

# Aligning Environmental Stewardship and Transmission Planning



It may be unusual to hear the terms “environmental stewardship” and “transmission planning” in the same sentence, but that’s changing. A 45-kilometer deployment of 69-kV transmission line through an environmentally sensitive area has preserved trees and worked to reduce the risk of wildfires. Utilities considering 69-kV projects are starting to take notice.

Over the next few years, utilities will invest tens of billions of dollars to build new transmission and distribution (T&D) infrastructure across North America. This buildout is taking place amid a generalized and growing concern about sustainability, resiliency and rising energy prices.

Preserving trees also helps fight climate change, as they remove carbon from the air and produce oxygen.

The T&D buildout is being driven by several factors, including the need to rebuild infrastructure following severe weather, efforts to harden existing electric infrastructure against severe weather, and bringing vast new amounts of renewable electricity from remote areas where it is generated to areas where it will be used. Utilities, prodded by state utility regulators, are making T&D investment decisions based on numerous factors, including reliability and affordability. Across Western North America, wildfire prevention also is a significant factor in decision-making.

# CASE STUDY

The mandate facing electric utilities is no longer limited to providing reliable service at an affordable price. Increasingly, operating sustainably and with greater resiliency have been added to utilities' longtime mandate. Operating sustainably has many elements, including protecting the environment, minimizing risk of wildfires, and balancing customers' love of trees with the need to maintain right of way (ROW) clearance to prevent trees from coming into contact with lines and causing power outages.

As utilities seek to optimize their capital outlays for T&D assets, it is apparent that no single approach or technology will succeed in all settings. Heavily forested areas pose different challenges than urban or suburban settings. Undergrounding medium-voltage distribution lines may work better in some settings, but the cost of placing higher-voltage transmission lines underground remains exorbitant—as much as 10 times the cost of the lowest-cost overhead approach.

Some regulators are emphasizing the non-wires approach to serving some areas: constructing distributed energy resources powering microgrids

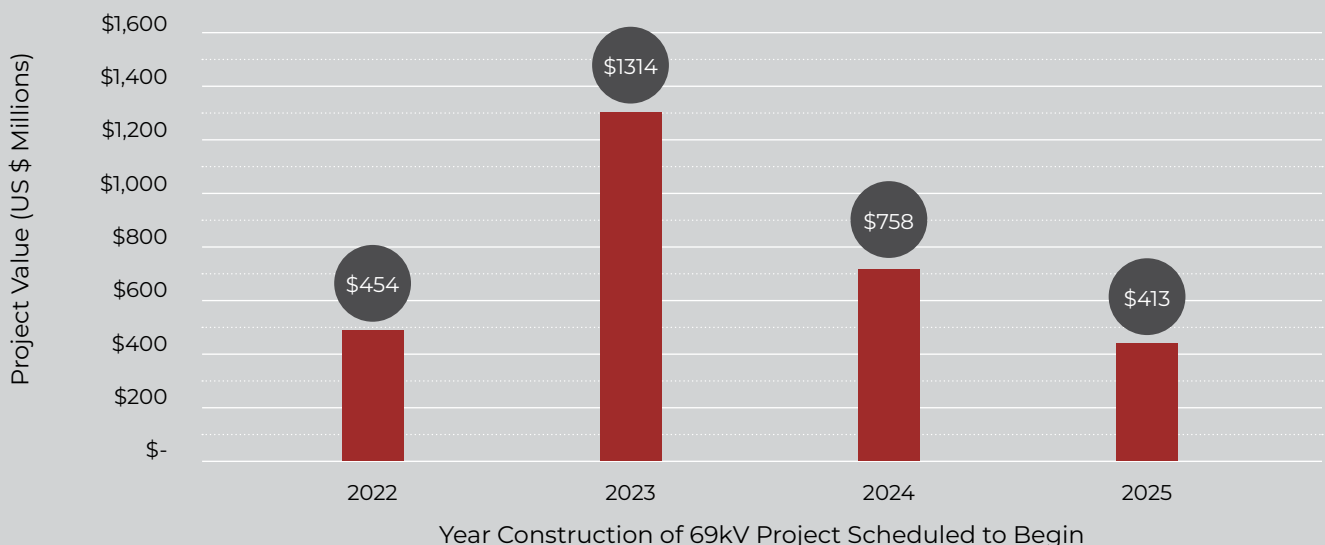
equipped with battery energy storage systems. While workable in some settings, this remains a niche approach.

Once the decision has been made to build overhead transmission lines, the costs, benefits, and tradeoffs of different designs must be further assessed. For a 45-kilometer line running through an environmentally sensitive area, ATCO Electric, a Canadian utility, deployed a 69 kV line with a 25-kV underbuild, with both lines using an aerial covered conductor in a tree wire configuration, to minimize the danger of wildfires while also reducing ROW clearance, thus preserving trees in the area.

## MARKET OUTLOOK

The energy transition underway across North America will require a healthy dose of investment in utilities' T&D infrastructure. Over 1,660 T&D projects valued at over \$76 billion are scheduled to begin construction across North America between 2022 and 2025, according to [Industrial Info Resources](#), a Sugar Land, Texas-based global business intelligence firm.

