TXU Electric Delivery

Pathway of Power

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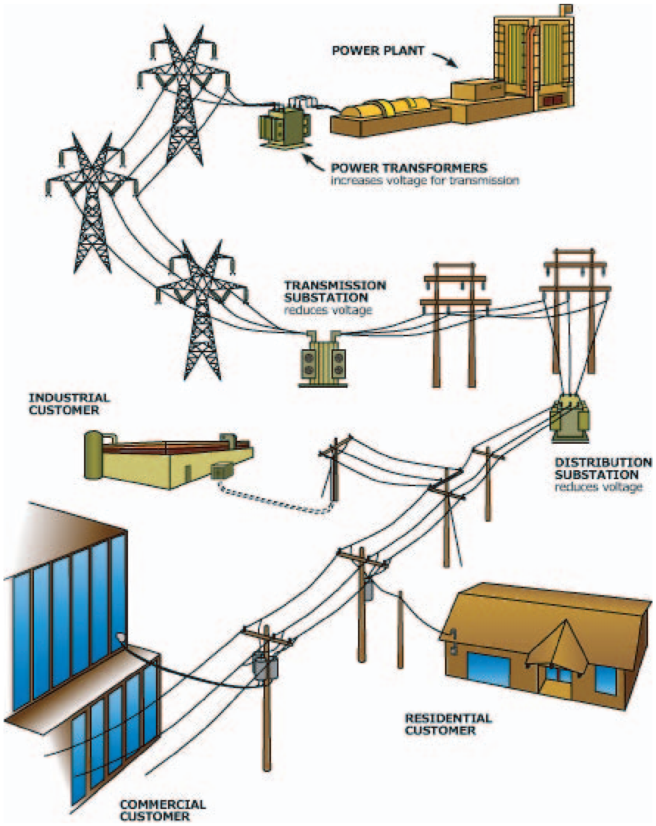


Each day, billions of watts of electricity are produced and distributed to more than two million customers within the TXU system. The network that carries electricity from power plants to customers is one of the most basic parts of the electric utility industry. It's a process that most people take for granted because electricity is there when needed.

Plant: Electricity & Generation

Electricity is the flow of electrons, tiny particles found in all atoms. Atoms of some metals such as copper and aluminum have electrons that are easily pushed and guided into a stream. When a coil of metal wire is turned near a magnet, electricity will flow in the wire (see diagram #1). This same principle is used in power plants to make large amounts of of electricity. In the TXU system, power plants have the capability of making more than 17 billion watts of electricity. All the plants in our system are called fossil fuel plants. Fossil fuels – lignite, natural gas and oil – come from decayed plant and animal life that was buried in the earth millions of years ago.

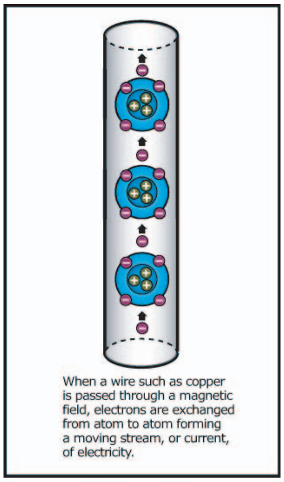
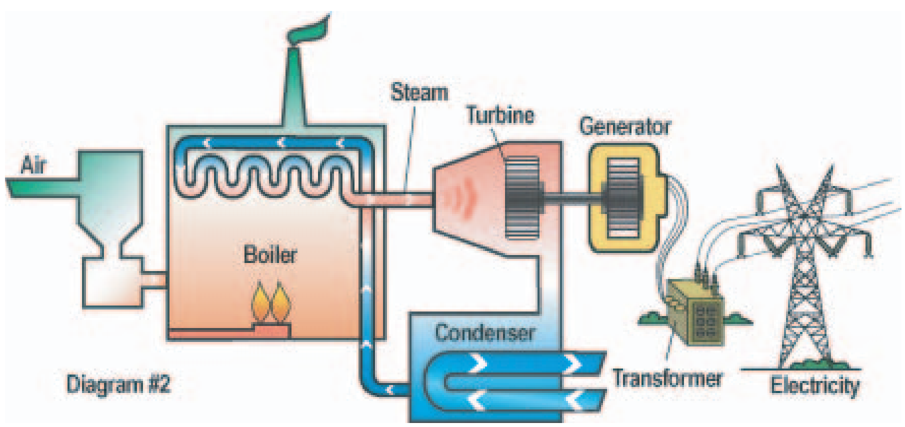


