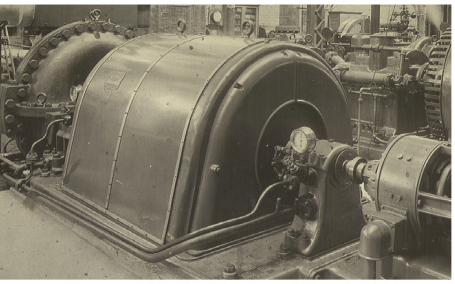
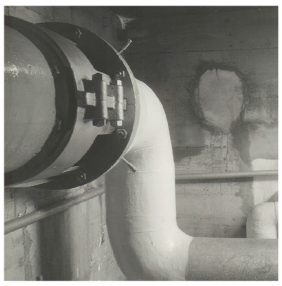
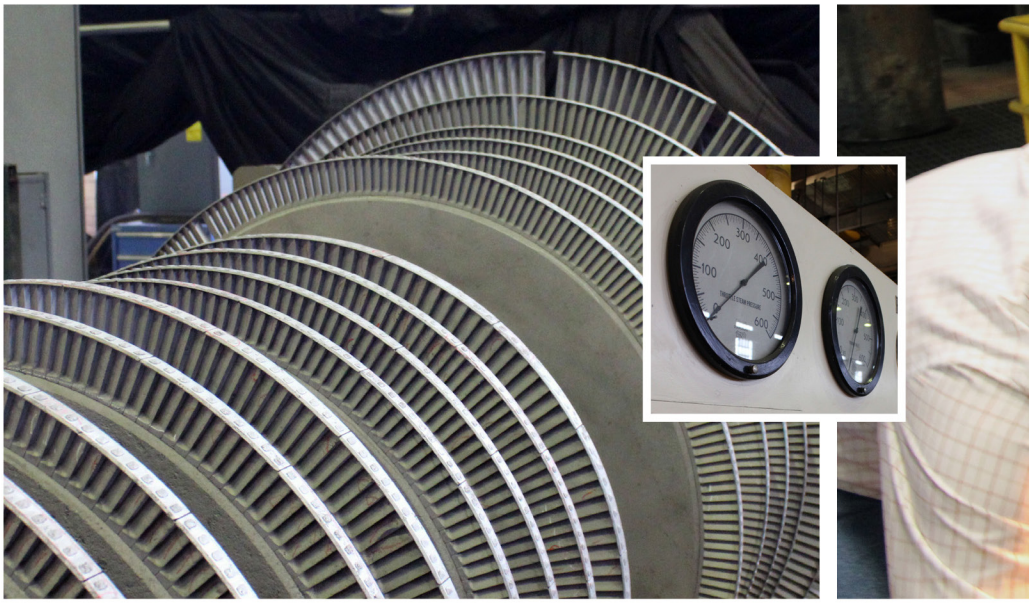
ABBOTT POWER PLANT






Abbott Power Plant is a co-generation facility producing steam for heating and cooling campus buildings and generating the electricity supplied to campus, maintaining a careful balance between safety, environmental compliance, reliability, and cost-efficiency.



THE THREE ORIGINAL UTILITY PLANTS

The University of Illinois at Urbana-Champaign has always maintained its own heating, lighting, and power facilities. Dating back to the late 1800s, the university has relied on four separate utility plants. The first plant, constructed in 1881 near Gregory Hall and the Illini Union, served the campus for 17 years and was replaced by a second central heating, lighting, and power plant in 1898. The capacity of that plant's coal boilers was 27,600 lbs of steam per hour, and the total capacity of the installed electric generators was 175 kilowatts (kW), which was adequate to meet the needs of campus at that time.

The Mathews Avenue Heating, Lighting, and Power Plant building was constructed in 1910. The plant's original equipment included two longitudinal-drum boilers and a chimney. The plant was capable of producing 120,750 lbs of steam per hour and since the demand for electricity was still relatively small, the original electrical output was only 500 kW. The Mathews Plant was expanded several times until 1941 when additions to campus facilities, construction of new buildings, along with new electrical and lighting demands made construction of the Abbott Power Plant necessary.

