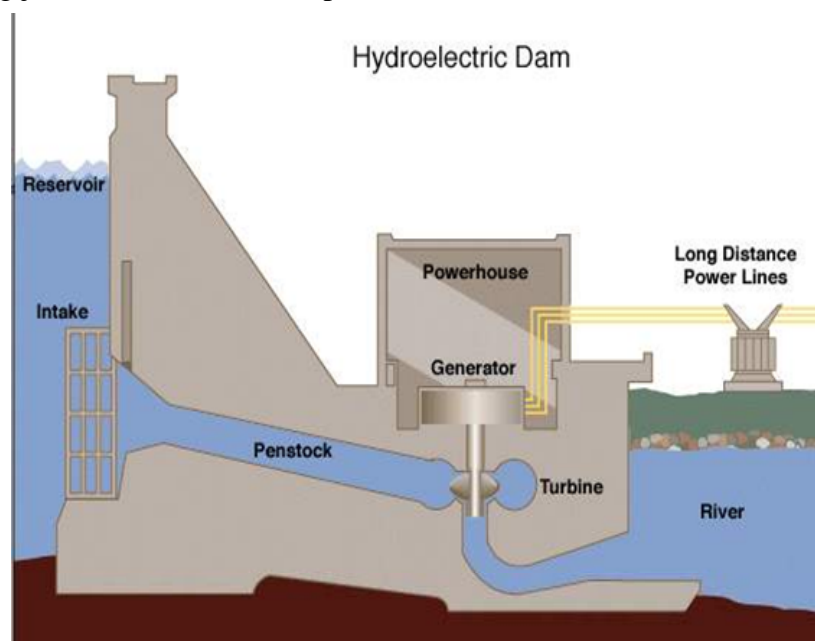


Hydropower Tour Background

Upper and Lower Baker Dam Timeline:

- **April 1924** – Construction begins on Lower Baker Dam
- **November 1925** – Lower Baker Dam begins operating
- **1925 – 1958 Fish Passage at Lower Baker Dam**
Fish passed upstream by way of a fish ladder to a tank that was then raised on a cable line over the dam and dumped into the lake. Downstream fish passage consisted of chute that dropped fish down the spillway. The fish chute had a 55-65% survival rate. **By the mid 50's** the cable line system had become dilapidated. To replace the cable system an adult fish trap was constructed below lower baker dam in the town of Concrete and fish began to be trapped and transported around the dam in specially designed tank trucks.
- **June 1956** – Construction began on Upper Baker Dam
- **October 1959** – Upper Baker Dam begins operating
- **1950 – 2007 Fish Passage at Upper Baker Dam**
In the late 1950's a floating barge, the gulper, pumped water to create a current that attracted out-migrating juvenile fish to a pipeline. The pipeline shot them over the spillway. There were no guide nets to funnel fish into the pipeline and some fish would go through the turbines. Returning adults were trapped below the lower baker dam and driven around the dams. **In 1985** only 99 adult salmon returned to Baker Lake to spawn. In the late 1980's the gulper was centered and guide nets were installed. Later the guide nets funneled fish into a tank, known as a hopper, which could then be loaded on a truck. **In 1989** PSE began to trap out-migrating fish and drive them around the dams.
- **2008** – Floating Surface Collector completed. The FSC more efficiently traps out migrating juvenile fish to be transported around the dam.



Baker River Sockeye Salmon Trap Counts			
Year	Trap Count	Year	Trap Count
1970	821	1990	1,977
1971	2,931	1991	480
1972	10,031	1992	2,443
1973	3,656	1993	3,818
1974	3,611	1994	15,991
1975	1,303	1995	2,181
1976	1,518	1996	7,769
1977	1,707	1997	7,099
1978	2,716	1998	13,187
1979	865	1999	4,654
1980	499	2000	10,384
1981	208	2001	4,942
1982	1,869	2002	4,021
1983	735	2003	20,235
1984	358	2004	9,106
1985	99	2005	3,191
1986	542	2006	8,325
1987	683	2007	2,763
1988	818	2008	3,211
1989	536		

Upper Baker Dam Stats

Dam

The dam is 330 feet high and 1,235 feet long. The dam has a volume of 609,000 cubic yards of concrete.

Powerhouse

The powerhouse has two vertical shaft generators, each with a capacity of 47,200 Kw for a total installed capacity of 94,400 Kw. The total capability is 103,000 Kw.