Diagram #1

To produce commercial electricity, a fossil fuel is ignited in the furnace section of the boiler. Water, which is piped through the boiler in large tubes, is superheated and converted to steam. The steam turns turbine blades that are connected by a shaft to a generator. The generator, a huge electromagnet surrounded by coils of wire, produces electricity when it rotates. (see diagram #2).



The push, or pressure, forcing electricity from the generator is measured in volts. The flow of electricity is called current and is similar to water flowing in a stream. Electrical current is measured in amperes (amps).

If you multiply amps and volts, you get watts. A watt is a measure of the amount of work electricity can do. Electrical appliances, light bulbs and motors have certain watt requirements depending on the task they are expected to perform. For convenience, we usually use kilowatts (one kilowatt is 1,000 watts) when speaking about electricity.

Kilowatts of electricity generated in a power plant are sold in units called kilowatt-hours (kwh). For example, a 100-watt light bulb left on for ten hours uses one kilowatt-hour of electricity. A typical residential customer uses about 12,000 kwh during the year.

Electricity is generated at voltages ranging from 13,000 to 24,000 volts. After electricity is made, devices called transformers increase the voltage to hundreds of thousands of volts for transmission – 345 kilovolts(kv) – an economical way of shipping large amounts of electricity from the plant to key locations within the system.

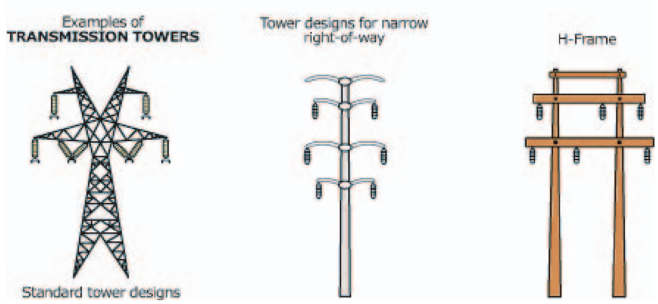
Once the electricity is given enough push (voltage) to go a long distance, it's ready to begin its journey along conductors. Conductors are cables made up of many strands of wire. A continuous system of conductors through which electricity flows is called a circuit.

Transmission System

High-voltage electricity is moved over distance through the transmission system. Transmission lines are interconnected to form a network. Should one line fail, another will take over the electric load. Transmission lines can be overhead or underground.

All transmission lines carry three-phase current, or three separate streams of electricity traveling along three separate conductors (see diagram #3).

