

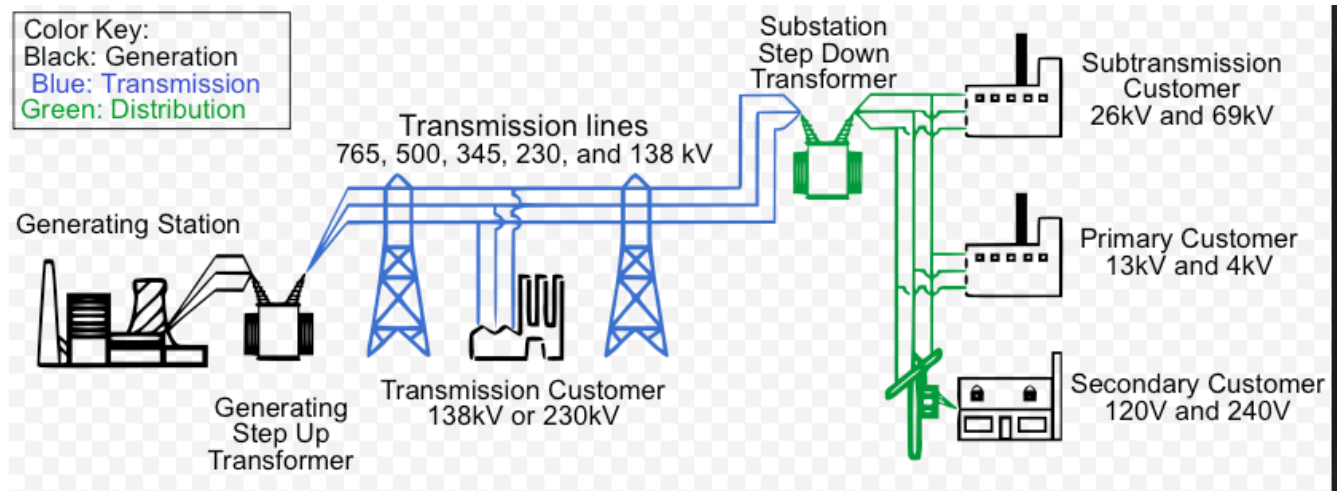
## What Is an Electric Grid?

Prepared by the Research Team for Current Issues Club June 20, 2014 Program

An **electrical grid** is an interconnected network for delivering electricity from suppliers to consumers. It consists of generating stations that produce electrical power, high-voltage transmission lines that carry power from distant sources to demand centers, and distribution lines that connect individual customers. Power generation stations (generators, dams wind farms, etc.) are often far from heavily populated areas. They are often quite large to take advantage of economies of scale. The electricity that is generated is stepped up to a higher voltage at the connection to the transmission network.

The transmission network moves the power to wholesale customers (usually a company that owns the local distribution network), sometimes across international boundaries.

On arrival at a substation, power will be stepped down from a transmission level voltage to a distribution level voltage. From the substation, it enters the distribution wiring. Finally, at the service location, the power is stepped down from the distribution voltage to the required service voltage(s).



The Electricity (Supply) Act of 1926 created the national electricity grid in the U.S. This national interconnected electrical system, which began operation in 1938, standardized the nation's electricity supply and established the first synchronized AC grid.

The primary benefit of having national and regional electrical grids is sharing peak electrical load coverage and backup power when local and regional failures occur. Since the 1930s, electric utilities have been categorized as “public goods”, along with gas, water, and telephone services, giving governments regulatory oversight of their operations. The *Golden Age of Regulation* lasted for more than 60 years. However, the Energy Policies Act of 1992 began the deregulation of electric utilities by creating wholesale electric markets. The Act required transmission line owners to allow electric generation companies *open access* to their networks. This effort to create competition in power generation led to a major restructuring of the electric industry. Electric utilities no longer needed to be vertical monopolies, with a single company handling generation, transmission and distribution. Open access to transmission lines allowed the three stages to be split among various companies, in an effort to promote competition. The Energy Policy Act of 2005 provided incentives and loan guarantees for alternative energy production and advanced innovative technologies that avoided greenhouse emissions.

