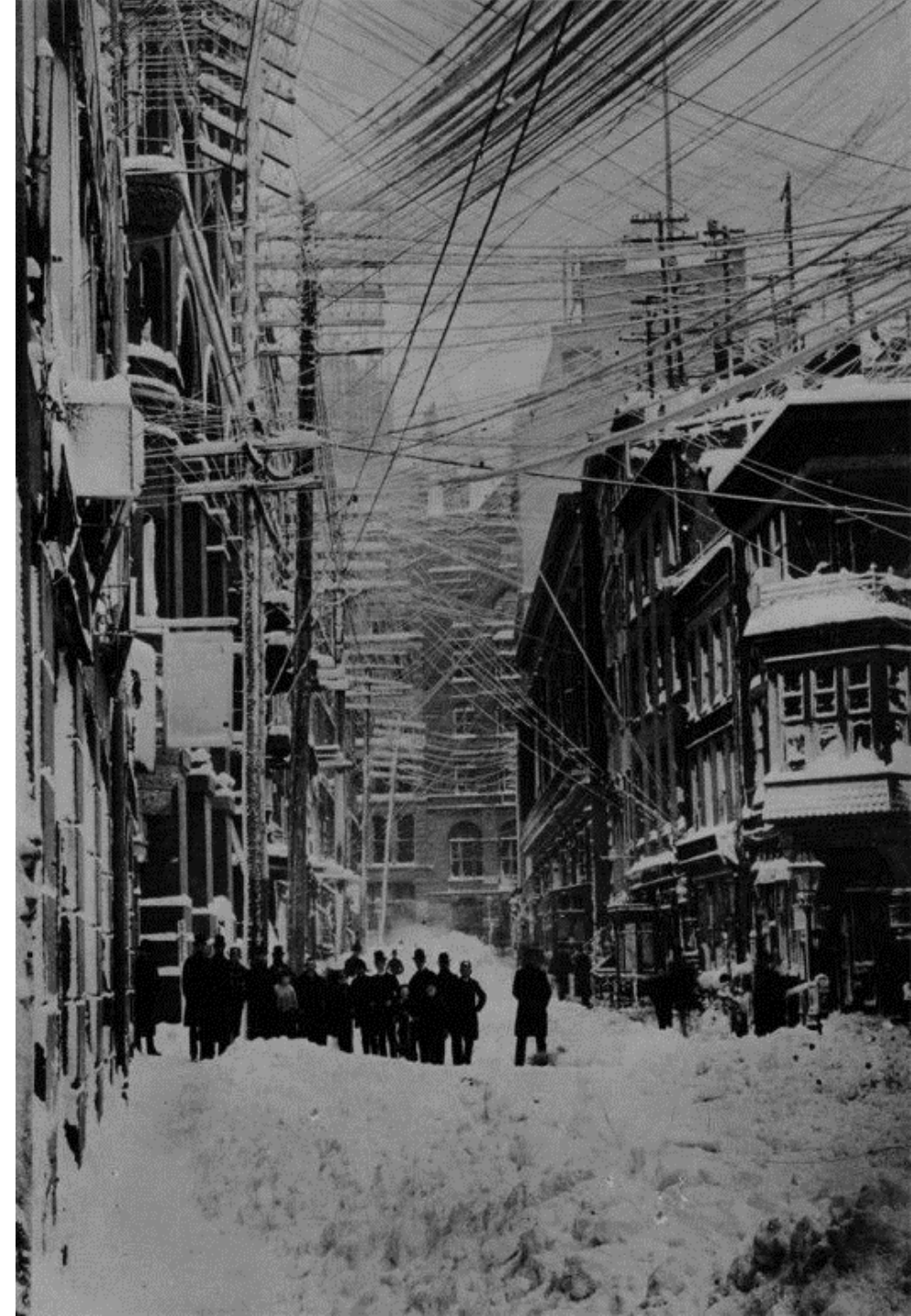
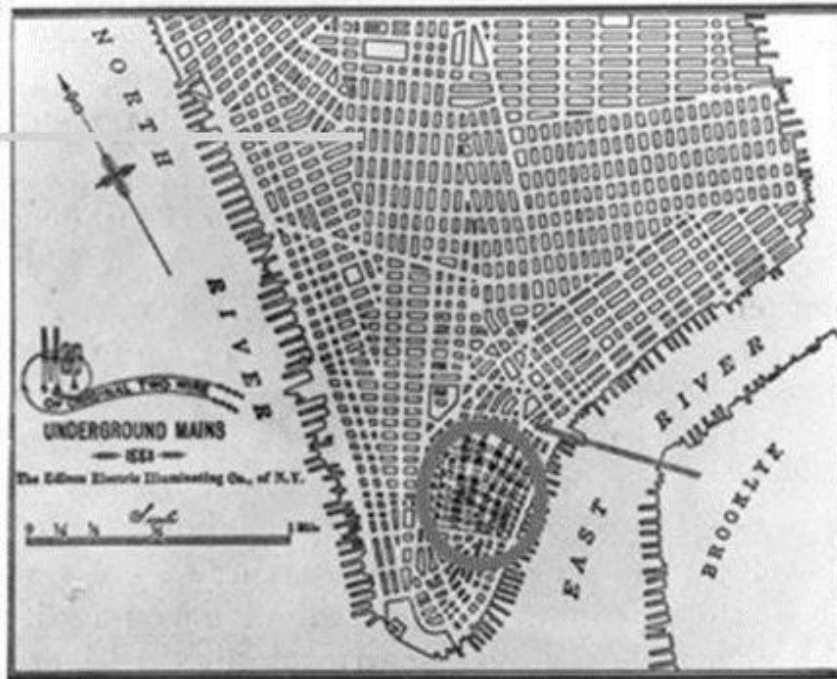


