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## California is beginning to bury its power lines to prevent wildfire

Aiming to curb wildfires, PGE is undergrounding its high-risk distribution lines



WALNUT CREEK, CA – May 19: Tyler Owens, left, directs track hoe operator Alan King, both with the Underground Electric Construction Company, as they work to dig two lines of six inch conduit to the correct depth at the Lime Ridge Open Space in Walnut Creek, Calif., on Thursday, May 19, 2022. The conduit will carry Pacific Gas and Electric power lines underground and replace the existing lines that currently run above ground to reduce the risk of wildfire ignitions. (Anda Chu/Bay Area News Group)

By **LISA M. KRIEGER** | lkrieger@bayareanewsgroup.com | Bay Area News Group

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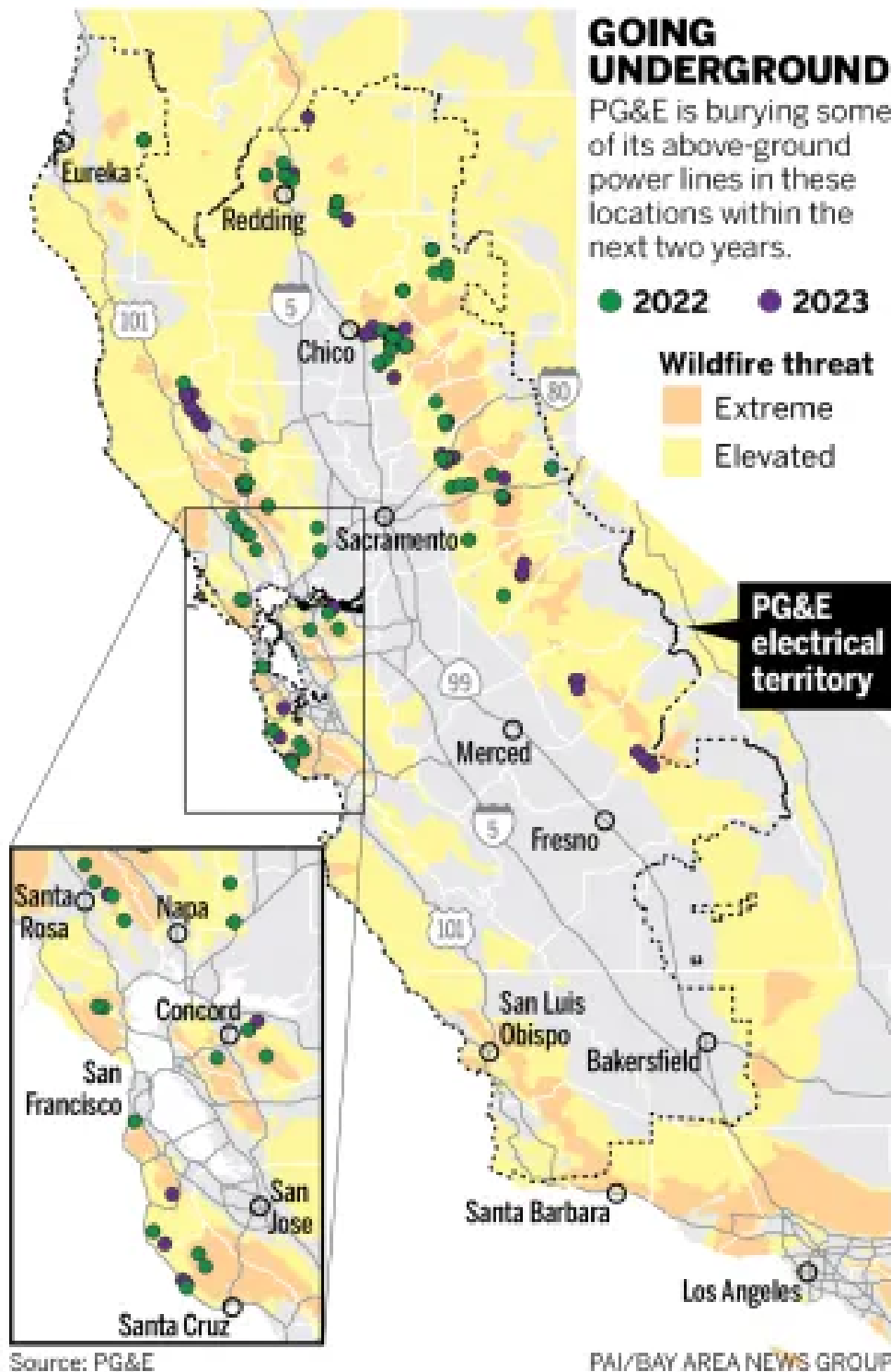
WALNUT CREEK – Etched in dirt, a narrow furrow is the only clue that the grasslands of Lime Ridge Open Space will soon be restored to their original splendor, cleared of dangerous power lines that could ignite nearby subdivisions.

The undergrounding project, costing \$3.75 million a mile, represents the beginning of a 10,000-mile-long effort by Pacific Gas and Electric to bury the state's distribution lines to cope with the growing risk of winds and wildfires linked to global warming.

"It is a one-time investment to eliminate essentially all ignition risk related to power lines, with the added benefit of reducing reliability issues," said Jamie Martin, who oversees PG&E's undergrounding initiative. "It's permanent risk reduction."

The utility long resisted calls to bury its power lines as being too costly.