Electric utilities across regions are many times interconnected to allow for a variety of advantages. First, interconnecting electric utilities allows for economies of scale. Second, utilities can draw surplus power from a different region to diversify their loads and ensure continuing, reliable power. Interconnection also provides regions with potential access to cheap bulk energy from different sources. For example, one region may be producing cheap hydropower during high water seasons, but in low water seasons, another area may be producing cheaper power through wind, allowing both regions to access cheaper energy sources from one another during different times of the year. Neighboring utilities also help others to maintain the overall system frequency and also help manage tie transfers between utility regions. This interconnected electrical grid provides customers with “reliability” in terms of access to electrical power.

## Texas Electric Grid

- Why This Matters

Texas has electricity consumption of \$24 billion a year, the highest among the U.S. states. Its annual consumption is comparable to that of Great Britain and Spain, and if the state were an independent nation, its electricity market would be the 11th largest in the world.

- Overview of North American grid

There are three grids in the Lower 48 states: the Eastern Interconnection, the Western Interconnection—and Texas, though not all of Texas. El Paso, the panhandle and parts of east Texas are outside the Texas Grid.

- Why Texas is (almost) separate

During the First World War, Texas utilities began to link themselves together. These ties, and the accompanying transmission network, grew further during the Second World War, when several Texas utilities joined together to form the Texas Interconnected System, which allowed them to link to the big dams along Texas rivers and also send extra electricity to support the ramped-up factories aiding the war effort. The Texas Interconnected System had another priority: staying out of the reach of federal regulators. By not crossing state lines, Texas utilities avoided being subjected to federal rules regulating power companies put in place in the 1930s.

- What deregulation in Texas did to change the structure of electric power distribution

The law eliminated the old monopolies and created three distinct divisions: generators, which produce the energy; transmission companies, which transport the electricity to people's homes; and retailers, which buy electricity on the wholesale market and resell it to residents and small businesses. Part of the problem is that breaking up the old monopolies created a far more complicated system for the state to oversee. The wholesale market in which the generators participate is managed by the nonprofit ERCOT, which is itself overseen by the Public Utility Commission and the Legislature. The transmission companies are still directly regulated by the PUC, which must approve the rates they charge retailers. The PUC also oversees more than one hundred retailers, who compete against one another by offering customers a dizzying array of contract terms and rates. In other words, "deregulation" is a misnomer. Texas has a hybrid of regulated and deregulated markets, a mishmash that requires more government involvement and bureaucracy than the old monopoly system.

- What deregulation was intended to do

It was supposed to result in a robust market, thriving with competition, which would drive down prices for consumers, unleash a host of twenty-first-century innovations, and boost reliability by encouraging newer—and greener—generating plants. Texas, it was claimed, would become the envy of the nation for its cheap and abundant power, and the companies involved would make fat profits in the process.

- What actually happened

According to a recent analysis by the Texas Coalition for Affordable Power, deregulation cost Texans about \$22 billion from 2002 to 2012. And residents in the deregulated market pay prices that are considerably higher than those who live in parts of the state that are still regulated. For example, TCAP found that the average consumer living in one of the areas that opted out of deregulation, such as Austin and San Antonio, paid \$280 less in 2012 than consumers in the deregulated areas. Over the course of a decade, those savings have topped \$4,500 per household. Things haven't gone so well for some power companies either. On April 29, 2014, the state's largest integrated power company, Energy Futures Holdings, filed for bankruptcy. EFS, successor to the north Texas energy monopoly, was created in the largest leveraged buyout in US history. The company fell afoul of the rate structure set by the Public Utilities Commission. The structure was based on the cost of generation with natural gas, which at the time of EFS's creation was more expensive than generation with coal. When gas prices plummeted, EFS, which generated most of its power with coal, was caught between a rock and bankruptcy.

- Prospects for the future

Electricity is still relatively cheap in Texas. As of 2012, Texas residential electricity rates ranked 31st in the United States but average monthly residential electric bills in Texas were the 5th highest in the nation due to the heavy use of electricity in both heating and cooling in Texas. Compared to the other grids, Texas runs much closer to capacity. In the summer of 2011, Texas used 98% of its capacity and projections through 2021 show Texas as being much closer to capacity than other regions.