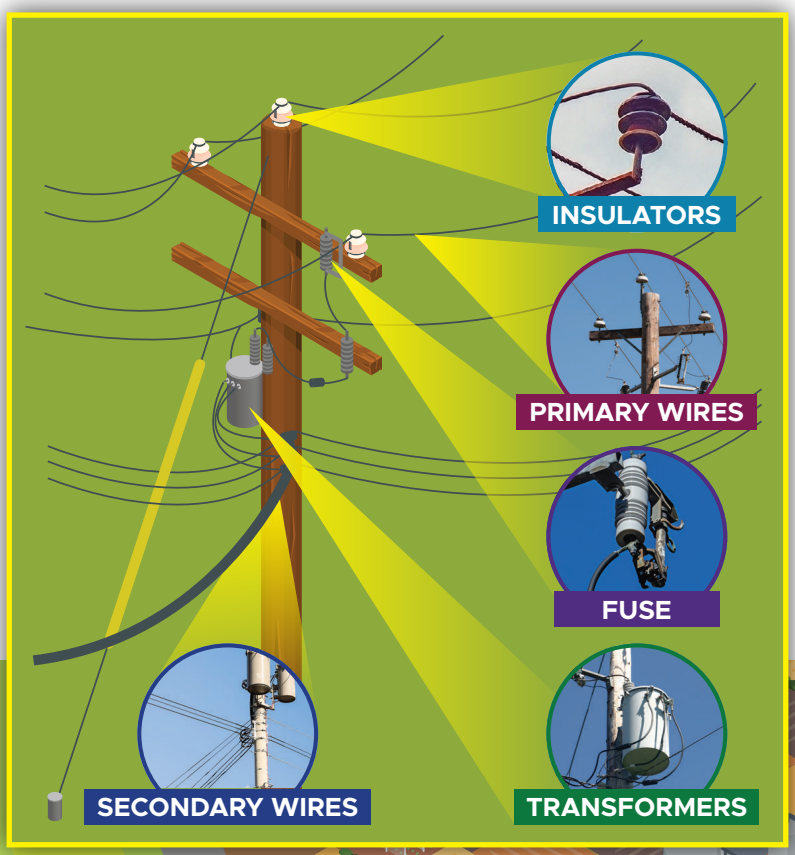
GRID MODERNIZATION INITIATIVE
U.S. Department of Energy