**The city that
never sleeps**

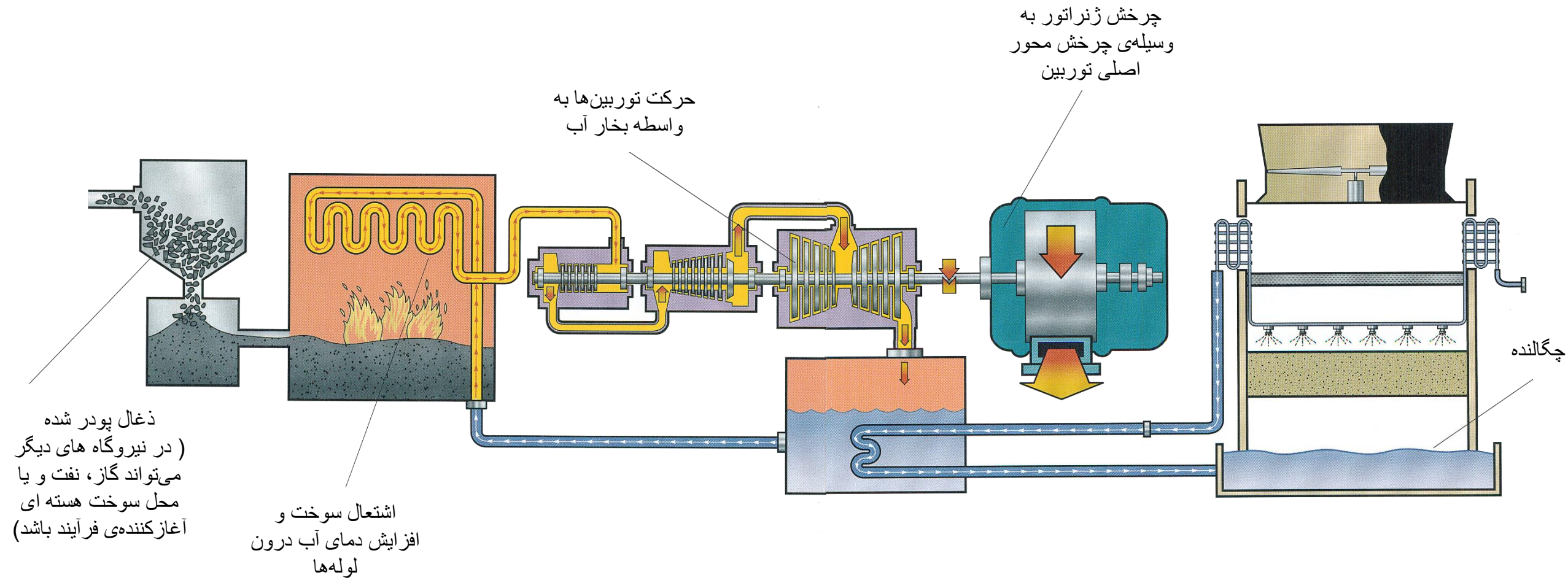


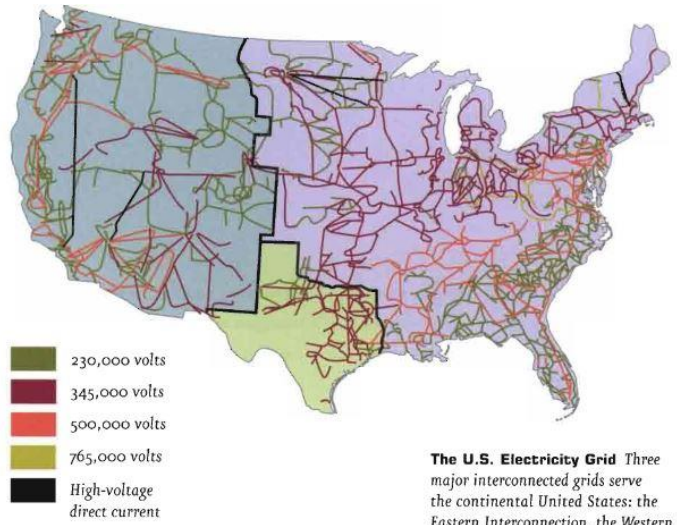
The great blizzard of 1888 \triangleleft

The Pearl street ∇



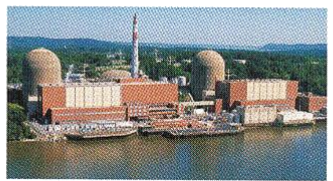
Generation



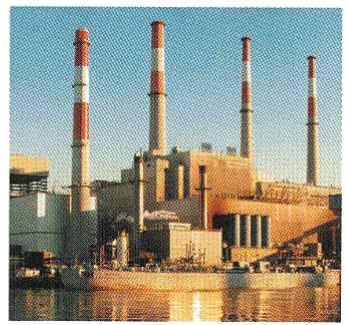


The U.S. Electricity Grid Three major interconnected grids serve the continental United States: the Eastern Interconnection, the Western Systems Coordinating Council Interconnection, and the Electric Reliability Council of Texas.

