Capitol Power Plant Cogeneration Project

The Capitol Power Plant (CPP) was built in 1910 to supply steam for heating and electricity for the U.S. Capitol Building. In the 1930s, the CPP added a refrigeration plant and began providing chilled water for air conditioning. In 1951, the plant stopped producing electricity and focused solely on producing steam and chilled water. Today, the CPP utilizes an efficient district energy system to heat and cool over 17 million square feet of building space that includes the Capitol Building, Capitol Visitor Center, House and Senate Office Buildings, the Supreme Court, the U.S. Botanic Garden, and the Library of Congress buildings.

Cogeneration at the CPP

The CPP plays a critical role in the Architect of the Capitol's (AOC's) long-term energy conservation strategy. Significant energy reductions have been achieved through the on-going expansion and renovation of the CPP refrigeration plant, but significant investment is needed in the steam plant to replace aging infrastructure and to install new, energy-efficient equipment. As part of the AOC's Strategic Long-Term Energy Plan for the CPP, which was reviewed by a panel of industry experts convened by the National Academy of Sciences, cogeneration was identified as the most energy efficient, cost effective, and environmentally beneficial means to meet the current and future energy requirements.

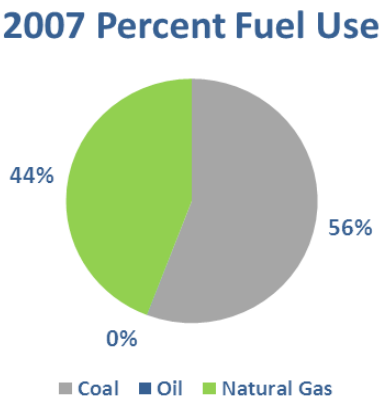
Currently, the CPP steam plant contains seven boilers, two of which have the capability to use coal. The proposed cogeneration project will allow the AOC to stop using coal unless catastrophic events dictate no other alternative. Instead, the CPP would generate steam and electricity in an environmentally friendly and highly efficient manner using natural gas. Specifically, the system would consist of two combustion turbines rated at 7.5 megawatts each and two heat recovery steam generators rated at approximately 71.9 million British thermal units per hour.

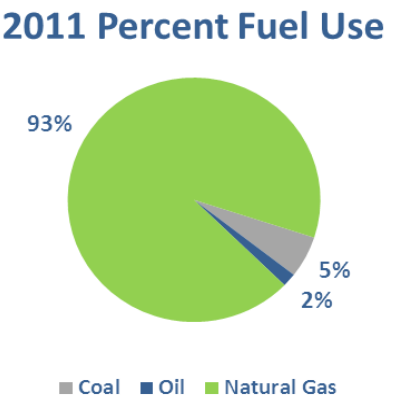
The AOC has applied to the Environmental Protection Agency (EPA) and the District Department of the Environment (DDOE) for air permits including Plantwide Applicability Limit (PAL) permits and Chapter 2 construction permits.

Fuel Use at the CPP

Since 2007, the CPP has steadily increased its reliance on natural gas as its primary fuel source. The CPP maintains the capability to burn three fuel sources to ensure that it can provide uninterrupted service to the U.S. Congress. There are three circumstances when the CPP may use coal to maintain adequate service to Congressional buildings: (1) if there is an emergency and natural gas supply is interrupted, (2) if we have an unusually cold winter, or (3) if natural gas equipment needs to be taken offline for maintenance or repair.

While the AOC has reduced coal use at the CPP over the past several years, it cannot cease using coal until the new cogeneration plant is constructed. As a result, the Defense Logistics Agency (DLA) secures a certain quantity of coal for the AOC should any of the three circumstances listed above occur. The AOC is not obligated to purchase a minimum quantity under the current DLA contract.
The following charts illustrate the dramatic decrease in the use of coal from 2007 to 2011 as a percentage of the total fuel use at the CPP.