But after its equipment was blamed for sparking a string of devastating wildfires in Northern California the past few years that have killed dozens of people and destroyed thousands of homes, the company reversed its position. It filed for bankruptcy protection in 2019 after facing \$30 billion in wildfire-related fines and liability, and pleaded guilty to 84 counts of involuntary manslaughter in the 2018 Camp Fire that destroyed the town of Paradise.



Other fire-prone areas of the Bay Area are also targeted for undergrounding. Based on an analysis of weather patterns, fire history, tree density, outage data and other factors, priority is going to parts of Santa Rosa, Rossmoor, Pacifica, West Marin's Lucas Valley and the coastal towns of Pescadero and Davenport.

Only 175 miles will be buried this year — but the project will accelerate. PG&E, the nation's largest electricity provider, has estimated about 3,600 miles will be completed from 2022 to 2026. When all 10,000 miles are underground, risk will be reduced 70% to 80% in high fire-threat districts, said Martin.

There are downsides. There's risk of underground faulting, caused by groundwater contamination, damage to cables during installation and the failure of cable splices and other connections.

And it's a very expensive approach.

"We're not convinced that undergrounding offers the greatest reduction for the most effective cost," said Mark Toney, executive director of TURN, The Utility Reform Network. "And that's really important, because we're in an affordability crisis, when it comes to monthly electricity bills. We want PG&E to look at other options. We're skeptical that ratepayers will end up getting their money's worth."

But stopgap measures, such as Public Safety Power Shutoffs during windy days, have proven disruptive, abruptly cutting off power to tech-dependent communities. Tree-trimming demands constant effort.

Meanwhile, burying wires and cables is getting cheaper and easier. With innovations in tools and techniques, the utility expects that the cost will drop to \$2.5 million a mile by 2026.

"PG&E is being very smart in doing this. It's a great move," said Samuel Ariaratnam, construction engineering program chair at Arizona State University.

It's a trend all over the United States as a changing climate sparks severe weather patterns.

"This is not just a California problem. This is a national problem," said geotechnical engineer Brian Dorward of Brierley Associates. "California has wildfires. Florida has hurricanes. The Midwest has tornadoes. All natural disasters play havoc on power lines, which are critical infrastructure."



But none have proposed a project on the scale of PG&E's new plan. San Diego Gas & Electric, a smaller utility, has buried 44% of its distribution lines and 4.4% of its transmission lines. In cities such as Manhattan, lines have been channeled underground for years. Germany and the Netherlands are moving to put all their lines underground.

Compared to elsewhere, PG&E has been slow to embrace the solution, said Robert McCullough, a veteran energy consultant in Portland, Oregon, and adjunct professor of economics at Portland State University.

"California is the nation's most regulated state, with a certain amount of inertia. It's rigid and slow to respond," he said. "But Pacific Gas & Electric is the poster child of rigidity. ... It should have been fixing everything all the time."

In the East Bay, the new underground route across the windswept chaparral of Lime Ridge will link Ygnacio Valley subdivisions in Walnut Creek and Concord. Once it is finished, tall distribution towers will come down.

The installation method is straightforward in the region's soft sedimentary soil. A bulldozer with a plowing blade digs the furrows. Twelve-kilovolt lines are buried almost three feet underground, deep enough to prevent damage from erosion or animals. The lines, only 1-1/2 inches wide, sit inside a 6-inch black PVC conduit, creating room for the heat to dissipate. A second empty conduit, which serves as a spare, sits alongside.

Then work crews quickly cover it with dirt, and dampen it. Sometimes they reopen an area to check the integrity and depth of the conduit.

The process is not always so simple in areas where other utilities — gas, cable, fiber-optic — are also underground. That requires open trenching, a slower and more traditional approach with much more hands-on manpower.

But new tools are accelerating the work. A powerful device called a "rock wheel" can cut clean rock walls with a sharp rotary blade. Another, called an "asphalt zipper," can open up a 1,000-foot-long stretch of road in merely an hour; using backhoes and jackhammers, it takes days.

If drilling must be deep or if a line must run under a river or a road, a technique called "horizontal directional drilling" is a better option, said Ariaratnam. Rather than trenching, it uses a machine to drill a precisely-guided pilot hole and then pulls a conduit, holding the cable, through the hole. While more expensive than open trenching, it greatly reduces the time and effort spent on restoration.



Better tracking and steering tools makes it possible to do “intersectional drilling,” where two holes underground to form a single bore, said Dorward. Drill bits, reamers, and hole openers are now specially designed, instead of simply homemade.

This quickly extends the length of the route, said Dorward. A single drill can open up more than 9,000 feet, he said.

For now, PG&E’s program is focused on burying distribution lines which are closer to homes, rather than the large high-voltage transmission lines, said spokesperson Jennifer Robison. It’s more cost-effective and practical, she said. The transmission lines conduct more heat, so they must be housed in big concrete ducts, she said.

Transmission lines could be a future project. It’s harder to bury transmission lines; because they conduct more heat, they must be housed in big concrete ducts, she said. And distribution lines are closer to homes.

While welcoming the effort, McCullough and others urged greater speed and expansion.

“We are at the start of global warming, not the end,” he said. “We’re going to be seeing increased average temperatures and wind speeds for years to come.”

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 Author **Lisa M. Krieger** | Science/Research reporter

Lisa M. Krieger is a science writer at The Mercury News, covering research, scientific policy and environmental news from Stanford University, the University of California, NASA-Ames, U.S. Geological Survey and other Bay Area-based research facilities. She graduated from Duke University with a B.A. degree in biology. She splits her time between Palo Alto and Inverness, and in her spare time likes wildlife photography, swimming, skiing and backpacking.

lkrieger@bayareanewsgroup.com

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