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Super-thin cable packs mighty punch

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By: **Scott Jones** | Oak Ridger Intern

Among the technologies being explored at Oak Ridge National Laboratory to help the country better deal with the overloaded and aging electric network is that of superconducting cables - power lines that are capable of carrying three to five times more current than conventional overhead lines.



Marie Moffitt/Staff

The nation's aging power infrastructure, shown above, could get a boost from ORNL's superconductive cable.

technologies such as personal computers.

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But these cables have several advantages. They can be placed at ground level or underground, because there is no high voltage on the outside of the cable, said Michael Gouge, group leader of applied superconductivity group at ORNL. This could be less expensive than placing them overhead, Gouge said.

The newer, less-expensive cables are made of ceramic and a copper and nickel alloy, as opposed to the first generation cables made of two-thirds pure silver. Liquid nitrogen helps prevent the overheating that would normally occur in underground lines, allowing the cables to carry a large amount of current while remaining underground.

Gouge said he sees a primary market for these cables in urban areas, where underground ducts, anywhere from 25 to 75 years old, carry conventional power lines that are now overloaded due to an expanding population and new



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Because the lines are no larger than conventional lines, these urban ducts could simply be refitted with superconductive cables, allowing "three to five times more current in a given cross-sectional area," he said. And because the same area is occupied, this would eliminate the need for big urban renewal projects due to transmission upgrades.

He said Southwire, a Georgia-based company in partnership with ORNL, has had the "most successful" superconducting line test. Southwire president and CEO Stuart Thorn wrote in a letter to congressmen leading hearings regarding the Aug. 14 blackout.

"Installed in February 2000, this cable has operated continuously, providing power to Southwire's manufacturing facilities in Carrollton, Ga.," he wrote. However, Bob Hawsey, manager of the superconductivity group at ORNL, said that longer lengths of superconductive cable need to be tested before they start taking the load off of conventional power lines.

According to Gouge, three projects will take place in the next one to three years to demonstrate the effectiveness of the wires to industry.


Thorn seems optimistic. Superconductivity cables "will be an integral part of future transmission systems where reliable bulk power must be moved long distances or through constricted corridors," he wrote.

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