New York Power Generation



- موجود
- پیشنهادی
- < 100 MW
- < 500 MW
- < 1000 MW
- < 5000 MW

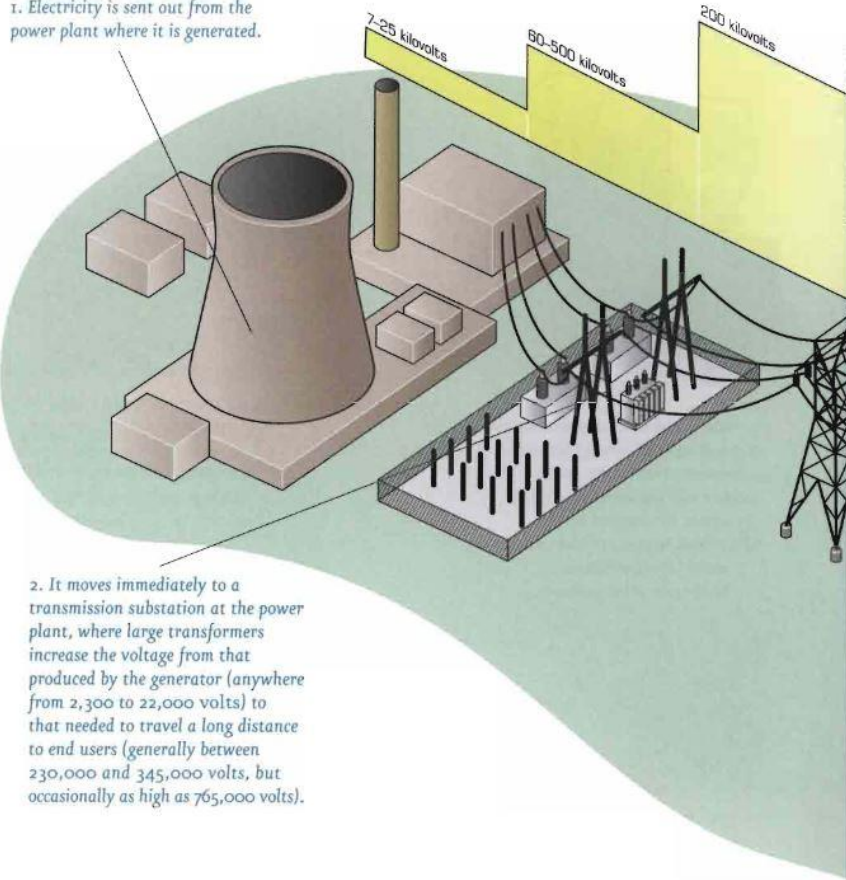


Distribution

Power Distribution

1. Electricity is sent out from the power plant where it is generated.

2. It moves immediately to a transmission substation at the power plant, where large transformers increase the voltage from that produced