

Grid rewiring: An answer for Biden's climate goals?

By **Peter Behr** | 07/13/2023 07:15 AM EDT

CHARLOTTE, N.C. — Secretary of Energy Jennifer Granholm's search for clean energy solutions has led her to a strategy that dodges permitting problems, saves money and could bring large amounts of renewables online, but remains largely unused.

The concept is called advanced reconductoring, and studies show it holds the potential to help break a growing logjam in delivering new renewable power to meet the Biden administration's steep clean energy goals. The idea is to restring existing high-voltage towers with new cables employing state-of-the-art carbon fiber or aluminum alloy materials.

In return for a higher upfront cost, the advanced wires can deliver up to twice the current of same-sized conventional steel and aluminum cables. That in turn would accelerate a surge in transmission capacity without the long wait times and landowner fights that have plagued many earlier projects

It's an idea that is popping up in Granholm's speeches. At a visit to the Electric Power Research Institute laboratory in Charlotte late last month, Granholm held a wrist-sized sample of a new advanced cable that could carry a sizable part of President Joe Biden's uphill decarbonization goals — if it can gain traction.

EPRI's research on the cables, "hopefully is changing the game for how utilities across the country see the opportunity to do this reconductoring," Granholm said during the laboratory visit. "That is one of the solutions we're looking at."

Analysts at Princeton University and other researchers have calculated that the capacity of the nation's 160,000-mile, high-voltage networks may have to triple by 2050 to meet a [trio of steep demands](#) — zeroing out grid carbon emissions, expanding electricity production as electric vehicles and data centers multiply, and strengthening power networks against extreme weather.

Under Granholm, DOE is pursuing multiple programs to build more big, multistate lines to move renewable power from wind- and sun-rich regions to cities. Backing comes from the \$2.5 billion Transmission Facilitation Program funded by the infrastructure law and potential loan guarantees from the Department of Energy.

"We want to have the first tranches of all of that money out the door" by this time next year, Granholm said at the EPRI visit, referring to the \$2.5 billion.

But large-scale transmission projects would need to set speed records for planning, siting and permitting to meet climate goals, considering that such projects typically take longer than seven years from planning to operation. Reconductoring, on the other hand, takes advantage of transmission

owners' most valuable asset — the rights of way of their existing lines, said EPRI Chief Executive Arshad Mansoor in an interview.

“There is no environmental permitting, no tower construction; just change the wire,” said David Townley, director of public policy for CTC Global Corp., a leading advanced cable manufacturer, in an interview.

Melanie Kenderdine, executive vice president of the EFI Foundation, a think tank led by former Energy Secretary Ernest Moniz, estimates that as many as 360,000 new towers would be needed by 2030 to build enough transmission lines with traditional wiring technology to get the United States on a trajectory toward Biden's zero carbon goals. There are approximately five towers per mile with new high-voltage lines.

But with reconductoring, there isn't a need for raising transmission towers. It also would leave more steel, aluminum and copper to build wind turbines and electric vehicles, Kenderdine calculated in an unpublished EFI analysis.

Advanced power lines also must be part of a new transmission network that crisscrosses the United States to move vast quantities of electricity from new wind, solar, and nuclear generation that are essential in 2050 decarbonization scenarios, the technology's advocates say. Reconductoring would be cheaper than building new projects, they say.

“A reconductoring project may cost up to half as much as a new transmission line and can be completed in a significantly shorter amount of time,” [DOE reported](#) in a 2020 study.

But initial sticker shock poses a big obstacle, despite long-term cost gains. Even though reconductoring is cheaper than building new projects, advanced wires are more expensive than traditional wires. DOE concluded the construction cost of advanced cables ranges from 1 ½ to 5 times that of conventional conductors.

The Midcontinent Independent System Operator (MISO), the grid operator in the Midwest, calculated last year that the advanced conductor materials cost 181 percent more than standard cables in reconductoring projects. Reconductoring can also require costly upgrades to substations.

However, the newer technology cuts power losses when electric current “leaks” from power lines, delivering at least a quarter more power than conventional lines, shortening the payback period to utilities and customers, according to DOE. The length of time it would take to pay back an investment would vary from project to project, but by reducing leaks, the technology would allow more energy to reach customers and increase revenues for project developers.