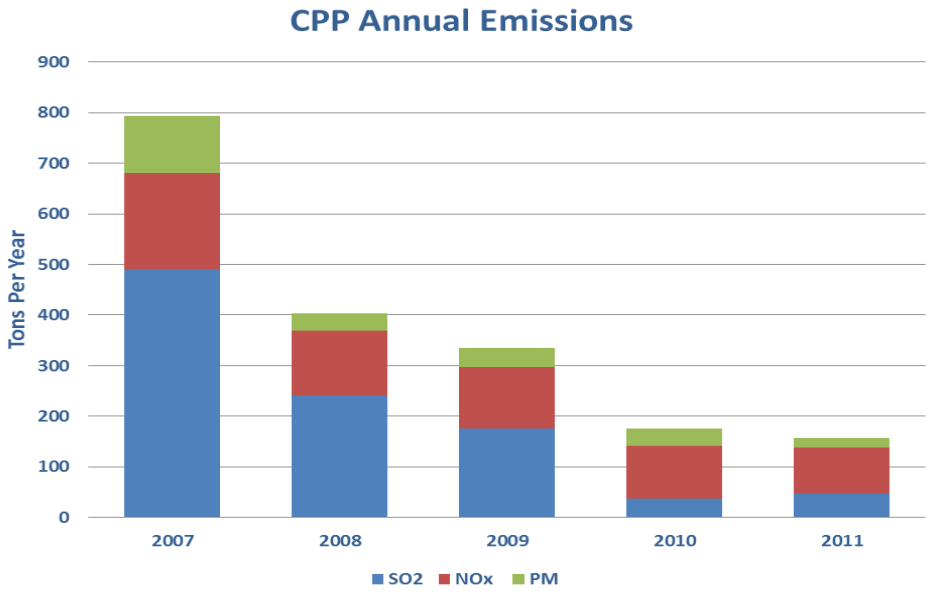




Note that while the coal use has significantly declined since Calendar Year 2007, mild winter weather in Calendar Years 2010 and 2011 allowed the CPP to further reduce the use of coal. For example, 2010 and 2011 had higher annual average temperatures over historical averages for this region.[1]

Past Emissions at the CPP

The reduction of coal use at the CPP has significantly reduced annual emissions of key criteria pollutants such as sulfur dioxide (SO_2), nitrogen oxides (NO_x) and particulate matter (PM). The chart below shows a decrease of 636 tons of these pollutants (an 80% decrease). The AOC has seen similar reductions in Hazardous Air Pollutants (HAPs), and, although the CPP has only been required by regulation to report carbon dioxide equivalent (CO_2e) emissions since 2010, the figures should be similar for CO_2e reductions.



Pollutants	2007	2008	2009	2010	2011
SO_2	490.59	240.73	175.33	36.98	48.04
NO_x	189.02	128.79	121.20	105.15	90.36
PM	114.08	33.09	39.09	32.92	19.09
HAP	-	39.62	29.68	6.03	8.40
CO_2e	-	-	-	83,103	78,862

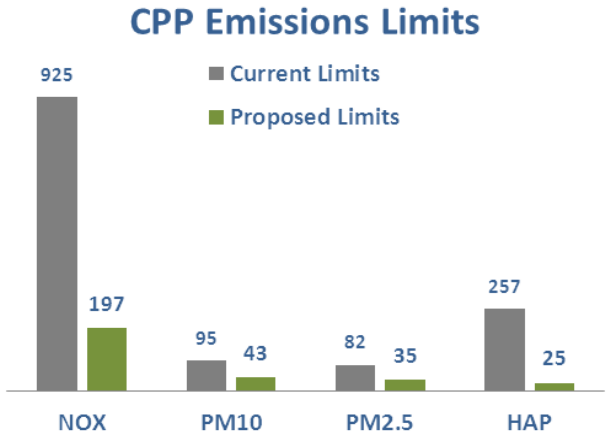
Emissions Limits under Cogeneration

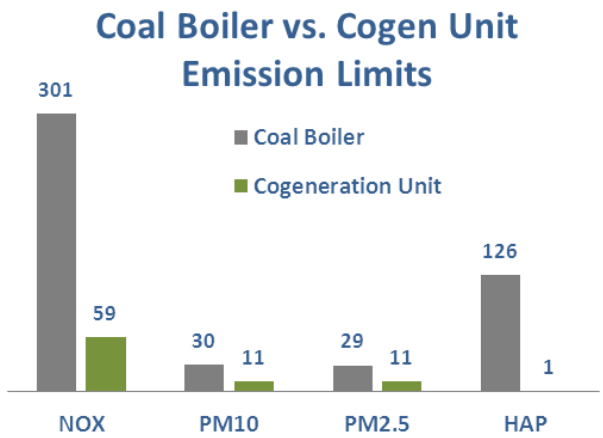
The new permits required to install cogeneration units would impose much more stringent emissions limits at the CPP. For example, the PAL permits create site-wide limitations on certain pollutants that are far more stringent than the CPP's current air permits. The following graphs summarize the current allowable emissions limitations that are only restricted by the amount of fuel the current boilers can burn over the course of a year. The new emissions limits in the