Reservoir:

The original Baker Lake was one square mile and was located up at the north end of the present day Baker Lake. The current Baker Lake is 9 miles long and the area covered by the normal full pool is 4,985 acres.

Source: Washington Department of Fish and Wildlife
<http://wdfw.wa.gov/fish/sockeye/bakerriver.htm>

How do hydroelectric dams work?

In a hydroelectric dam, the moving or kinetic energy of flowing water is converted to electrical energy. Water flows under the dam through an intake opening and into a large pipe called a **penstock**. The water flows down the penstock and at the bottom turns a **turbine**, which resembles a giant fan. The turbine is attached with a shaft to a **generator**. The turbine spins the shaft, which spins the generator, which generates electricity. At this point the water's job is done and it flows back into the river and continues its journey downstream. The electricity produced by the generator travels along cables to a transformer or **transmission station**. Here the electricity is converted to a higher voltage so it can be more efficiently transported long distances along **transmission lines**. Next the electricity travels to **substations**, where the voltage is converted or "stepped down" to a lower voltage that can be used in homes and offices. It is sent to buildings along smaller power lines called **distribution lines**.

Hydro Model Lesson Background

How do Incandescent Light Bulbs work?

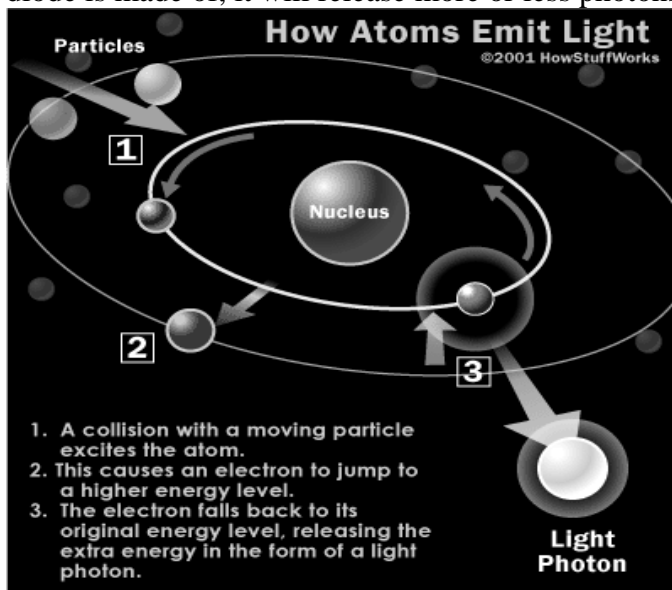
In Incandescent light bulbs electricity is used to heat up a tungsten filament to around 4,000 degrees F or 2,000 degree C. At this temperature, electrons get excited, jump to a higher energy level, and then release the extra energy in the form of photons of visible light. Tungsten is used in the filament because it has a very high melting point. Most other metals would melt before they gave off any light. The glass bulb is filled with an inert gas, argon, to prevent the tungsten from combusting, which it would in the presence of oxygen. Incandescent light bulbs release most of their energy in the form of heat. Only about 10% of the energy they release is in the visible spectrum of light.

How do Compact Florescent Lights work?

Compact Florescent Light bulbs contain a small amount of mercury and a coating of phosphors. Phosphors are substances that emit photons of visible light when they are bombarded by photons ultraviolet light. When an electrical current passes through the light bulb this energy heats up the mercury and changes it from a liquid to a gas. Atoms of mercury gas move through the bulb and collide with each other, as well as electrons from the electric current. This causes electrons in the mercury atoms to become excited, jump to a higher energy level, and then release the extra energy in the form of photons. Mercury releases photons mostly of the ultraviolet wavelength, which are invisible to the human eye. The phosphors convert the ultraviolet light released by mercury into visible light. The color of the CFL can be adjusted by combining different phosphors.

How do Light Emitting Diodes, (LEDs) work?

An electrical current is passed through a semiconductor. This causes negatively charged electrons in the semiconductor to move one way, and positive holes in the semiconductor to move the opposite way. As electrons fill in the positive holes, they drop in energy levels and release extra energy in the forms of photons. Depending on the substance the diode is made of, it will release more or less photons of visible light.



Source: <http://home.howstuffworks.com/light-bulb.htm>

Sources

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