 24/7 for AI and prefer [clean-energy sources](#). But accessing the nation's packed grid is difficult in many places, and the intermittence of power from new wind and solar projects makes them [an imperfect solution](#).

What ensued was months of engineering work, including the frantic restoration of a training simulator that had been cannibalized for parts. It also involved a grueling meeting with Pennsylvania Gov. Josh Shapiro, whose support would be critical in greenlighting a politically sensitive project that had become synonymous with nuclear disasters.

Company executives used a code name for the project: Tetris, after the 1980s-era videogame in which players stack descending geometric shapes, and fast.

After 17 months, Constellation and Microsoft announced in September that the tech giant has signed a 20-year power-purchase agreement to pair its data centers with round-the-clock clean power from Three Mile Island. Constellation expects to spend around \$1.6 billion on the unprecedented effort to resuscitate a reactor already undergoing decommissioning.

For Constellation, the deal could restore its relevance in an industry that had lost enthusiasm for nuclear power. Meanwhile, Microsoft may have scored an early victory in a [fierce competition](#) among tech giants to secure nuclear power to cut rising carbon emissions and power AI.

THE ENERGY PUZZLE

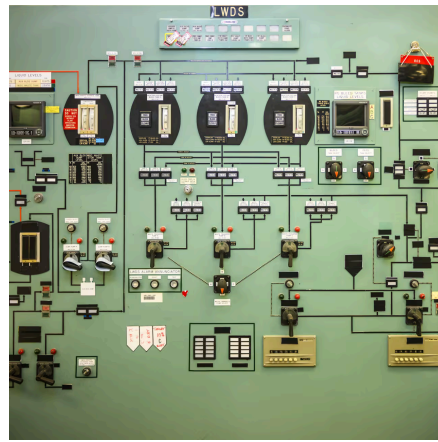
Within a few years, the most advanced AI models are projected to need five gigawatts of power, as much as five nuclear reactors, or roughly what Manhattan consumes at any given time. There is [nowhere in the U.S.](#) where it will be easy to connect data centers of that magnitude.

The prospect has caused electricity demand forecasts to skyrocket in many pockets of the country, [prompting a tug of war](#) over how to shoulder costs and concerns about whether emissions reductions targets set by tech firms and the federal government are still viable.

In Pennsylvania, Shapiro had questions. The Democratic governor had campaigned in part on accelerating the state's clean-energy transition.

Shapiro and Dominguez met for the first time last December in Philadelphia. Dominguez, who said it was generous to describe most of his conversations with politicians as vague, didn't know what to expect.

Shapiro, though, wanted details on the plant's physical condition, whether the company had spoken to labor leaders, if it could find workers and equipment, and whether a restart could happen safely and without cost to Pennsylvanians.



CONSTELLATION IS EXPECTED TO SPEND \$1.6 BILLION TO RESTART THE THREE MILE ISLAND REACTOR, WHICH WILL NEED SOME NEW EQUIPMENT AND TECHNOLOGY.

Three Mile Island's undamaged Unit 1 reactor sits next to Unit 2, which was shut down after a partial core meltdown in 1979. It was the biggest civilian nuclear power accident in the U.S. and became a major factor in America's ambivalence about nuclear power. The 835-megawatt Unit 1 closed only five years ago because it had been losing money.

"He grilled me, literally grilled me for well over an hour, maybe an hour and a half," Dominguez recalled of the governor.

At the end of the meeting, Shapiro said that if Constellation thought it could do the project, he would support it. But Constellation had to be perfect in executing it.

Shapiro spokesman Manuel Bonder said the administration has talked for a year with Constellation, legislators and stakeholders about the restart "to create thousands of good-paying union jobs and ensure the reliability of our energy grid." Bonder noted it requires no state subsidies.

Shapiro's support was critical. An attempt to keep Three Mile Island open in 2019 with around \$500 million in state funding had failed to garner widespread support among lawmakers and business groups.

Dominguez, a former federal prosecutor and lobbyist, had worked on securing state support for it while at Exelon, the plant's former owner. He also had tried to find tech, industrial or commercial customers who would sign agreements that could keep the plant running. It didn't work.

Many nuclear plants in competitive power markets have been marching toward closure for years because they couldn't compete on cost against natural gas-fired plants or renewables. Since the 1990s, 16 U.S. reactors supplying more than 11,000 MW of power have shut down, according to the Nuclear Regulatory Commission.

‘SADDLE UP’



JOURNALISTS ON A RECENT MEDIA TOUR OF THREE MILE ISLAND

But in a shift, the Biden administration was beginning to see nuclear power as critical in achieving its goal of decarbonizing the U.S. grid by 2035. Around the country, some coal-and gas-fired power plants were retiring more quickly than they could be replaced by wind and solar farms paired with battery storage, increasing the risk of supply shortages.

The Inflation Reduction Act, the sweeping climate bill passed in late 2022, included tax credits to support nuclear energy.

After the Microsoft meeting, Dominguez directed dozens of employees to compile a status update on new energy projects that produced the zero- or low-carbon electricity tech companies needed around the clock.

Employees analyzed plans for solar and battery projects, carbon capture and storage technology, and [small modular nuclear reactors](#). Nothing was fast or cheap, which meant Three Mile Island’s undamaged reactor might be a moneymaker again.

Dominguez recalled telling executives, “Saddle up. I want to understand within five weeks whether we could do this.”

Constellation's engineers determined that a restart of Three Mile Island could be done but not without challenges. The main transformer needed replacement. Because of the yearslong lead time for such switchgear, Constellation started talking to suppliers about how to jump the line.

The company moved quickly to halt the decommissioning and put a blanket prohibition on any kind of destructive work that would take components apart. Employees also started to restore a specialized training simulator. Every nuclear plant has its own; workers can't simply be transferred from other locations.

By January 2024, Dominguez was ready to shop Three Mile Island to a few corporate clients. Competition for nuclear assets was starting to heat up. Microsoft was clear: It wanted first dibs.

Noelle Walsh, Microsoft's corporate vice president of cloud operations and innovation, said the deal made sense because it would bring a large amount of reliable, carbon-free power to market more quickly and cheaply than other options.

"If we had walked from the deal, I'm sure somebody else would have stepped in," Walsh said.

Though the companies haven't released financial details, Walsh and Dominguez said price wasn't a sticking point in negotiations. Analysts at Jefferies estimate Microsoft will pay between \$110 to \$115 per megawatt hour of electricity. Currently operating reactors cost far less, though estimates for new nuclear construction start around \$142 per MWh, according to industry analysis and Lazard.

An array of state and federal approvals will be needed. The history of U.S. nuclear power is that things take longer and cost more than expected, a risk Constellation must manage. It says it will spend around \$1.6 billion to restart the reactor. It is supposed to start delivering power in 2028 under the agreement.

Restarts are possible at sites in Iowa and in Michigan, where the federal government and the state are spending nearly \$2 billion to revive Michigan's Palisades nuclear reactor, mothballed in 2022 and targeting a restart next year.

Nuclear Regulatory Commission Chair Christopher Hanson said the task of backing out of decommissioning puts Three Mile Island in "uncharted regulatory territory," though he is optimistic.

"There may be some unique issues, and there's going to need to be some flexibility on both sides," he said.

Microsoft hasn't yet put money on the table—Constellation will have to start delivering power first—but investors are excited.

Constellation was spun out of utility Exelon in early 2022, when U.S. nuclear energy's long-term path seemed uncertain. Since then, shares are up more than 400% and its market capitalization is nearly double that of Exelon.

"The first question that we're getting from clients is, 'how much more of this can you do?'" Dominguez said.

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