THE FUTURE OF OUR POWER GRID

Why the right of way industry is crucial

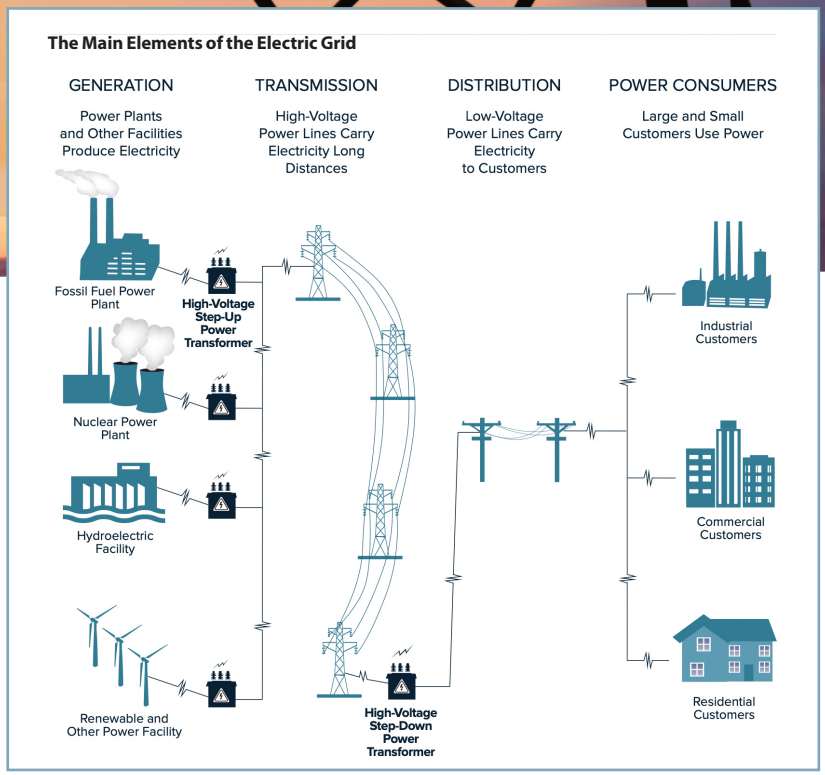
BY DOUGLAS PEETERS, SR/WA

The right of way profession has never been in a better place to collaborate within and support the power industry's commitment to improving and expanding our aging North American grid.

With an influx of new government funding coming via the Infrastructure Investment and Jobs Act, long-overdue investments in aging transmission and distribution infrastructure are on the way. Right of way professionals will play a crucial role in helping clients and employers manage this development.

What Is a Power Grid?

A power grid is a complicated system comprising thousands of power generation plants that are connected to vast networks of high-voltage transmission lines. This complex grid system — sometimes described as one of the engineering marvels of the 20th century — is the essential mechanism that balances this supply and demand of electricity usage among industrial, commercial and residential consumers.



Source: Congressional Budget Office

Electric Power Grid Development Meets Consumer Demand

The power grid concept was developed after World War II to meet the increasing demand for reliable electricity. Before then, utility companies mostly operated independently. By integrating standalone electricity networks into a shared power grid, utility companies could more cost effectively build and upgrade facilities because of greater economies of scale. This integration led to the development of Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs) tasked with balancing electric supply with demand across vast geographical areas. These RTOs and ISOs today maintain responsibility for reliability through wholesale bulk power dispatch, relying on a complex network of system interconnections grouped as follows:

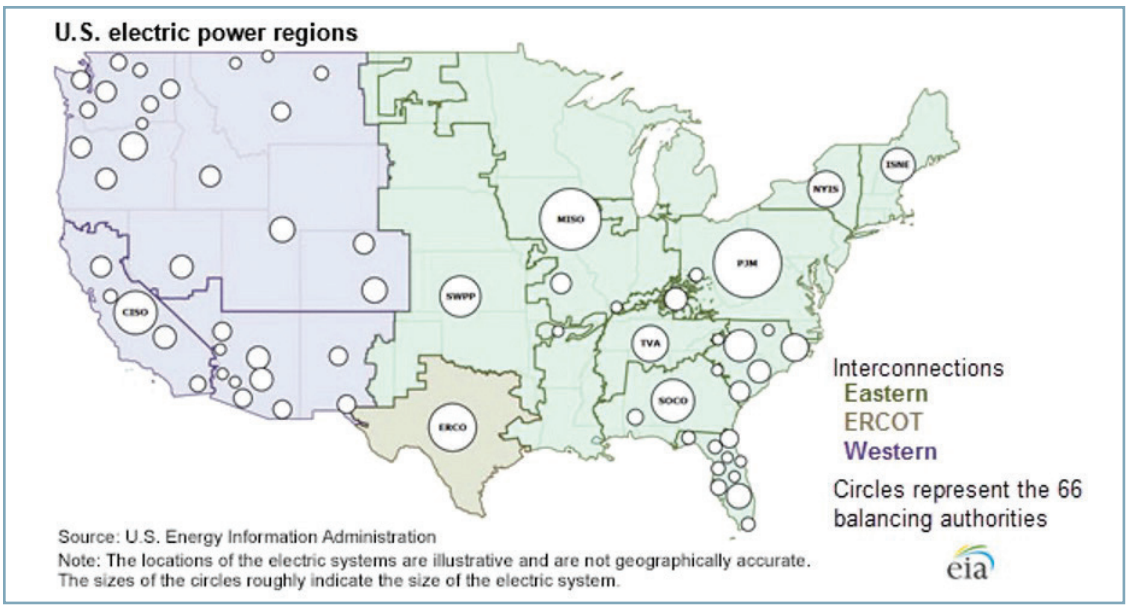
- The Eastern Interconnection, the largest grid system, encompasses regional authorities located generally east of the Rocky Mountains, including a portion of the Texas panhandle.
- The Western Interconnection encompasses the regional system operators that serve the Rockies and areas extending to the west.
- The Electric Reliability Council of Texas (ERCOT) is an independent system operator covering most of Texas.