Diagram #3



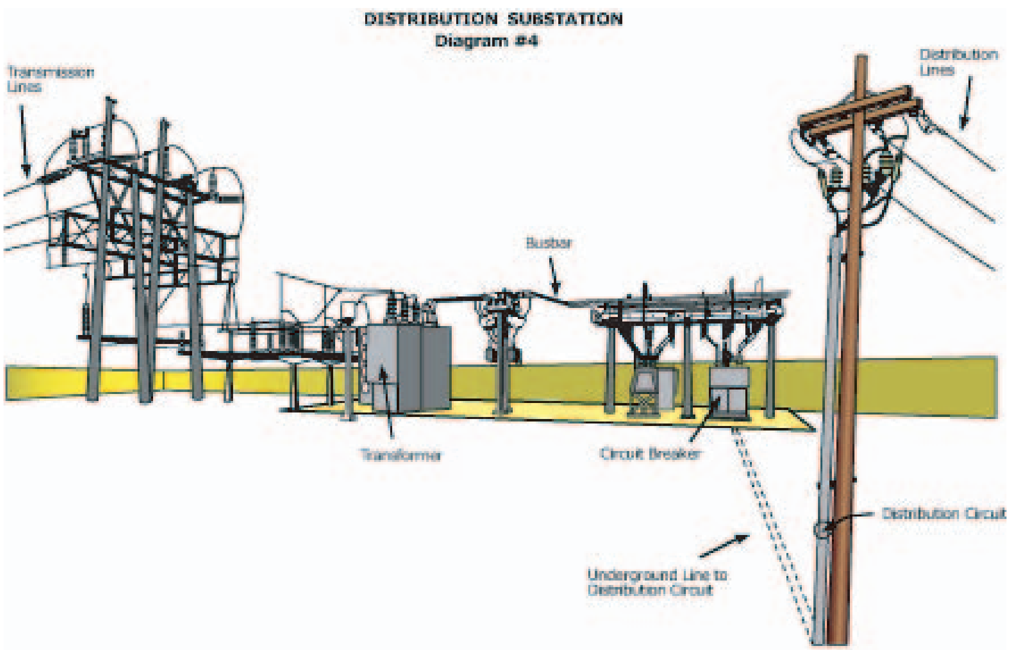
The transmission system is interconnected with transmission systems of other electric utility companies in the state. If we need an emergency supply of electricity or if another company needs our electricity, we can send or receive power through a statewide network of transmission lines.

Substation

Before electricity can be delivered to customers, it must travel through a distribution substation. Distribution substations, located near where electricity will be used, monitor and adjust circuits within the system.

Substations are fenced-in yards containing switches, transformers and other electrical equipment. The main purpose of distribution substations is to lower transmission voltage to 24,900 volts or less to feed the distribution system.

Relays are mechanical switches that will cause a substation breaker to shut off power if it senses a higher than normal current. Within the substation, rigid tubular or rectangular bars, called busbars, or buses, are used as conductors to feed power to two or more circuits. Circuit breakers automatically disconnect power to a circuit in the event of a failure or interruption in an electric line (see diagram #4).



Distribution System

Once voltage has been lowered at the substation, the electricity is ready to be transported to homes and businesses through a distribution system.The distribution system is made up of poles and wire you see in neighborhoods. Conductors called feeders reach out in all directions from the substation carrying electricity to our customers. At key locations along the distribution system, voltage is lowered by distribution transformers to the level needed by customers (see diagram #5).

Reclosers are located throughout the distribution system to prevent a permanent outage due to a temporary fault (see diagram #6).

Reclosers function as circuit breakers isolating permanent faults from the rest of the circuit. A recloser will automatically restore the circuit when power is lost due to a temporary fault. If an outage occurs, reclosers will localize the fault in order to minimize the number of customers affected. Devices called regulators maintain the voltage depending on customer demand for electricity (see diagram #7).

Capacitors, which are found in substations and on poles, momentarily store electricity to help

