Transmission Tests New Technology for Cable Leak Detection
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National Grid is assessing the use of tracer gas technology for finding fluid leaks in underground high-voltage transmission lines. This technique has the potential to reduce the environmental impact of leaks by speeding up the leak locating process.

Many underground transmission cables are insulated with a dielectric fluid, which is similar to mineral oil, and is pressurized at between one and 200 pounds per square inch (psi), depending on the cable type. Corrosion or mechanical fatigue of the cable sheath or pipe can result in fluid leaks. Leaks put the cable at risk of electrical failure, and can also release dielectric fluid to the environment. Since the cables are buried, locating the leak can be a time-consuming and difficult process.

The traditional way to locate leaks has been to excavate the cable at the midpoint, freeze a solid plug in the cable using liquid nitrogen and determine which side of the cable is losing pressure. This process is repeated over and over, narrowing the search until a short enough section of cable can finally be excavated to find the leak. While effective, this technique is time consuming and results in multiple excavations along the cable route.

With the new gas tracer technology, an inert, manmade gas called perfluorocarbon tracer (PFT) is injected into the cable. When a leak occurs, the PFTs exit the cable through the leak and can be detected at ground level using special sensors. This technique was originally developed by EPRI (Electric Power Research Institute) for use on high-pressure pipe type cables. National Grid is adapting this technique so it can be used on some of Transmission's self-contained fluid-filled cables.

The new method has the potential to reduce the leak search time from days to a week or more. It is also less disruptive to the community because excavation only occurs at the leak. Faster leak locating can mean less fluid loss to the environment, and quicker return of the cable to normal operation.

"We are still in the initial stages of testing this relatively new technique, but we have had a successful trial on a transmission cable in Salem, Massachusetts," said Jonathan Gonynor, manager of Underground Engineering and Operations. "We are now investigating more efficient ways to add the PFT to our cables. The idea is to keep the feeders in service and locate fluid leaks in a safe, cost-efficient manner while still being responsible to the environment."

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