When were power poles invented

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Electric power transmission, the tools and means of moving electricity far from where it is generated, date back to the late 19th century. They include the movement of electricity in bulk (formally called "transmission") and the delivery of electricity to individual customers ("distribution"). In the beginning, the two terms were used interchangeably.

High voltage was of interest to early researchers working on the problem of transmission over distance. They knew from elementary electricity principle that the same amount of power could be transferred on a cable by doubling the voltage and halving the current. Due to Joule"s Law, they also knew that the power lost from heat in a wire is proportional to the square of the current traveling on it, regardless the voltage, and so by doubling the voltage, the same cable would be capable of transmitting the same amount of power four times the distance.

The idea of investing in a central plant and a network to deliver energy produced to customers who pay a recurring fee for service was familiar business model for investors: it was identical to the lucrative gaslight business, or the hydraulic and pneumatic power transmission systems. The only difference was the commodity being delivered was electricity, not gas, and the "pipes" used for delivering were more flexible.

Grand Rapids Electric Light & Power Company, established in March 1880 by William T. Powers and others, began operation of the world"s first commercial central station hydroelectric power plant, Saturday, July 24, 1880, getting power from Wolverine Chair and Furniture Company"s water turbine. It operated a 16-light Brush electric dynamo lighting several storefronts in Grand Rapids, Michigan.[13][14] It is the earliest predecessor of Consumers Energy of Jackson, Michigan.

In December 1880, Brush Electric Company set up a central station to supply a 2-mile (3.2 km) length of Broadway with arc lighting. By the end of 1881, New York, Boston, Philadelphia, Baltimore, Montreal, Buffalo, San Francisco, Cleveland and other cities had Brush arc lamp systems, producing public light well into the 20th century.[15] By 1893 there were 1500 arc lamps illuminating New York streets.[16]

Availability of large amounts of power from diverse locations would become possible after Charles Parsons" production of turbogenerators beginning 1889. Turbogenerator output quickly jumped from 100 kW to 25 megawatts in two decades.[22] Prior to efficient turbogenerators, hydroelectric projects were a significant source of large amounts of power requiring transmission infrastructure.

By allowing multiple generating plants to be interconnected over a wide area, electricity production cost was reduced. The most efficient available plants could be used to supply the varying loads during the day. Reliability was improved and capital investment cost was reduced, since stand-by generating capacity could be

shared over many more customers and a wider geographic area. Remote and low-cost sources of energy, such as hydroelectric power or mine-mouth coal, could be exploited to lower energy production cost.[43]

The first transmission of three-phase alternating current using high voltage took place in 1891 during the international electricity exhibition in Frankfurt. A 15 kV transmission line connected Lauffen on the Neckar and Frankfurt am Main, 175 km (109 mi) apart.[33][44]

In 1882, the German Miesbach-Munich Power Transmission used 2kV DC over 57 km (35 mi). In 1889, the first long-distance transmission of DC electricity in the United States was switched on at Willamette Falls Station, in Oregon City, Oregon.[45] In 1890, a flood destroyed the power station. This unfortunate event paved the way for the first long-distance transmission of AC electricity in the world when Willamette Falls Electric company installed experimental AC generators from Westinghouse in 1890.

Initially transmission lines were supported by porcelain pin-and-sleeve insulators similar to those used for telegraphs and telephone lines. However, these had a practical limit of 40 kV. In 1907, the invention of the disc insulator by Harold W. Buck of the Niagara Falls Power Corporation and Edward M. Hewlett of General Electric allowed practical insulators of any length to be constructed for higher voltages.