Fast Facts
Kaw Hydroelectric Plant

Number & Type of Units	One - Vertical Kaplan Turbine
Plant Average Energy	104,000,000 Kilowatt-hours
Maximum Rating of Generator	36.7 MVA
Head Elevation	76 feet
Unit Speed	138.5 revolutions per minute
Generator Voltage	13,800 volts
Top of the Flood Control Pool	1,044.5 feet
Normal Operating Level	1,010 feet
Length of Kaw Dam	9,466 feet
Start of Construction	August 29, 1987
Project Completion	September 26, 1989
Total Cost of Plant Construction	Approximately $25 million
Total Cost of Kaw Lake/Dam	$111 million

Member Cities

Altus Municipal Authority
Blackwell Municipal Authority
Comanche Public Works Authority *
Copan Public Works Authority *
Duncan Public Utilities Authority *
Edmond Public Works Authority
Eldorado Public Works Authority *
Fairview Utilities Authority
Frederick Public Works Authority
Geary Utilities Authority
Goltry Public Works Authority *
Granite Public Works Authority *
Hominy, Oklahoma Public Works Authority *
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Laverne Public Works Authority
Lexington Public Works Authority *
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Tecumseh Utility Authority
Tonkawa Municipal Authority
Walters Public Works Authority *
Watonga Public Works Authority
Waynoka Utilities Authority
Wetumka Municipal Authority *
Wynnewood City Utilities Authority
Yale Water and Sewage Trust*

**Also has SWPA Allocation*

Oklahoma Municipal Power Authority
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OMPA's Kaw Hydroelectric Plant at Kaw Reservoir near Ponca City, Oklahoma

(Top) Kaw Hydroelectric Plant at Kaw Reservoir near Ponca City, Oklahoma (Left) Entrance to Kaw Hydroelectric Plant's powerhouse

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Hydroelectric power – electricity produced by the force of falling water – is one of the oldest methods of producing power. Although most energy in the United States is produced by fossil-fuel and nuclear power plants, hydroelectricity is still important to the nation, as about seven percent of total power is produced by hydroelectric plants. Hydroelectric power is the most important and widely-used renewable source of energy. Producing electricity using hydroelectric power has advantages over other power-producing methods. These advantages include water to run the power plant is provided free by nature, minimal pollution and relatively low operations and maintenance costs.

The Kaw Hydroelectric Plant, located near Ponca City, Oklahoma, is 100 percent owned and operated by the **Oklahoma Municipal Power Authority (OMPA)** for the benefit of its 39 participatory municipal electric systems in Oklahoma. Kaw Reservoir and Dam are operated by the U.S. Army Corps of Engineers.

The U.S. Army Corps of Engineers' multi-purpose dams are the largest producer of hydropower in the United States. The Corps' hydropower plants provide 100 billion kilowatt-hours annually, enough power to serve more than 10 million households, according to the Corps. Under Federal law, the Corps doesn't sell the power it generates, but the power generated is marketed by the Department of Energy to public bodies, such as municipal utilities and rural electric cooperatives.

In Oklahoma, the Southwestern Power Administration (SWPA), which operates within the Department of Energy, coordinates marketing of hydroelectric power from the Corps of Engineers from its headquarters in Tulsa, Oklahoma. As one of four Power Marketing Administrations in the United States, SWPA markets hydroelectric power in Arkansas, Kansas, Louisiana, Missouri, Oklahoma, and Texas from 24 Corps dams. Sixteen OMPA members have hydro power allocations from SWPA.

OMPA is a municipal joint action agency with its headquarters in Edmond, Oklahoma. OMPA is a wholesale power company owned by 39 municipal electric utilities. The Oklahoma legislature authorized the formation of OMPA in 1981 with the passage of the Oklahoma Municipal Power Authority Act under Title II O.S. The Authority receives no appropriations of funds from the State of Oklahoma and is funded from rates paid by participating municipal members. OMPA's mission is "To provide reliable, low cost energy and services to municipal entities to enable each municipality to be competitive while maximizing the benefit to our stakeholders."

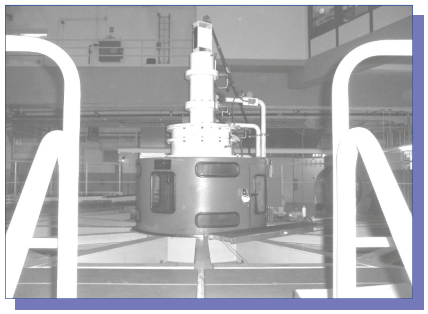
Kaw Hydroelectric Plant

The Kaw Hydroelectric Plant is located at Kaw Reservoir. The lake's surface area is approximately 38,000 acres at the top of the flood control pool. The top of the flood control pool is 1,044.5 feet, while the normal operating level is 1,010 feet. Kaw Dam is 9,466 feet long and 121 feet above the streambed, 654 miles above the mouth of the Arkansas River.

The construction of Kaw Dam was authorized by the Flood Control Act of October 24, 1962. Ground breaking began on the project on May 21, 1966 and it was completed in May 1976.

The total cost of Kaw Reservoir and Dam was $111 million. This included the construction of a foundation for the powerhouse, tailrace guard and penstock in the dam. OMPA purchased the substructure from the U.S. Army Corps of Engineers for $3.8 million in July 1987. Construction began on August 29, 1987 and was completed in September 1989. The hydroelectric plant was declared commercial on September 26, 1989.

Operation of the Kaw Hydroelectric Plant is monitored via the SCADA (Supervisory Control and Data Acquisition) system at the OMPA headquarters in Edmond, Oklahoma. Operating as a run of river facility with daily ponding, Kaw Hydroelectric operates approximately 104 gigawatt hours of energy for the OMPA power supply system on an annual basis. The generator is nominally rated at 29 megawatts at 76 feet of gross head with a maximum rating of 36.7 MVA. The plant was constructed at a total cost of approximately $25 million.