by the generator (anywhere from 2,300 to 22,000 volts) to that needed to travel a long distance to end users (generally between 230,000 and 345,000 volts, but occasionally as high as 765,000 volts).



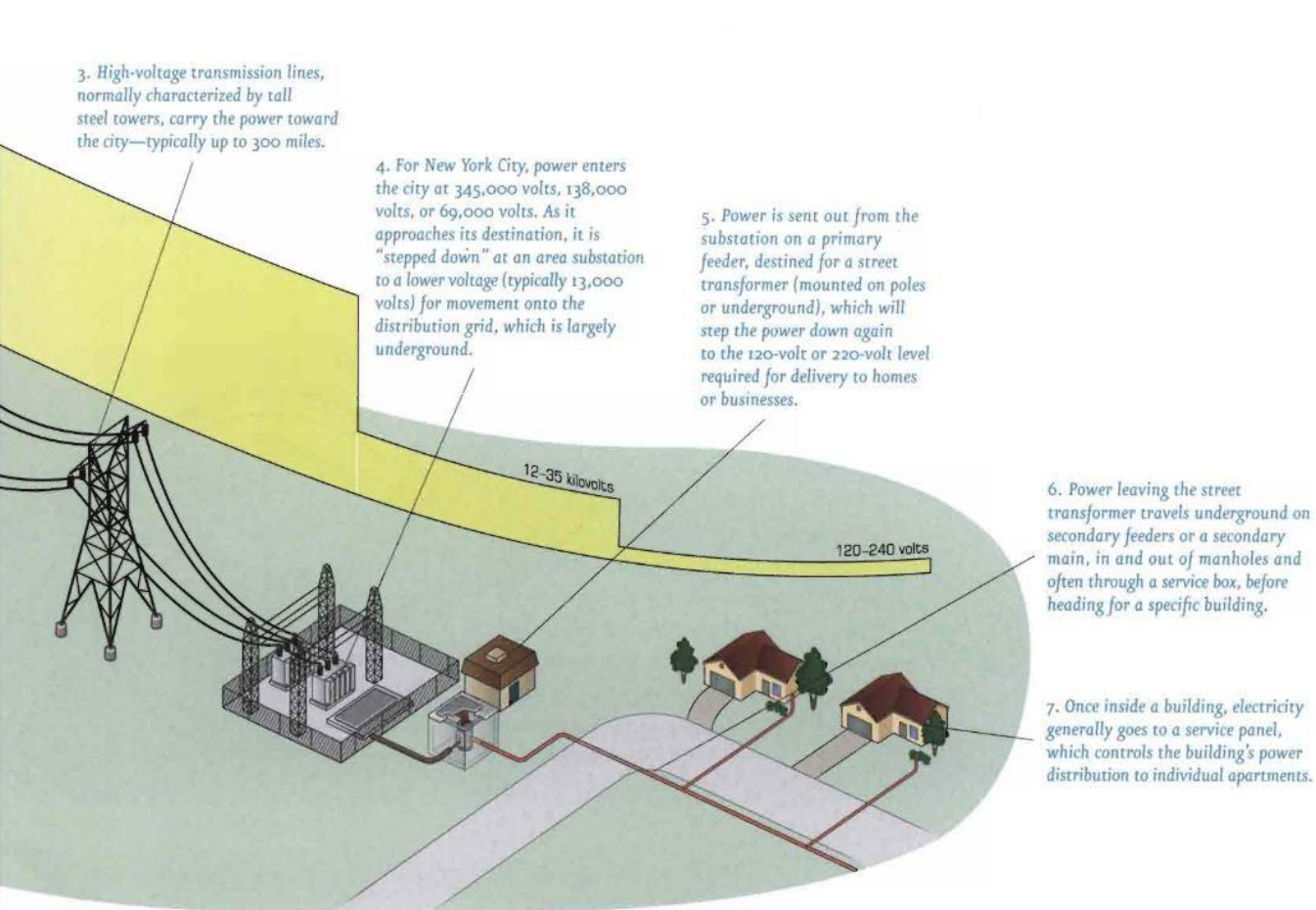
3. High-voltage transmission lines, normally characterized by tall steel towers, carry the power toward the city—typically up to 300 miles.