Figure 1: Estimated Spend for 69-kV Transmission Projects Across North America / Source: Industrial Resources



# CASE STUDY

Of that overall T&D spend, IIR calculates that at least \$3 billion will be devoted to 69-kV transmission projects (see Figure 1). Although 69-kV transmission projects have been announced in over two dozen U.S. states and Canadian provinces, project pending is expected to be especially heavy in Texas, Ohio, Minnesota, Indiana, and Michigan, according to data tracked by IIR.

## SUSTAINABILITY AND ESG

That transmission spending will take place in a very different environment compared to prior buildouts across North America. These days, transmission project developers and electric utilities are expected to pay greater far attention to environmental, social, and governance (ESG) factors than in prior decades.

Institutional investors like pension funds and mutual funds, which collectively manage trillions of dollars of assets, have been pressuring the companies in which they invest to pay greater attention to ESG factors in their decision-making (Figure 2).

In their quest to become environmental stewards, utilities have been actively building or contracting

for renewable energy generation for over a decade. Typically, those green electrons are being generated far from where they will be used, which means transmission lines rated at 69-kV and above are needed to realize a more sustainable energy future.

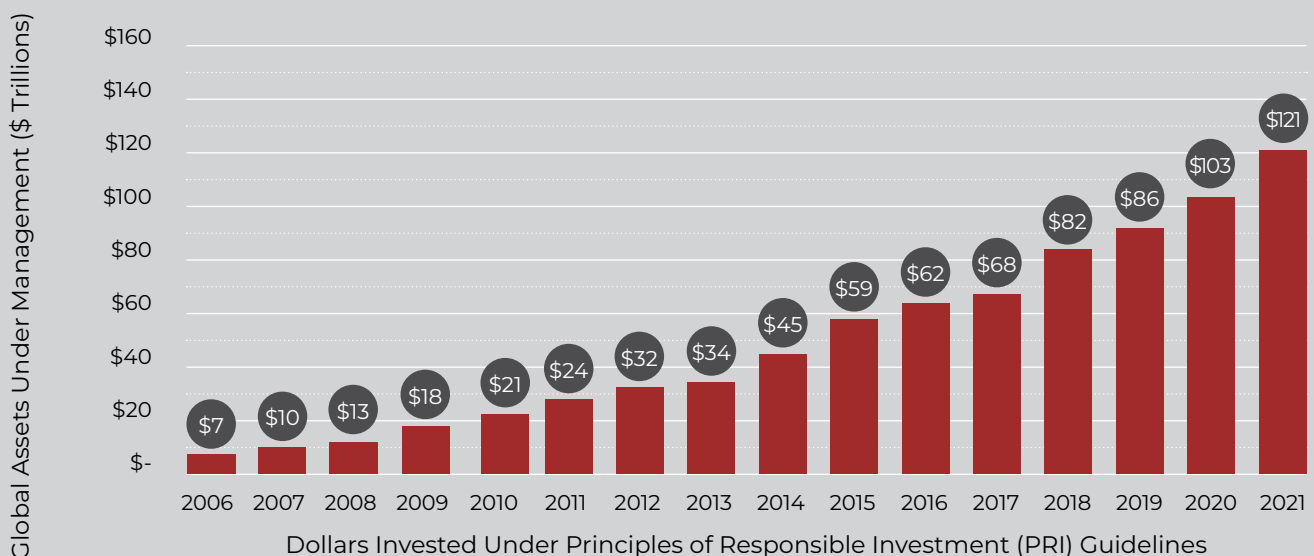
Operating sustainably means more than recycling paper and substituting non-emitting generation for fossil-fueled generation. A more holistic assessment of operating sustainably includes reducing a company's impact on the land, water, and air where it operates. Protecting the land, among other things, includes minimizing tree cutting and lowering the risk of wildfires sparked by utility lines.

## ATCO ELECTRIC'S CHALLENGES—AND SOLUTIONS

ATCO is a publicly traded Canadian energy, housing, transportation, and infrastructure solutions company based in Calgary, Alberta. ATCO's electric utility, ATCO Electric, transmits and distributes electricity to about 229,000 customers in northern and east-central Alberta.

ATCO Electric's service area includes Jasper National Park, a national environmental treasure on par with U.S.-based national parks like Yellowstone, Yosemite,

Figure 2: ESG Investing Continues to Grow / Source: U.N. Principles for Responsible Investment (PRI)



## CASE STUDY

Denali, and Shenandoah. Several thousand people live in Jasper Village, a bucolic community situated in the heart of the national park.

For decades, those customers relied on nearby diesel generators for their electricity. But several years ago, when those generators were reaching the end of their useful lives, ATCO Electric needed to consider its options. Building new diesel generators was not optimal, given their environmental impact. Burying transmission lines was far too costly. Thirdly, the park's heavy forestation limited ATCO Electric's tree-trimming options (Figure 3).

Brent Prickett, ATCO Electric's manager of transmission lines and civil engineering, said, "When we energized 45 kilometers (about 28 miles) of 69-kV radial line through the Jasper National Park in 2019, it brought us two significant environmental benefits: Reduced risk of originating wildfires and being able to operate with a reduced tree-clearance right of way."

