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UNDERGROUNDING

RESILIENCE TECHNOLOGY PROFILE

IFA ILLINOIS FINANCE AUTHORITY Illinois Climate Bank

See the GDO Undergrounding Investment Guide for more details.

OVERVIEW

Undergrounding is the process of **relocating components of distribution and transmission systems from above ground to below ground.**[1]

This practice is gaining momentum among both large and small electric utilities. Increasingly severe and frequent weather events—along with evolving economic conditions—have made undergrounding more practical and accessible for investor-owned utilities, municipal utilities, and electric cooperatives alike. Underground power lines are less susceptible to weather-related damage, outages from falling trees, and wildfire ignition risks—making them a resilient option in vulnerable areas like dense urban centers, coastal zones, or wildfire-prone regions.[2]

PROGRAM OVERVIEW

This document was developed under the **Customized Help and Expertise on Energy Resilience for States (CHEERS)** program. CHEERS is a community of practice focused on helping states implement **Infrastructure Investment and Jobs Act (IIJA) Section 40101(d) Grid Resilience State and Tribal Formula Grants ("40101(d)")**. CHEERS is managed by the U.S. Department of Energy (DOE) Grid Deployment Office (GDO), and convenes an annual cohort of states to deliver grid resilience technical assistance.

RESILIENCE BENEFITS

Community Safety. Underground power lines minimize the risk of accidents caused by downed lines and protect communities from damaged power lines.

Reliability. Underground cables are less vulnerable to storms, wind, ice, and vegetation-related disruptions, leading to fewer outages and better SAIDI and SAIFI scores.

Decreased Maintenance Costs. Underground cables typically require less maintenance than overhead lines due to their protection from weather and vegetation-related hazards. This includes a decreased need for tree trimming and other vegetation management, leading to long-term operational cost savings.

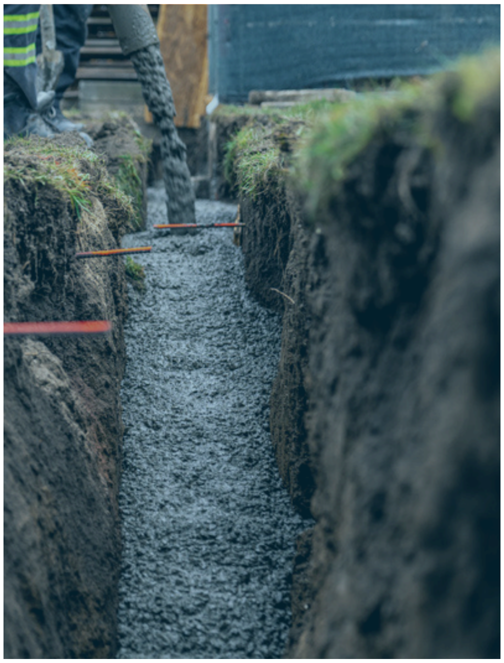

Image Source: SPF Underground

CHECKLIST

Consider this technology if you experience the following:

- [ ] Congested customer service area (number of customers per line mile; built environment)
- [ ] Frequent outages due to intense storms
- [ ] Pursuing or have existing system monitoring capabilities
- [ ] Conducive environmental and subsurface conditions (not prone to flooding or geological activity)

UNDERGROUNDING

RESILIENCE TECHNOLOGY PROFILE

40101(D) APPLICABILITY

Eligible Uses of 40101(d) Grid Resilience Formula Grants:

- **Insulating Materials.** Materials include various polymers and natural options, and are chosen for their durability and ability to shield underground cables from moisture, chemicals, and heat.
- **Trenching.** Trenching involves digging a narrow trench, placing a bedding layer (such as sand or cement), laying the cables, and backfilling with protective material.
- **Tunneling.** Where trenching is not feasible—such as under rivers, roads, or dense urban areas—techniques like horizontal drilling allow crews to install cables with minimal surface disruption.

KNOW BEFORE YOU DEVELOP

Consider the following before choosing to underground for your 40101(d) application:

- **High Costs.** The upfront costs of undergrounding depend on the voltage of the lines, but can be at least double the cost of overhead lines.
- **Complex Repairs.** Underground repairs generally take longer because accessing lines and locating faults is more difficult. Consider pairing with system monitoring capabilities to mitigate this.
- **Shorter Lifetimes.** Lifetimes for undergrounded lines can be 20-60% shorter due to excessive heat buildup and susceptibility to moisture.
- **Natural Hazards.** Depending on the location, lines may be at risk from flooding and geological activity.

CASE STUDY#1: CITY OF NAPERVILLE[3]

Image Source: Wikimedia Commons

"One of the more common complaints I've heard from residents in downtown neighborhoods over the past year (is) our blackouts we've had. There's a number of reasons for it, some of it's back luck, some of it is just the fact that we've got overhead lines in those neighborhoods." - Councilman Patrick Kelly, Naperville, Illinois

As of 2024, 94% of the City of Naperville's electrical cable is underground—a strategic effort that started in the early 1990s. This long-term investment has improved reliability, with customers experiencing an average outage time of just 23 minutes in 2024. A key factor in Naperville's success is its robust system for tracking and analyzing data on underground infrastructure, enabling data-driven improvements and more effective city planning.

CASE STUDY #2: MOUNTAIN PARKS ELECTRIC[4]

Image Source: Flickr

Mountain Parks Electric (MPE), a cooperative based in Granby, Colorado, has undergrounded 550 of its 19,000 miles of distribution lines.

The Colorado Energy Office and the Colorado Resiliency Office were awarded $739,940 through the U.S. Department of Energy's Grid Deployment Office (DOE-GDO) under the Grid Resilience State and Tribal Formula Grants program. These funds will help advance MPE's undergrounding initiative, enhancing reliability and resilience in the region.

1. Lawrence Berkeley National Laboratory (2024). "Undergrounding Transmission and Distribution Lines," Grid Deployment Office
2. Watts, C. (2023). "The Changing Economics of Utility Investment in Undergrounding," S&C Electric Company.
3. Galvin Electricity Initiative (2010). "The Naperville Smart Grid Initiative," The Galvin Project, Inc.
4. Mountain Parks Electric, Inc, (2025) "Mission/Vision."