4. For New York City, power enters the city at 345,000 volts, 138,000 volts, or 69,000 volts. As it approaches its destination, it is "stepped down" at an area substation to a lower voltage (typically 13,000 volts) for movement onto the distribution grid, which is largely underground.

5. Power is sent out from the substation on a primary feeder, destined for a street transformer (mounted on poles or underground), which will step the power down again to the 120-volt or 220-volt level required for delivery to homes or businesses.

6. Power leaving the street transformer travels underground on secondary feeders or a secondary main, in and out of manholes and often through a service box, before heading for a specific building.

7. Once inside a building, electricity generally goes to a service panel, which controls the building's power distribution to individual apartments.



Blackouts and Brownouts

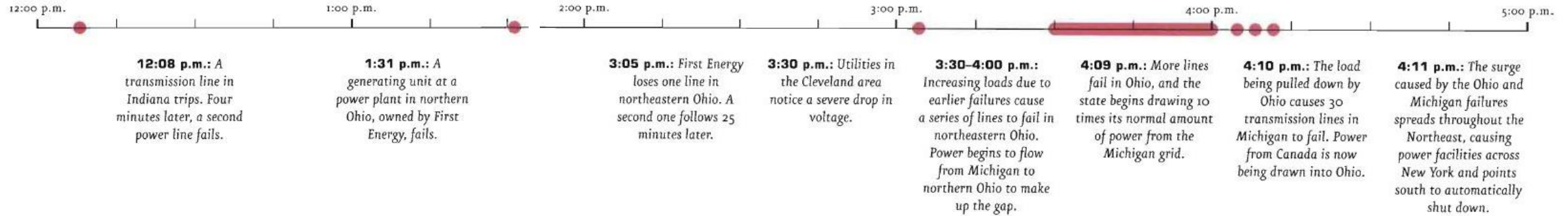


New York blackouts

- 1965
- 1977
- 2003
- 2019



Northeast blackout of 2003



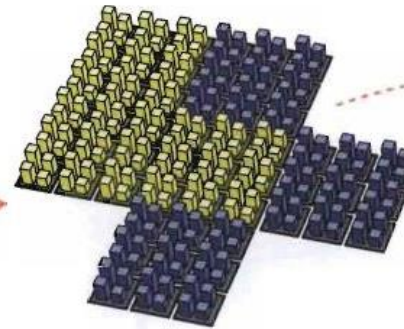
Returning to Power



1. A power plant must be brought on line slowly, first producing power in small increments. Starting fossil fuel and nuclear plants can take time, as considerable energy is needed to turn enough water to steam in order to begin generating power.



2. As small amounts of electricity are produced, limited numbers of customers may be brought on line by activating certain feeder lines.



3. Electricity demand is added, neighborhood by neighborhood, until roughly half of the generator's capacity is being produced.