The benefits—environmental and otherwise—of reduced wildfires speak for themselves, particularly as Western states and Canadian provinces grapple with unprecedented wildfires in recent years.

High winds, wildfires, or heavy snows can cause utility poles and wires to snap and ignite wildfires. That's another reason why utilities must keep ROWs clean from vegetation, trees, and "danger trees" (trees on the ROW border which might hit the power line if they fall). The use of covered conductor power lines, either in tree wire or spacer cable configurations, will prevent wildfire ignition if a tree comes into contact with the line. Similarly, if a covered conductor comes to the ground, it will not cause ignition, since a covered conductor will not create sparks when it comes into contact with dry brush (Figure 4).

ATCO Electric was drawn to the Hendrix 69-kV tree wire system because it reduced ROW clearance needs and thus the need for tree trimming. As a heavily forested national park in a nation with a highly developed environmental sensibility, Jasper National Park was not particularly accessible to vegetation management trucks and crews.

"In general, we can secure sufficient ROW width to remove vegetation contact risk," Prickett said. "But in Jasper National Park, Parks Canada required us to limit our impact to vegetation, so we needed to search for a non-traditional solution."



*Figure 3: To comply with narrow rights of way imposed by Canada's Jasper National Forest, ATCO Electric used Hendrix distribution and transmission lines.—Source: ATCO*



*Figure 4: 69-kV covered conductor is available in tree wire or spacer cable configurations*

## Hendrix Provides Suite of Covered Conductor Systems

For over a quarter-century, Hendrix has been providing electric utilities with covered conductor systems in a variety of voltages, from 15-kV, 25-kV, 35-kV, and 46-kV at the distribution level to 69-kV and 115-kV at the transmission level.

Our covered conductor systems, either in tree wire or spacer-cable configurations, are used in transmission projects by dozens of utilities around the world, including:

- National Grid—Massachusetts
- Pepco—Washington D.C., Maryland (several lines)
- OPPD—Omaha, Nebraska
- City of Natchitoches—Louisiana
- St. Johns Energy—New Brunswick, Canada
- CGET—Villarrica National Park, Pucon, Chile
- CNEL—Guayaquil, Ecuador
- LUCELEC—St. Lucia, B.V.I.

For distribution-level cable, Hendrix has over 1,000 clients in 75 countries.

A unit of Berkshire Hathaway, Hendrix has been producing covered conductor systems for electric utilities for over seven decades.

***“We are trimming less trees and protecting the foliage in Jasper National Park because we deployed the Hendrix aerial covered conductor system in a tree wire configuration.”***

ATCO Electric selected Hendrix’s tree wire system for its 69-kV transmission project. That system allowed ATCO Electric to string the new lines with less ROW clearance for trees. Utilities typically require 15 meters of clearance (7.5 meters on each side of a 69-kV line) to allow for tree trimming and to guard against the line coming into contact with trees during storms and high winds. But the Canadian government only provided 10 meters of clearance (five meters on each side of the line) for the Jasper project.

“We are trimming less trees and protecting the foliage in Jasper National Park because we deployed the Hendrix aerial covered conductor system in a tree wire configuration,” Prickett said.

In addition to the aesthetic benefits, there’s a climate change benefit: Leaving more trees standing allows them to remove carbon dioxide from the atmosphere while providing oxygen via photosynthesis. In that way, trees function not only as the earth’s lungs but also as its liver, removing harmful materials from the environmental body. Some have called trees nature’s carbon capture, utilization, and storage (CCUS) system.

A typical hardwood tree will absorb as much as 48 pounds of CO<sub>2</sub> per year, according to carbon

***“The Hendrix tree wire system really is an ambassador for itself. It’s a great product, really a flagship. We had unique needs and constraints in the Jasper National Park, but the attributes that made the tree wire system the right choice for our project also apply to other settings”***

measurement firm **CO2 Meter**. Over 40 years, each hardwood tree will remove approximately one ton of CO2 from the air while giving back life-sustaining oxygen. A more robust tree ecosystem also leads to improved animal life in and around those trees and improved visual aesthetics. One arborist estimated that this system saves as many as 1,000 trees and 10,000 animals. It may be impossible to calculate all of the environmental benefits of the Hendrix tree wire system. How do you place a value on more vibrant forests or a healthier ecosystem?

Installing a tree wire system cost ATCO Electric somewhat more than a bare wire system would have cost, but far less than an undergrounding option. But a bare wire deployment would not have worked in the heavily forested area, as bare wire systems are more susceptible to not only faults from contact with birds but are also more prone to wildfire ignition as a result of tree contact or falling to the ground and throwing sparks onto dry brush.

Undergrounding the lines was a financial non-starter, given that that can cost significantly more than what a bare wire system would cost. And building new diesel generators was not preferred either, both for environmental and reliability reasons.

Prickett commented: “The Hendrix tree wire system really is an ambassador for itself. It’s a great product, really a flagship. We had unique needs and constraints in the Jasper National Park, but the attributes that made the tree wire system the right choice for our project also apply to other settings.”

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