A ‘very, very conservative’ mindset

The higher current-carrying capacity of advanced cables is their greatest selling point to DOE and clean energy advocates.

Lighter carbon-fiber cores in some advanced designs allow more aluminum wiring to be wrapped around the center without increasing the line's overall weight compared to the old steel-centered versions, and the aluminum strands deliver the current, according to EPRI.

“Over a period of time it makes much more sense to do this because it’s stronger, safer, and of course [it delivers] a lot more power,” Granholm told Mansoor and other EPRI officials who briefed her at EPRI’s Charlotte lab.

But the long-term advantages of advanced conductors [are rarely considered](#) when U.S. utilities and regulators design new transmission projects, said analysts Jay Caspary and Jesse Schneider of the Grid Strategies LLC consulting firm in a 2022 report funded by the American Council on Renewable Energy (ACORE) and other sponsors, including CTC Global.

“Despite the clear need for replacements and upgrades over the next few decades,” utilities and grid operators “have surprisingly few planned reconductoring projects expected to be placed in service before 2030,” the two authors said.

Currently, advanced cables are most likely to be used to solve special, isolated transmission problems. American Electric Power Co. (AEP) chose CTC Global’s advanced cabling to meet an urgent need to deliver more power along the Lower Rio Grande corridor in Texas in 2016, for example.

Building a new line to solve the issue would have taken much too long given the fast growth of electricity demand in the area, CTC Global’s Townley said. So technicians in steel-lined protective suits replaced two side-by-side, 120-mile sections of a multiline transmission network with carbon-fiber cabling while another line remained “hot,” he said.

That solution doubled the lines’ total capacity and saved millions of dollars over other options, according to CTC Global.

The Western Area Power Administration also used 3M advanced lines to reductor a North Dakota transmission pathway regularly hit with high winds.

In Montana, NorthWestern Energy used advanced conductors in replacing a transmission section cutting through heavily forested areas in the center of the state where wildfires are a deadly menace.

The original lines went up in 1925, signaling the advanced age of much of the U.S. grid. More than 70 percent of the nation’s grid transmission lines and power transformers are over 25 years old, [according to DOE](#).

Conventional steel core cables sag in summer heat, raising the risk of fire-generating contact with trees, said Randy Pinocci, a member of the Montana Public Service Commission, which approved the NorthWestern project, in an interview.

The utility combined low-sag advanced cables and tall steel towers as fire defense, and also gained capacity to move the growing wind energy from Montana that goes out of state, Pinocci said.

Pinocci said he used the project this year as evidence in arguing for a new state law that would allow the Montana regulatory commission to award higher returns to developers who install advanced conductors. The proposal is now law after being signed this year, but there are few if any similar policies in other states.

Across the United States, the reconductoring option must overcome a long-standing bias among utility engineers and their regulators to favor the most familiar technologies and regulators' preference for the low upfront costs rather than the greatest long-term payoffs, according to the ACORE report.

"We have trained [utility engineers] to be very, very conservative," Townley said. "Do the same thing you did last year. Don't make a mistake. Don't bring any risks in front of the regulator. That inertia is part of the electric utility mindset."

NorthWestern spokesperson Chris Puryear, testifying in favor of the Montana reconductoring measure before a state legislative committee in March, said the technology is not the answer to every transmission issue.

"The technology, although promising is highly location and project specific," Puryear said. "It works really well in some instances and may not be a great fit in others."

'We're facing a crisis'

At the EPRI briefing this summer, Granholm pressed for ways to increase reconductoring projects.

"Could reconductoring standards be developed within a reasonable amount of time — six or nine months?" she asked. "We're facing a crisis."

One big confidence boost would be approved design specifications for advanced cables and cable connectors from a recognized standard-setting organization like the American National Standards Institute, Mansoor said.

But despite years of testing, there are no such final standards, according to EPRI.

ANSI did not respond to request for comment.

EPRI Vice President Andrew Phillips said engineers at the institute are testing how long advanced cables are likely to last under normal and harsh conditions. But you can't "just say this works" and expect utilities to buy it, he said.

"You've got to worry about the whole life cycle" of line under all types of conditions, he told Granholm.

<https://www.eenews.net/articles/grid-rewiring-an-answer-for-bidens-climate-goals/>