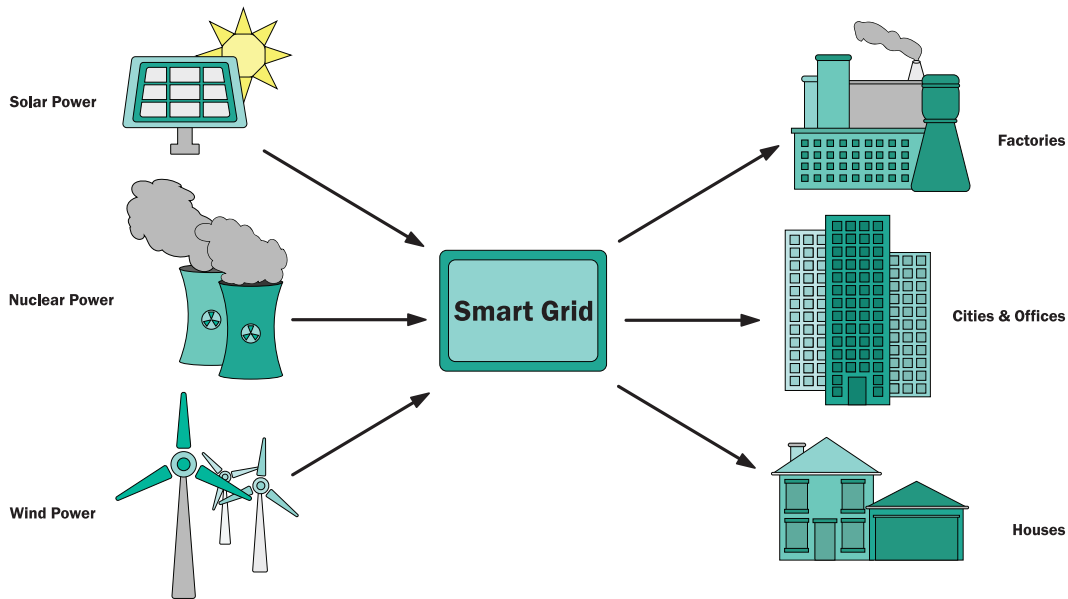


CONCEPT On the grid refers to the interconnected system of power generation, transmission, and distribution infrastructure that delivers electrical power to homes, businesses, and other consumers. The grid typically consists of large power plants that generate electricity and a network of transmission lines that transport the electricity over long distances to substations. From there, the electricity is distributed through a network of distribution lines to individual customers.



BACKGROUND

The power grid has a rich history that dates back to the late 1800s, when the first electrical power systems in the United States were being developed. At the time, the main discussion centered on should the distribution system be based on AC (alternating current) power or DC (direct current) power. AC power won out as it is more readily distributed over longer distance. Over the next century, the power grid evolved into a vast and interconnected network of power plants, transmission lines, substations, and distribution systems, delivering electrical power to consumers around the world. The grid remains a critical component of modern society, supporting a wide range of applications and enabling innovation and progress.

Make sure it measures up

REAL WORLD CONNECTIONS

For communities, the power grid is a critical component of infrastructure, providing the electrical power necessary to support homes, businesses, and other applications. The power grid also presents opportunities for economic development, as the development of renewable energy sources and smart grid technologies creates new jobs and investment opportunities.

For public power entities, the mission is to provide reliable, affordable, and sustainable electrical power to communities and customers.

TERMINOLOGY

POWER GENERATION: The process of producing electrical power using various sources of energy, such as coal, natural gas, nuclear, hydroelectric, solar, and wind.

TRANSMISSION LINES: The network of high-voltage power lines that transport electrical power over long distances from power plants to substations.

SUBSTATIONS: Facilities that transform the high-voltage electricity received from transmission lines into lower-voltage electricity suitable for distribution to consumers.

DISTRIBUTION LINES: The network of low-voltage power lines that deliver electricity from substations to individual customers, such as homes, businesses, and factories.

TRANSFORMERS: Devices that increase or decrease the voltage of electricity, depending on the requirements of the power system.



APPLICATION

A smart grid system is an advanced power grid that incorporates digital technologies and real-time data analysis to optimize the performance and efficiency of the grid. In a smart grid, sensors and devices monitor the flow of electricity, providing real-time data on power demand and energy consumption. This data is analyzed using advanced algorithms and machine learning techniques, allowing operators to optimize the performance of the grid and minimize energy losses. One specific example of a smart grid application is demand response, where customers are incentivized to reduce their energy consumption during times of peak demand. Overall, smart grid systems and demand response applications improve energy efficiency, reduce energy waste, and ensure reliable power delivery.



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