[1] NOAA National Climatic Data Center State of the Climate Global Analysis Annual 2010 and 2011 reports http://www.ncdc.noaa.gov/sotc/global/2011/13

cogeneration permits set significant reductions in allowable emissions from the CPP. For example, NO_x emissions limits will be reduced by 78%.

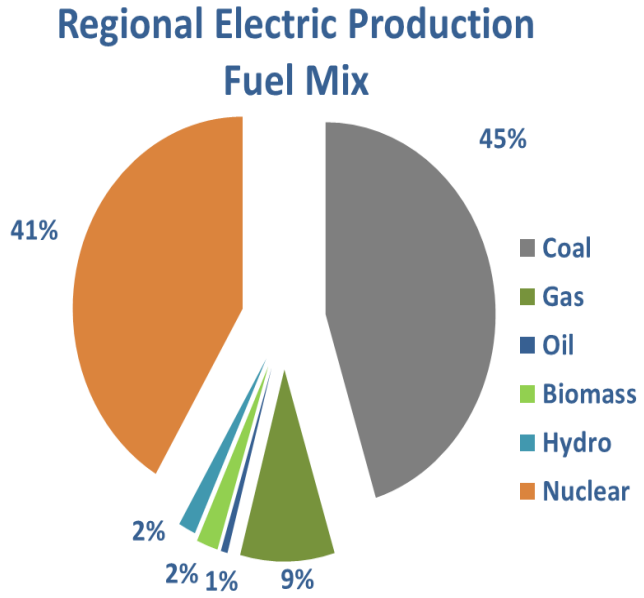
Further, as shown in the information provided below, the CPP compares the proposed cogeneration unit to one of the coal boilers at the CPP. The cogeneration unit is significantly cleaner than the coal fired boiler. If the cogeneration plant is not built, then the CPP may continue to rely on 60-year-old, less efficient coal boilers to generate steam in the winter.

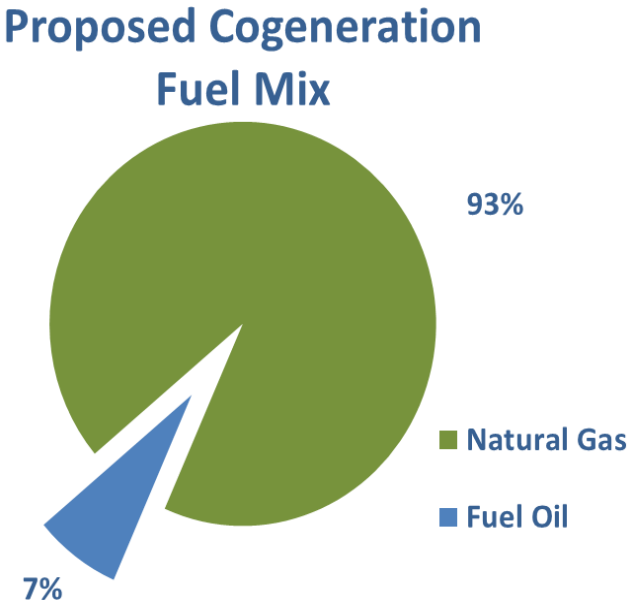




Cogeneration Equals Cleaner Electricity & Improved Air Quality

The environmental benefits of cogeneration reach beyond the emissions coming from the CPP property and have a much more dramatic impact on emissions regionally in the District of Columbia, Maryland, and Virginia. This is because the emissions coming directly from the CPP are only part of the overall picture. A secondary benefit of cogeneration at CPP will be the decrease in emissions regionally through the clean and efficient generation of electricity.