DIAGRAM #5

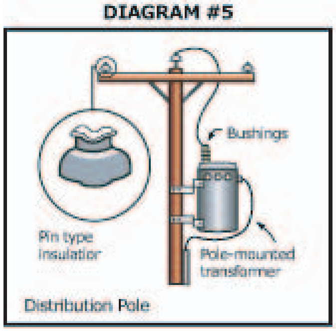


DIAGRAM #6

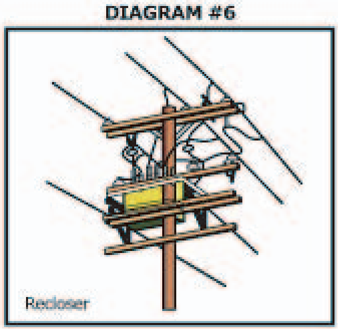


DIAGRAM #7

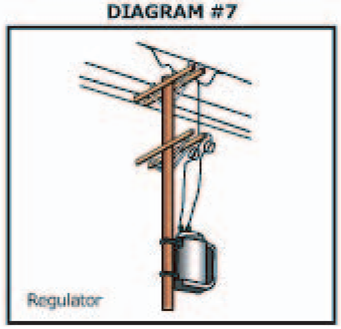
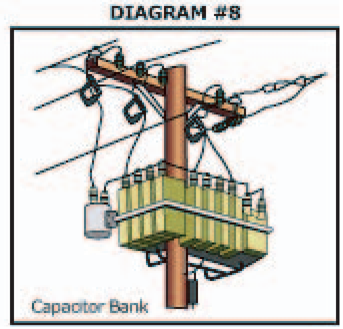


DIAGRAM #8



control and improve voltage regulation (see diagram #8).

Lines on the high voltage side of the distribution transformer are called primaries, and those on the low-voltage side of the transformer are called secondaries. Secondary lines tie to the transformer and run from pole to pole. The customer's service drop runs from the secondary line or transformer to our customer's meter.

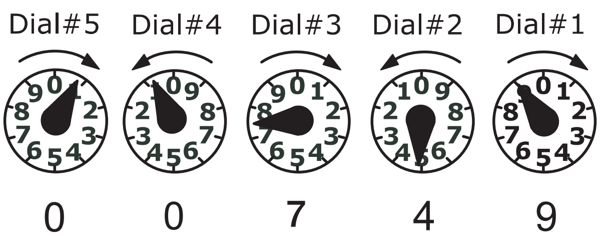
Customer

The service drop is usually made up of two 120 volt lines and a neutral line from which customers can get 120 or 240 volts of power (see diagram #9).

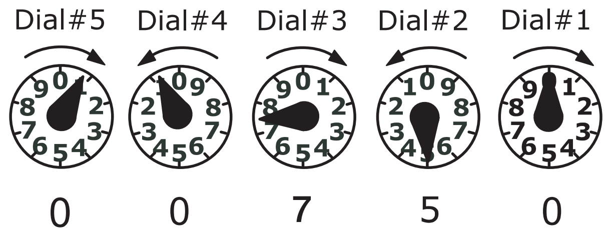
The device that measures and records electricity usage each month is called a meter.

How to Read Your Electric Meter

The dials of your electric meter should be read from right to left. Each dial is numbered from "0" to "9." If the pointer is between two numbers, read the lower number. If the pointer appears to be right on a number, the only way to be sure it has reached that number is to check whether the dial to the right has completed its revolution, or passed zero. For example:

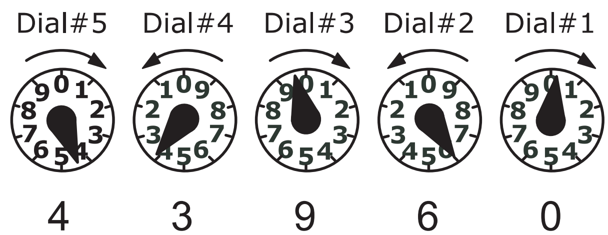


The pointer of Dial #2 appears to be right on the 5. However, since the pointer of Dial #1 has not reached zero, Dial #2 must be read as a 4. So this meter reads 00749 or 749. Below, the pointer of Dial #1 has reached zero, so Dial #2 becomes a 5. This meter reads 00750 or 750.

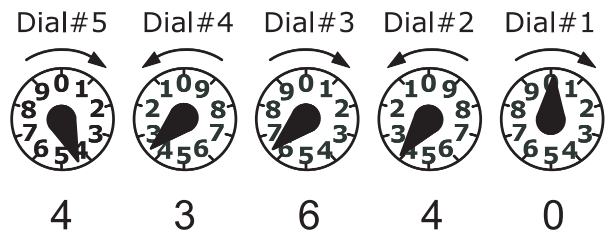


To determine the number of kilowatt-hours used in a month, simply subtract last month's reading from this month's reading.