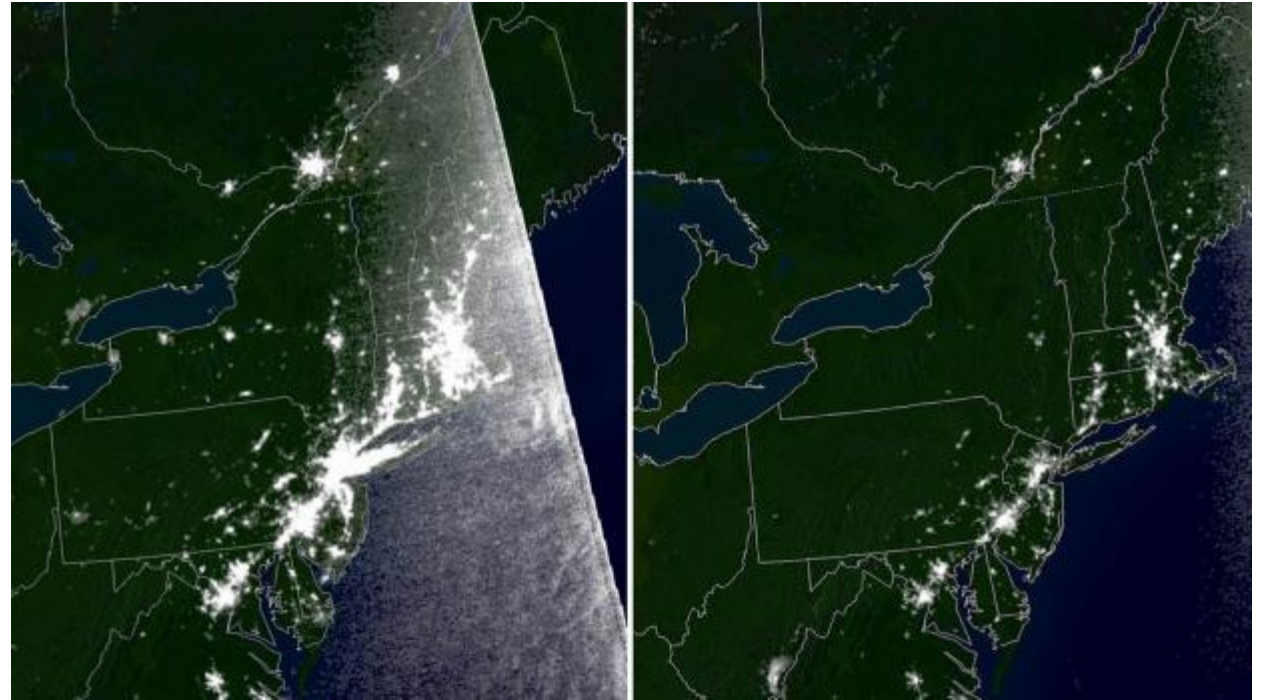


4. At that point, the plant can be connected first to other plants in the area producing at a similar level and then to the wider regional and state grids.

Northeast blackout of 2003



Map of August 14th, 2003 blackout. Source: U.S. Department of Energy, August 2003



Source: imagery provided by the national oceanic and atmospheric administration and the defense meteorological satellite program

Northeast blackout of 2003



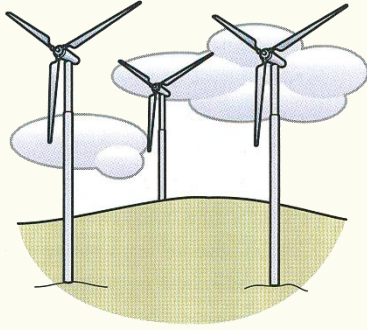
How to manage peaks

- Increase import
- Maximum outcome
- Policies
- Brownouts
- Small scale blackouts

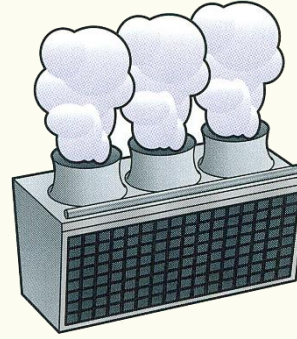


New York Independent System Operator (NYISO) control center

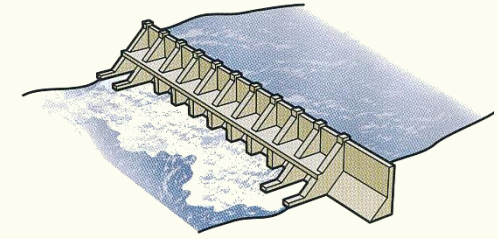
Alternative energy sources



Wind



Geothermal



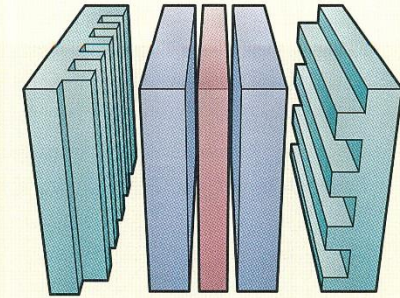
Hydroelectric



Solar



Bio mass



Fuel cells

ENERGY POOL