



How the Bulk Power System Works

A reliable electric grid allows for the proliferation of electronic and electric devices used for industrial production, home conveniences and life-saving technologies. A reliable electric power industry is the lifeblood of our economy and essential for the standard of living we enjoy today.

Unlike water or gas, electricity cannot be stored. It must be generated and then used immediately. Furthermore, electricity follows the “path of least resistance”, so it generally cannot be routed in a specific direction. This means generation and transmission operations in North America must be monitored and controlled in real-time, 24 hours a day, to ensure a consistent and ample flow of electricity. This requires the cooperation and coordination of hundreds of electricity industry participants.

Figure 1 depicts the basic flow of electricity: how it is created at power plants and other generating facilities and transported across high-voltage transmission and lower-voltage distribution lines to reach homes and businesses. Generation amounts must continually be adjusted to match the changing loads. All equipment must be monitored for proper operation to avoid overloading. Transformers at substations step the electric voltage up and down to efficiently deliver power to the customers. The Generation and Transmission components make up the “bulk power system”.

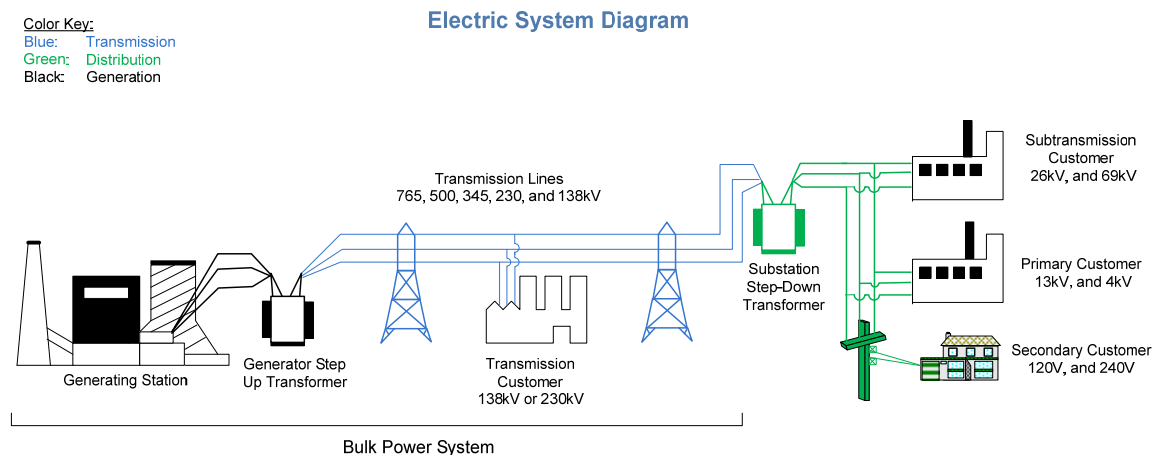


Figure 1: Electric System Diagram

* Source: [US-Canada Power System Outage Task Force](#)

The bulk power system is divided into three regional grids: (1) the Western interconnection which includes the Mountain states, Canadian provinces and the Pacific Coast; (2) the Texas interconnection; and (3) the Eastern interconnection which covers the rest of the contiguous U.S. and Canada. Regional Entities (REs) have been established by the North American Electric Reliability Corporation (NERC) to monitor and enforce compliance with reliability standards for the bulk power system.



NERC

The North American Electric Reliability Council (“NERC”) was established in 1968 to promote bulk power system reliability. With NERC becoming the international Electric Reliability Organization (“ERO”) under the Energy Policy Act of 2005 (“EPAAct 2005”) (U.S.A.), the name changed to the North American Electric Reliability Corporation.

NERC defines the **reliability** of the interconnected bulk power system in two ways:

1. **Adequacy** is the ability of the electric system to supply the aggregate electrical demand and energy requirements of customers at all times, taking into account scheduled and reasonably expected unscheduled outages of system elements.
2. **Security** is the ability of the electric system to withstand sudden disturbances such as electric short circuits or unanticipated loss of system elements.

NERC is a not-for-profit corporation, representing many stakeholders across the United States, Canada and the northern part of Mexico (see Figure 2). NERC delegates its authority to Regional Entities who carry out their responsibilities under a Delegation Agreement. The stakeholders come from all segments of the electric industry; rural electric cooperatives, investor owned utilities, state, municipal and provincial utilities, federal power agencies, independent power producers, power marketers, and end-use customers. NERC helps the bulk power owner, user, and operator work together to implement and comply with set standards for system wide reliability. An independent Board of Trustees provides leadership for NERC with oversight by the Federal Energy Regulatory Commission (“FERC”) and provincial authorities in Canada.

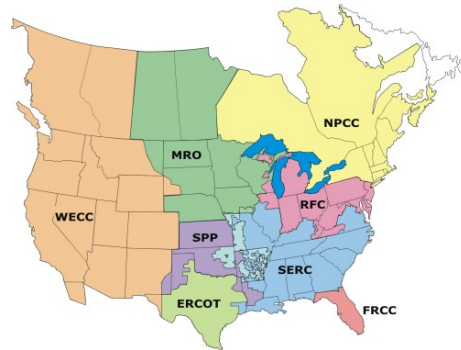


Figure 2– NERC Regional Entities



Figure 3 - The MRO Region

Midwest Reliability Organization

The Midwest Reliability Organization (MRO) is one of the Regional Entities of NERC. The MRO has processes to measure compliance with standards for assessing future reliability of the Bulk Power System. MRO has delegated authorities and responsibilities, as approved by FERC, to enforce NERC and regional reliability standards, and perform other standards-related functions assigned by NERC. MRO has non-statutory roles, which include working with their own members to forecast electricity demand, coordinate operations, share information, and plan for emergencies, in their respective regions of North America.

MRO conducts an intensive study of its planned generation resources and transmission system adequacy to ensure it will meet its region's electricity demand. NERC collects these regional studies to evaluate the reliability of the interconnected grid as a whole. MRO also monitors generation trends in the region. The generation fuel source mix is made up of fossil/coal, hydroelectric, gas/oil, nuclear, and wind/biomass. This diverse generation mix keeps our power system reliable and economical.

Conclusions

Electric reliability is essential to maintain our quality of life. NERC, MRO and other Regional Entities work to minimize the possibility of interruptions of the bulk power system by monitoring compliance with standards and assessing the adequacy of future power supply. These challenges offer opportunities for increased collaboration among all interested parties at the local, regional, and international level.