ABBOTT POWER PLANT

Abbott Power Plant was constructed in 1941, directly adjacent to the main line of the railroad. This location was chosen to allow for the quick delivery of coal and was also near the planned expansion area of campus. Construction at this time was also focused on the south end of campus, making this location a logical choice to serve the planned electric and steam loads.

Abbott has always produced steam and electricity simultaneously, which makes it a cogeneration plant. Abbott initially included three coal-fired boilers, each capable of producing 80,000 lbs of steam per hour. It was anticipated that within 10 years of Abbott's construction, peak heating demand would increase by 55,000 lbs to 200,000 lbs per hour. In 1941, the two original 3,000 kW turbine generators were able to service the campus peak load of approximately 3,400 kW.

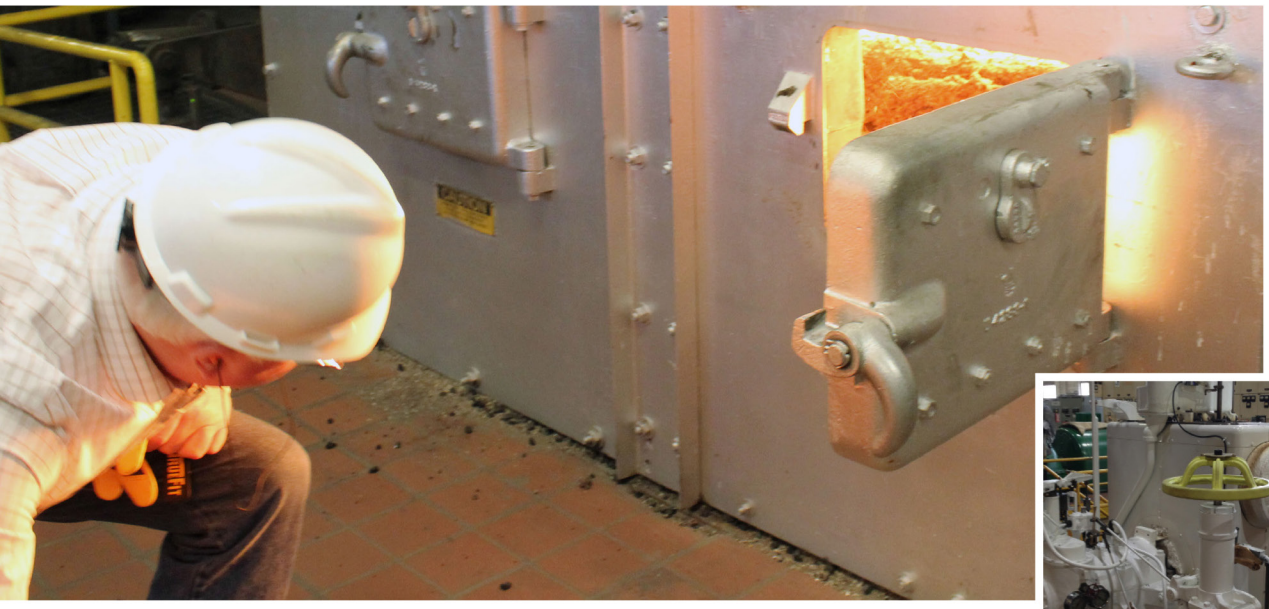
Numerous additions and alterations were made to Abbott and its equipment. From 1947-1962, five turbine generators were added along with three coal boilers. During the 1970s, the original coal boilers were replaced with oil-fired boilers and the three newer coal boilers were converted to natural gas. However, when fuel and oil prices increased during the early 1980s, the converted natural gas boilers were transformed back to burn coal. At the same time, a flue gas desulfurization scrubber was installed to remove sulfur from the coal-burning emissions.