(Top) The Kaw Hydroelectric Plant's generator undergoes its yearly scheduled maintenance inspection. (Right) The diagram shows the operation of a hydroelectric power plant and how the generator produces electricity.

Diagram courtesy of TVA

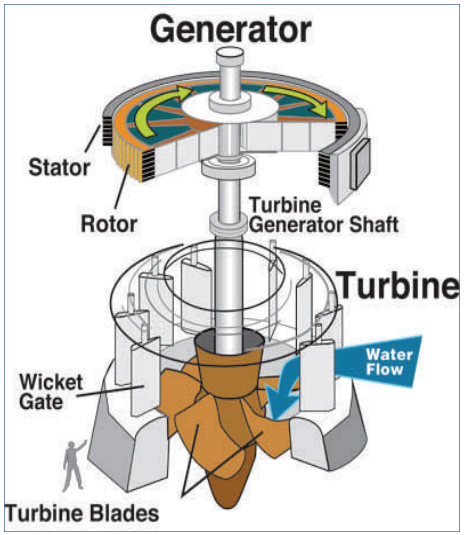
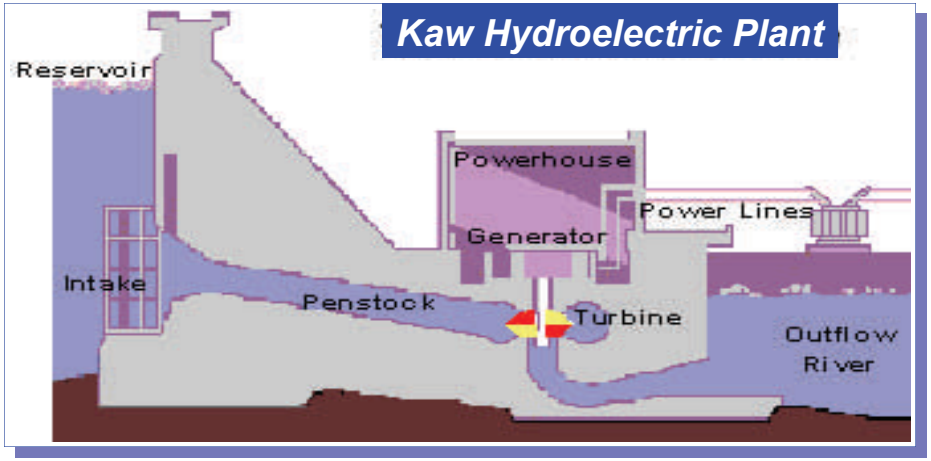


Diagram courtesy of USGS



Operation

Hydro power is the harnessing of potential energy from a river's gravitational fall and storing water behind a dam. This is the most common type of hydroelectric power plant. Originally, dams were built primarily for navigational improvements and flood control.

The storage area behind the dam is called the forebay and the surface of the forebay is called the headwater elevation. Required amounts of water are released at desired intervals through a conduit called a penstock or power intake.

The penstock then directs the water to a turbine-driven generator below the dam. Water is then released from the turbine into an afterbay, the surface of which is referred to as the tailwater level. The force exerted by the water hitting the turbine blades drives the turbine, which in turn, drives a generator to produce electricity. The energy producing potential depends on the height of its head (the difference in elevation between the headwater and the tailwater and the amount of water available).

The slip stream nozzle (bottom right) at the hydro plant increases the dissolved oxygen levels.

Our Environment

Hydropower is an environmental use of natural resources to generate electricity. OMPA has worked hard to ensure the Kaw Hydroelectric Power Plant does not have a negative environmental impact at the plant site and surrounding area. In 1995, OMPA installed a slip stream nozzle and made other improvements to increase the dissolved oxygen levels in the water being discharged from the Kaw hydro power facilities.

Production Costs

Hydroelectric power production costs are still less than those associated with other power sources. The continuous flow of water makes hydropower a renewable resource, whereas, fossil fuels are non-renewable resources and are more expensive.

Hydropower facilities also are simpler to operate and maintain than thermal plants. Consequently, fewer supervisory and maintenance personnel are required and outages (the inability to produce power) are less frequent. These are a few of the reasons for the operation and maintenance costs being less for hydropower than any alternative sources of energy. When production and construction costs are considered, hydropower is less expensive than power created by fossil fuels.

Peaking

"Peak" is the time of high-energy use and providing energy to meet this demand is called "peaking." Peaking patterns vary from utility to utility, depending on the climate, power demands of the industry and living habits of consumers. A utility in the southern part of the country during the afternoon summer months must provide more power for its customers because of the high usage of air conditioners. In all systems, the power load varies in a fairly predictable fashion over the hours of the day, the days of the week and the seasons of the year.

Meeting this peak demand is one of the utility's toughest tasks. The need for peak power is growing faster than the local demand for electricity. Some utilities have charged more for power during peak periods in order to curb and even cut demand.

Hydroelectric projects are generally capable of producing energy continuously. Hydroelectric plants are especially useful for meeting peak demand, since they can be stopped and started by simply controlling the flow of water. This ability to control water flow is the key economic advantage of hydroelectric power. The water supply and downstream water quality can be planned to create maximum capacity during peak periods. As long as established minimum stream flow levels are maintained, stored water can be released into the turbines only at peak periods.

Operating Schedule

If you are interested in knowing the daily operating schedule for the Kaw Hydroelectric Plant, call 580/765-9573 for a recorded message. Also, check the Tulsa District U.S. Army Corps of Engineers website, www.swt.usace.army.mil, under Water Control Data System for current readings on Kaw Reservoir.