

Superconductors: Cure for grid transmission woes?

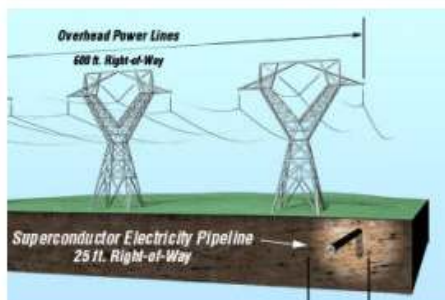
One idea to get more solar and wind power into the grid is frozen cables buried underground.

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American Superconductor, which makes superconductor wires, has developed a system to use direct current superconductor cables, which greatly reduce loss of energy during transmission. It's a way to beef up the U.S. power grid and bypass many contentious problems over siting overhead lines, according to the company.

Typically, plans to modernize the grid and meet growing demand for electricity involve adding bulk transmission lines. Also, more lines are needed to transport large amounts of solar and wind power from the west and Midwest to the load centers along the coasts. T. Boone Pickens last week said he is seeking new locations for a massive wind farm in Texas because the transmission lines are not available in panhandle region.

But laying new transmission lines, in addition to be expensive, is meeting opposition from many quarters and brings up thorny debates over federal versus states rights in siting. In one case, a group of environmental advocacy groups is suing government agencies because the proposal to build transmissions lines through public lands is not well suited for transporting solar and wind power.



Underground direct current superconductor wires—a viable alternative to overhead transmission lines?

(Credit: American Superconductor)

American Superconductor argues that superconductors get around many of those siting issues because cables can be placed underground on existing rights of way, company representative Jason Fredette said on Friday. Direct current superconductor cables are also far more efficient because there is minimal loss during transmission—only three percent. Losses today during transmission and distribution can be more than 10 percent of the energy generated, according to a 2007 Department of Energy study.

Superconductivity is possible when certain materials are lowered to very low temperatures, which makes the resistance drop off entirely. American Superconductor makes a ceramic wire that is cooled with liquid nitrogen circulated around the wires.

Researchers have been studying superconductive transmission lines for years and there are few installations of superconductor cables now in the U.S. for relatively short distances, a sign that utilities are more comfortable with using alternatives to aluminum or copper lines. But a long-haul direct current superconductor line is a big step from today's state of the art, Fredette said.

"The big barrier here, as with any new technology, is that electric utilities are very conservative...Now we're overcoming that obstacle with initial installations, which are relatively short runs but this superconductor pipeline is much grander in scale," he said.

In practice, the cables would be placed underground, as gas pipelines are, and have nitrogen cooling stations every seven or eight miles. Fredette said the technology is feasible but would likely need some sort of loan guarantee from U.S. government to test the system in the field.