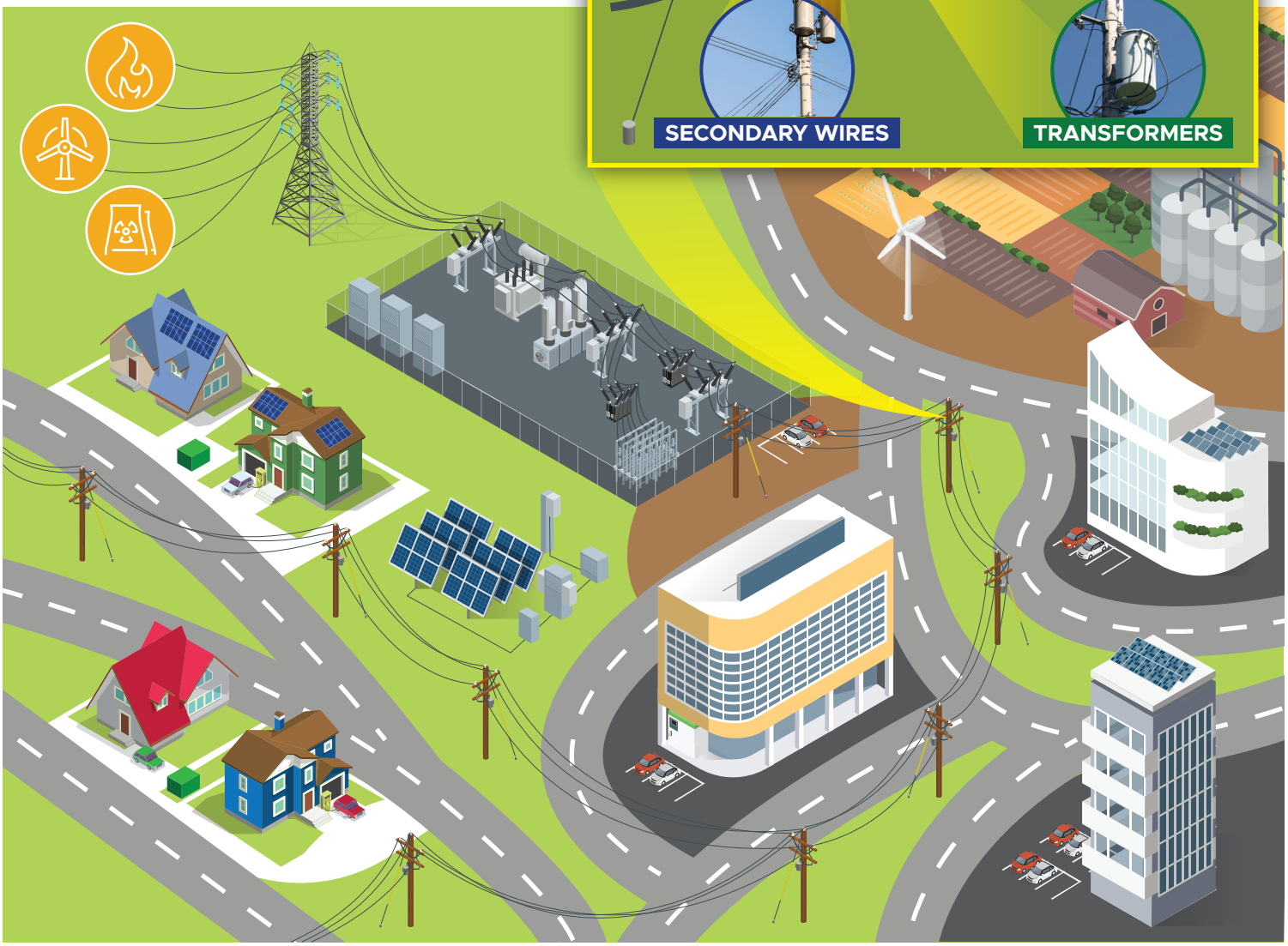
DISTRIBUTION SYSTEM

The distribution system refers to the medium voltage system (typically up to 35 kV) which distributes electricity to and from customer houses and businesses. This system includes physical equipment as well as information, communications, and operational technologies.

Utility pole components

- **INSULATORS** are non-conducting supports which prevent energized wires from coming in contact with or arcing to the utility pole.
- **PRIMARY WIRES**, also called conductors, are on top of the pole and carry medium voltage electricity from a substation to the transformer.
- A **FUSE** is housed in a cutout and interrupts power flow when there is an overcurrent in the line.
- Service or secondary **TRANSFORMERS** step voltage down from primary distribution levels to lower voltage secondary levels for customer use. Transformers can also be housed in a steel box on the ground if the electric wires are underground.
- **SECONDARY WIRES** carry lower voltage electricity from the transformer to the home or business where electricity is used.