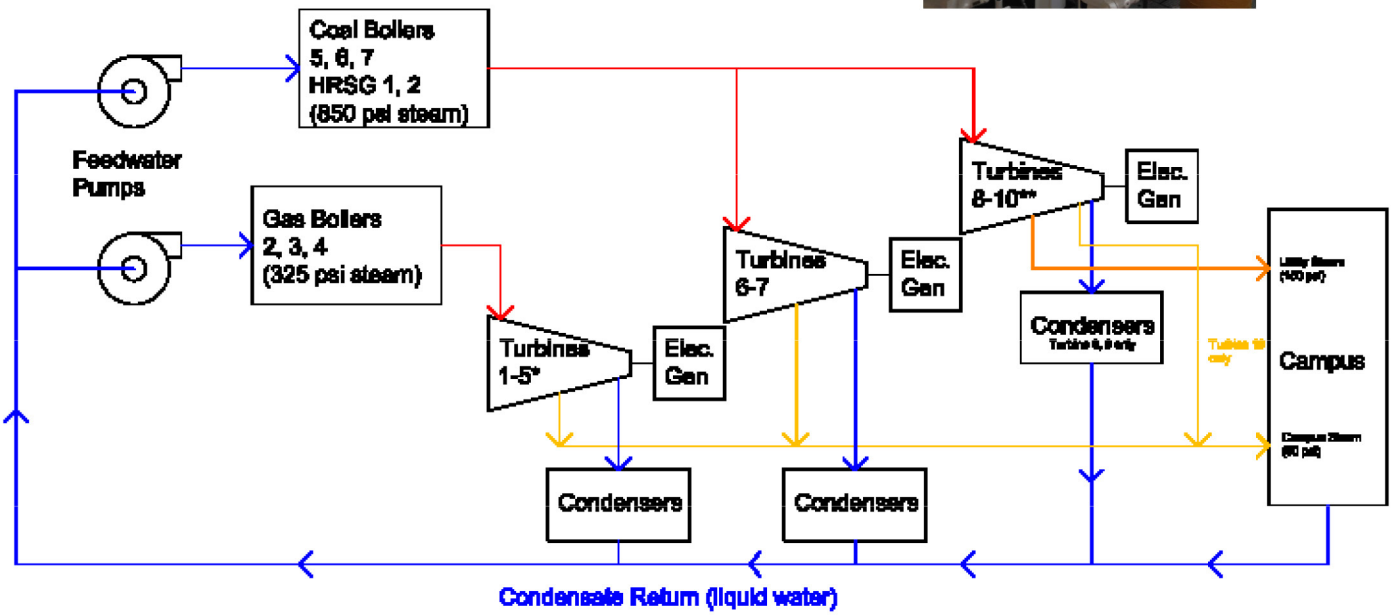
Abbott's most recent expansion project was completed in 2005. Two heat recovery steam generators (HRSGs), two gas turbine generators, two cooling towers, and three steam turbine generators were installed. Currently, there are five boilers, two HRSGs, two gas turbines, and nine steam turbine generators that work to produce 88.5% of the energy on campus.

By producing both steam and electricity, Abbott maximizes energy production from the fuel it consumes. Fuel and energy source flexibility provides the university the ability to insure both reliable service to the campus, as well as manage market risks. Natural gas, coal, and fuel oil can be used as necessary in response to fuel-market prices.

STEAM GENERATION

Abbott's maximum steam production is approximately 800,000 lbs per hour. Of the seven boilers at Abbott, two are dual fuel, utilizing natural gas or fuel oil; three are coal boilers; and two are HRSGs. The two dual fuel boilers are each capable of producing up to 150,000 lbs of steam per hour. Natural gas and fuel oil are trans-