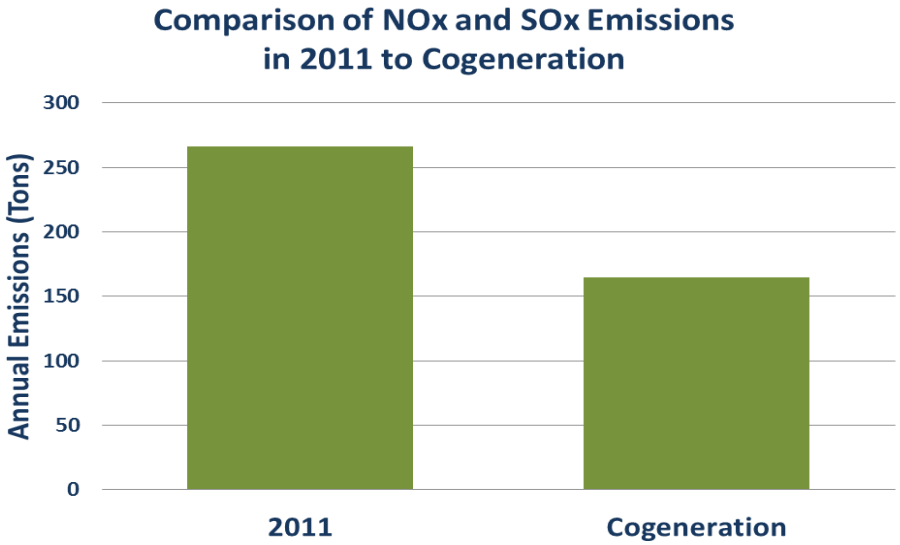
Fuel Oil would be used for cogeneration as a back-up only

Over 45% of the electricity in the DC Metro region is generated by coal[2]. By generating electricity using natural gas (with fuel oil as an emergency back-up), the CPP will reduce its purchase of electricity generated by over 93%. Additionally, the electricity we purchase is typically generated at approximately 33% efficiency, while the electricity generated by cogeneration is generated at approximately 60-80% efficiency. The use of natural gas and increased

[2] EPA eGrid2012 Version 1.0 Year 2009 Summary Tables

efficiency of cogeneration lead to significant regional reductions in emissions and is a collateral project benefit to public health and the environment from this project.

Installing a cogeneration plant will significantly reduce NO_x, SO_x and greenhouse gas emissions, helping to improve the air quality in the District of Columbia. For example, the benefit of installing the cogeneration plant over the current practice of importing electricity from a coal-fired power plant could be equivalent to reducing the amount of greenhouse gas emissions associated with the operation of 15,000 vehicles each year[3].



This table shows the NOx and SOx emissions in 2011 (including both emissions from the CPP and those from electricity purchased by the CPP) to those from the proposed cogeneration facility (including emissions from the CPP and those from electricity that will be purchased by the CPP).

The AOC is excited about the positive benefits of cogeneration at the CPP, as are other government organizations and public entities that recognize the benefits of this technology in providing clean, efficient and reliable energy. For example, in August 2012, President Obama issued an executive order that promoted cogeneration (also called combined heat and power or CHP).[4] For several years the EPA has worked with private and public organizations to promote cogeneration through their Combined Heat and Power Partnership program.[5] Recently the Department of Energy endorsed cogeneration by jointly promoting Combined Heat and Power as a clean energy solution with the EPA.[6]

The General Services Administration, National Institute of Health, University of Maryland, and Johns Hopkins University all operate cogeneration facilities. Both George Washington University and DC Water are planning to install and operate cogeneration facilities over the next few years in the District of Columbia. Organizations such as the International District Energy Association (IDEA) frequently work with organizations to help promote cogeneration.[7]

The Capitol Power Plant Cogeneration Project provides a unique opportunity to improve energy efficiency, reduce utility costs and replace aging boilers allowing the plant to move off of the small amounts of coal currently needed. Receiving the EPA and DDOE permits for the cogeneration plant is necessary in achieving the AOC's long-term goal of discontinuing coal use at the CPP.

[3] http://www.epa.gov/cleanenergy/energy-resources/refs.html
[4] http://www.whitehouse.gov/the-press-office/2012/08/30/executive-order-accelerating-investment-industrial-energy-efficiency
[5] http://www.epa.gov/chp/
[6] http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_clean_energy_solution.pdf
[7] http://www.districtenergy.org/