The Eastern and Western Interconnections in the United States are also linked with the Canadian power grid. These interconnections support the reliability and resiliency of the network by providing multiple transmission routes to keep electricity moving should one system go down, whether for an unexpected outage caused by extreme weather events or for planned reliability upgrades.

How the Power Grid System Works

The power grid system consists of three components: generation, transmission and distribution. The system load — or demand from power consumers — could be considered a critical fourth component of this system.

Transmission infrastructure — composed of high-voltage lines, substations and other equipment — serves as the power highway connecting generating plants to the distribution grids that bring energy to the end users. Typical transmission voltages range from 69 kV to as high as 765 kV. As the power reaches substations connected to the distribution system, it is stepped down via transformers and other equipment to lower voltages that can safely be routed through complex circuits and feeder lines.



Source: U.S. Energy Information Administration (July 20, 2016)

Today, there are a variety of ways to generate power through nonrenewable and renewable sources. As more distributed energy resources such as solar, wind and batteries are connected to the local grid, this system is becoming far more complex. This complexity is creating many challenges as electric utilities continue to be required by regulators to maintain high levels of service reliability.

There are a variety of ways to generate electricity through nonrenewable and renewable sources.

This dramatic evolution extends to the generation side, as an increasing share of capacity is being added from renewable sources like solar, wind, hydro, biomass and geothermal. Conventional generation from coal, natural gas and nuclear power plants still provides the bulk of power supply, but that number is changing rapidly. According to the U.S. Energy Information Administration, in 2020, about 60 percent of U.S. utility-scale generation was produced from fossil fuels (coal, natural gas and petroleum), about 20 percent was from nuclear energy, and about 20 percent was from renewable energy sources.

These structural changes are resulting in a push to expand development of grids enabled with "smart technology," integrating private and public wireless telecommunications and embedding artificial intelligence in devices that can instantly detect and mitigate grid problems. Grid modernization investments amounting to billions of dollars will allow utilities to reduce electricity losses, better manage ebbs and peaks in load demand and plan outages to perform system reliability improvements.

As utilities continue down these pathways, it will open the market for additional real property rights required to maintain the infrastructure buildup into the coming years.

Problems With Our Aging Grid Infrastructure

Designed and built primarily during the 1950s, '60s and '70s, the North American power grid is aging rapidly. The challenges facing the utility industry include:

- Siting new transmission lines (getting approval of new routes and obtaining rights to the necessary land).

- Determining an equitable approach for recovering the costs of new transmission infrastructure built in one state when the improvement benefits consumers in other states.

- Expanding the network of long-distance transmission lines to connect with renewable energy resources, often located considerable distances from load centers.

- Protecting the grid from physical and cyberattacks.

Solutions Through Government Funding

To help address these challenges, the $1.2 trillion Infrastructure Investment and Jobs Act was signed into law on Nov. 15, 2021. Widely acknowledged as the largest investment in clean energy transmission and grid improvements in American history, it:

- Allocates approximately $72.5 billion for modernization of the power grid, carbon capture technology and continued development of solar, wind, hydro and clean hydrogen resources. This includes smart grid capabilities to widely interconnect power to homes, businesses and electric vehicle charging stations.
- Allocates funds for power infrastructure upgrades, including new substations and power lines to new renewable energy sources.
- Funds cybersecurity improvements to protect against threats to energy infrastructure.
- Invests in development of battery energy storage systems to offset intermittent production from renewable sources.

The Right of Way Industry is Crucial

Nothing can slow down a project quicker than delays caused by initiating or building any facility that is not within the legal rights conveyed. Our industry's expertise in identifying, educating and securing the necessary rights to construct is crucial. Our skill sets across all right of way disciplines will be tapped to provide professional services in the identification, research, appraisal, public engagement and acquisition of real property rights. These rights will be needed in fee simple, new or upgraded (supplemental) easement rights and licenses, as well as acquiring improvements.

Additionally, with the expanding network of smart technology's interface with generation, transmission, distribution and service delivery systems, including the storage of energy, it is even more important that the rights owned by the provider allow for the intended use of the rights granted.

Clearly, the right of way profession plays a vital role in this massive infrastructure effort to fortify the North American power grid for the 21st century. ✪

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