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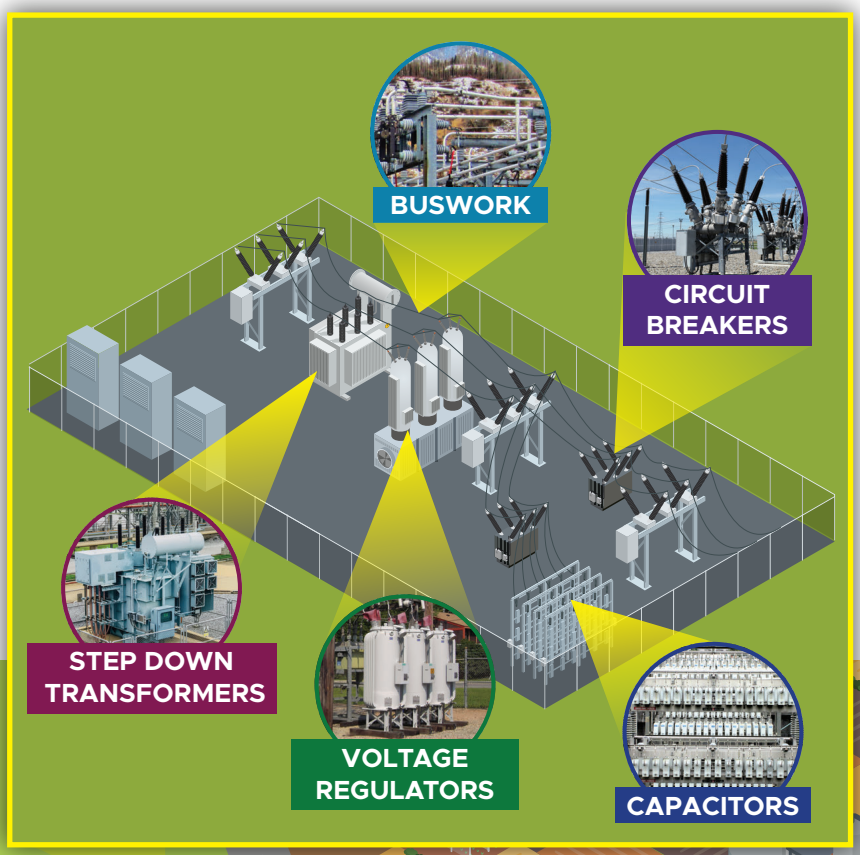
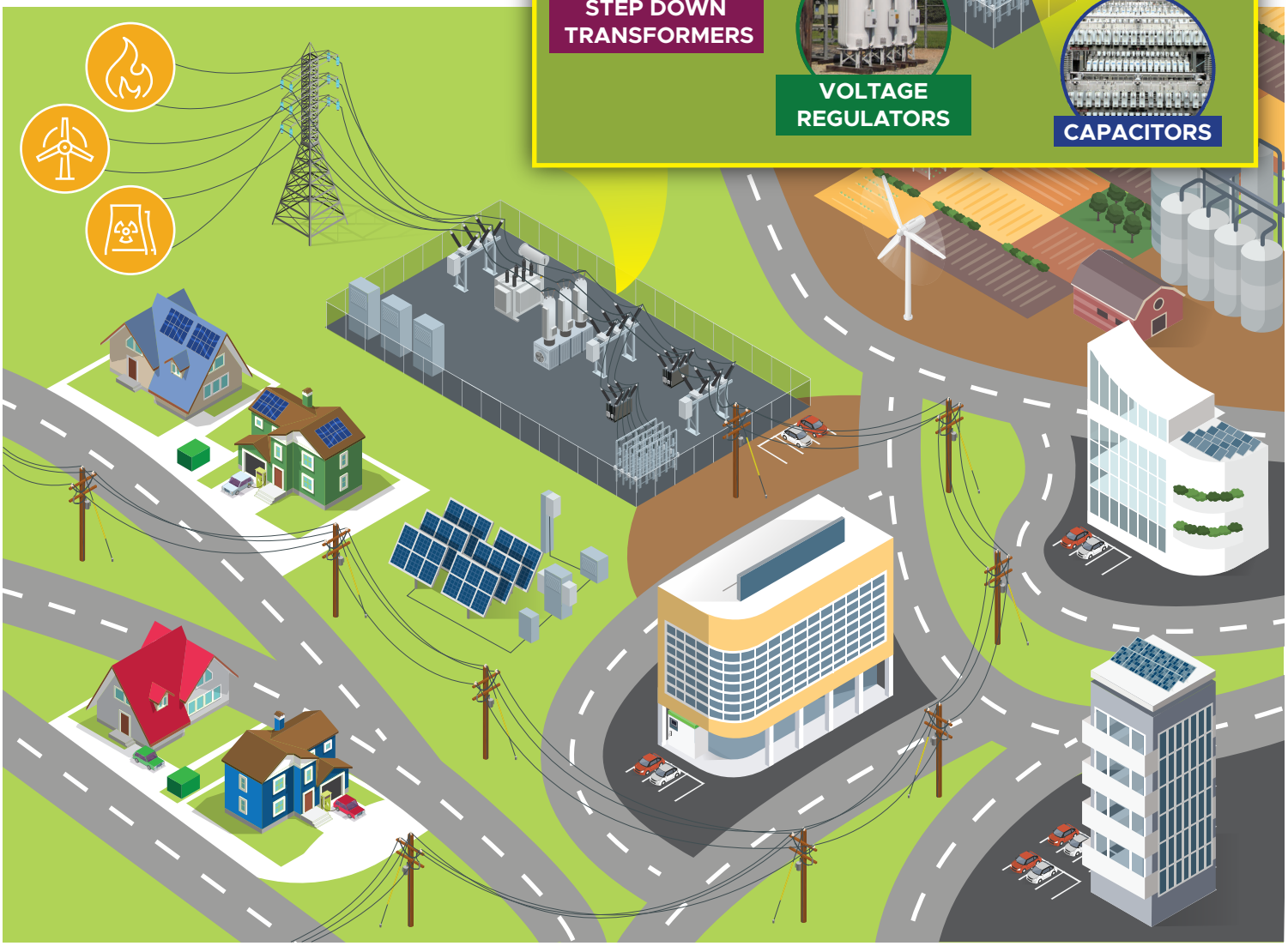
DISTRIBUTION SUBSTATION

A distribution substation is where high-voltage electricity from the transmission system or sub-transmission system is converted to lower-voltage electricity for the distribution system.

Substation components

- **BUSWORK** consists of electrical conductors that interconnect electrical equipment.
- **CIRCUIT BREAKERS** protect a transformer from damage by interrupting the current when a fault in the line is detected.
- **VOLTAGE REGULATORS** adjust output voltage within a specified range regardless of changes in input voltage or load conditions.
- **STEP DOWN TRANSFORMERS** convert voltage from transmission or sub-transmission levels down to levels appropriate for local distribution.
- **CAPACITORS** maintain or increase voltage in power lines and improve efficiency of the system by compensating for inductive losses.