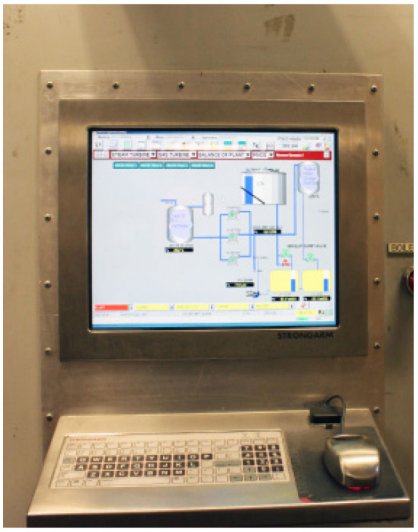
STEAM CYCLE MODEL

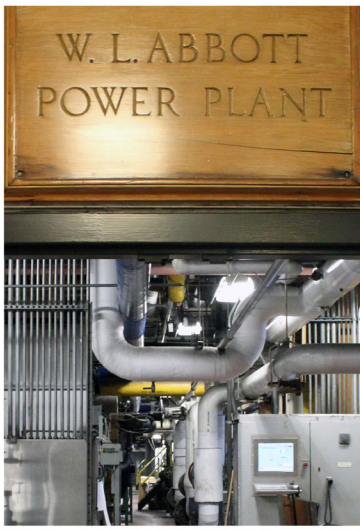
*Turbine 2 only has exhaust to Campus Steam loop.
**Steam passing completely through Turbine 10 goes to Campus Steam loop instead of through a condenser.

ported to the boilers via underground pipelines where they are directed through a burner.

The three coal boilers combined are permitted to produce up to 350,000 lbs of steam per hour. Coal is delivered to the plant via semi-trucks, and a series of belt conveyors are used to move the coal from the trucks into storage bunkers inside of the plant. Coal feeders are then used to move the coal from the bunkers into the boilers. The boilers are chain-grate stoker design. Electrostatic precipitators and a wet scrubber are used in conjunction with the coal boilers to remove particulate and sulfur from the flue gas.

The two HRSGs work in conjunction with the plant's two gas turbines. Natural gas or fuel oil is used to power the turbines, which in turn spin a generator that produces electricity. The exhaust gases from the turbine are routed with ductwork to a HRSG. The heat provided by the exhaust gases alone allow the HRSGs to generate approximately 40,000 lbs of steam per hour. The ductwork between the gas turbine exhaust and the HRSG is also equipped with natural gas fired duct burners. When these burners are utilized, the output from the HRSGs increases from 40,000 up to 110,000 lbs of steam per hour.





ELECTRICITY

Abbott produces electricity with the help of two gas turbines and nine steam turbine generators. Combined, Abbott produces enough energy to power 25,000 average United States homes. Abbott is capable of producing 85 MW of electricity.

Steam turbine generators, unlike gas turbine generators, depend on boilers to produce steam. The nine turbines have two exhaust modes, condensing and extraction. By running a turbine in extraction, steam is exhausted from the turbine and diverted out to campus for heating. In condensing mode, the steam is diverted through additional stages on the turbine and into a condenser. The condenser converts the steam back into water (condensate), which is then diverted back to the boilers to be converted back into steam.

Turbines #1 through #4 were installed over the course of plant's first 15 years. Each is designed to provide up to 3 MW of power. Turbines #6 and #7 provide up to 7.5 MW of electricity and were installed in the late 1950s and early 1960s to aid the construction of additional campus buildings. The remaining three turbines were installed with the Abbott expansion project in 2005. Units #8 and #9 each produce up to 12.5 MW and #10 produces up to 7 MW.

Abbott's gas turbine generators, installed in 2005, have a peak capacity of 15 MW each. The gas turbines are linked to an electric generator to produce electricity.

DISTRIBUTION

Steam is used to heat more than 250 campus buildings and in some cases, showers, tap water, and pools. The steam produced by Abbott is distributed via nine miles of tunnel and direct buried pipes. Once in the buildings, steam is distributed through radiators, hot water heating systems, and heat exchangers.

Power to campus is supplied through 52 miles of electrical distribution systems, 41 of which consist of underground duct banks. Electricity produced by Abbott is first transferred to the main substation. From there, it is disseminated to the rest of campus by way of distribution and load centers.

AIR POLLUTION CONTROL

Particulate matter and sulfur dioxide are continuously sampled and measured to confirm that emissions from coal are within Environmental Protection Agency restrictions. Abbott's pollution control technology, consisting of a combination of electrostatic precipitators (ESPs) and a flue gas desulfurization unit (scrubber), remains the "best available control technology" for removing pollutants from the byproducts of coal combustion. Precipitators are highly efficient filtration devices that remove the particulate matter from the flue gas, and the scrubber removes sulfur dioxide.

For more information about Utilities & Energy Services: http://www.fs.illinois.edu/services/utilities-energy