If this was this month's reading:



If this was last month's reading:



43960	This month's reading
-43640	Last month's reading
320	kilowatt-hours used

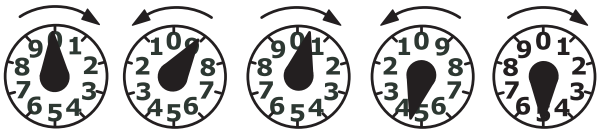
You will be billed for 320 kilowatt-hours, the difference between last month's reading and this month's reading.

When your meter turns over

Just like the odometer of a car, the register turns over after the last dial on your meter has completed a full revolution (100,000 kilowatt-hours on a five-dial meter). Each time the meter turns over, a "1" must be added in front of the next reading in order to compute the number of kilowatt-hours used. Here's an example:

Previous month's reading was 99045

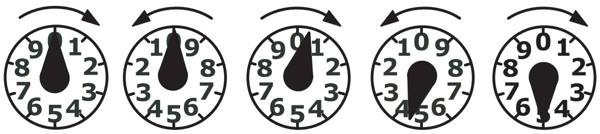
Dial#5 Dial#4 Dial#3 Dial#2 Dial#1



9 9 0 4 5

This month's reading is

Dial#5 Dial#4 Dial#3 Dial#2 Dial#1



0 0 0 4 5

(1)00045	This month's reading
-99045	Last month's reading
1000	kilowatt-hours used

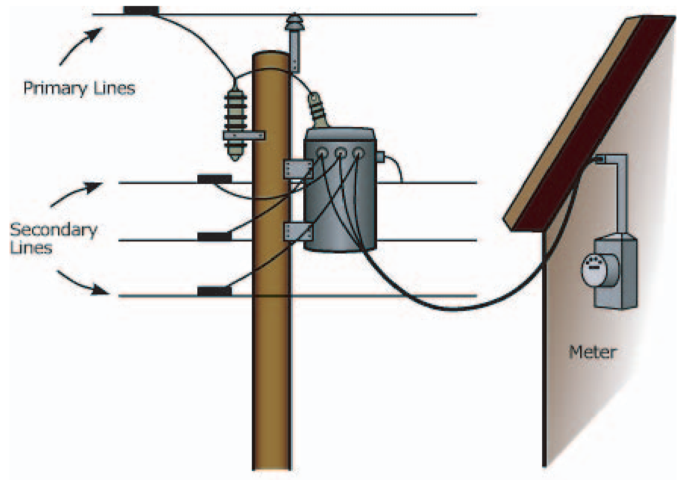


Diagram #9

There are two kinds of electric lines on the distribution system: three-phase or single-phase. Customers who need large amounts of electricity to run heavy machinery require three-phase service. Residential customers use single-phase service (see diagram #9).

Electricity is delivered to customers through either overhead or underground lines. In underground service, distribution transformers are installed at or below ground level. Those mounted in steel boxes are called padmounts while those installed in underground vaults are called underground transformers. Transformers and other equipment in the overhead system are mounted on poles or other supporting structures.

Service Interruptions

Although our reliability of service is almost 100 percent, we do have service interruptions. These are usually caused by tree limbs, animals, lightning, wind and automobile accidents.

Customers should stay away from fallen power lines and anything the lines may be touching, such as a fence or metal building.

If a customer calls to report an outage, we ask if they have lost power in part or all of the house or if their house is the only one on the block without power. If power has been lost in part of the house, or it's the only house without power in the neighborhood, the customer may have tripped a circuit breaker or blown a fuse.

The customer can correct the situation by replacing the fuse or resetting the circuit breaker. If the fuses and circuits are working properly and there is no power, we advise the customer that we will send an employee out as soon as possible to check the situation.

TXU
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