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Independent Regulatory Review Commission

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To: Environment-Committee@pasenate.com; IRRC; environmentalcommittee@pahouse.net; regcomments@pa.gov; ntroutman@pasen.gov; timothy.collins@pasenate.com; gking@pahousegop.com; siversen@pahouse.net
Cc: c-jflanaga@pa.gov
Subject: Comment received - Proposed Rulemaking: CO2 Budget Trading Program (#7-559)

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Re: eComment System

The Department of Environmental Protection has received the following comments on Proposed Rulemaking: CO2 Budget Trading Program (#7-559).

Commenter Information:

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Comments entered:

Fossil fuel -a devils bargain - gets too hot to function.
How it Works: Water for Electricity
Published Sep 30, 2010 Updated Nov 9, 2017
Ref. https://www.ucsusa.org/resources/how-it-works-water-electricity
We all know that if you trace the power lines far enough, you'll eventually find a coal, gas, or nuclear plant, or perhaps a solar panel or wind turbine.
But not everyone understands the relationship between electricity and water, which is used in various ways throughout the power sector. Understanding that relationship can help decision makers make smarter, more-informed decisions that produce better outcomes for consumers and the environment.
Water's many roles in electricity
Water is involved at many points in the process of producing electricity:
Electricity Generation: Around 65 percent of US electricity comes from power generators that need cooling. These types of power plants, called thermoelectric or "thermal" plants, boil water to produce steam for generating electricity. Water is also central to hydroelectric power plants, which use dams and other approaches to capture the energy in moving water.
Fuel Extraction and Production: Water is a critical resource for the drilling and mining of natural gas, coal, oil, and uranium. In many cases, fuel extraction also produces wastewater, as it does in natural gas and oil wells, and coal slurry ponds.

Fuel Refining and Processing: Oil, uranium, and natural gas all require refining before they can be used as fuels, using substantial amounts of water.
Fuel Transportation: Water is used to transport coal through slurries—pipelines of finely ground coal mixed with water—and to test energy pipelines for leaks.[1]
Emissions Control: Many thermoelectric power plants emit sulfur, mercury, particulates, carbon dioxide, and other pollutants, and require pollution control technologies. These technologies also require significant amounts of water to operate.
Water for power?
Water use in power plants has two components: withdrawal and consumption. Water withdrawal is, predictably, the act of removing water from a local water source. The withdrawn water may or may not be returned to the source or made available for use elsewhere. Water consumption is the amount of water lost to evaporation during the cooling process.
Some power plants use cooling systems that draw water from a lake, river, aquifer, or ocean to cool steam and then return virtually all of it—although at higher temperatures—to the source. Such systems, known as once-through cooling systems, have high withdrawals but low consumption.
Coal and nuclear plants, for example, may draw 20 to 60 gallons of water for every kilowatt-hour of electricity they produce, depending on how they are cooled.[2] Largely because of older power plants using this approach, electric power generation is responsible for almost 40 percent of freshwater withdrawals in the United States—on the order of 100 billion gallons per day in 2008—most of which is used for cooling.[3]
Water withdrawal by power plants can become a major challenge during times of drought or other water stress, when water is simply not available in the required volumes or at the required temperatures. Drawing vast volumes of cooling water through systems of pumps and pipes can also trap and kill fish, insect larvae, and other organisms.
Power plants using other cooling systems, known as recirculating or closed-loop systems, withdraw only a fraction of the amount that once-through systems do, but consume most or all of it. Power plant water
Hydropower plants withdraw large amounts of water to run through their turbines, while the lakes they rely on can also consume water quickly by evaporation; however, dammed lakes are used for multiple purposes, such as agricultural irrigation, flood control, and recreation.
Impacts on water quality
Producing electricity can have significant implications for water quality. For example:
Water used to cool electricity-generating steam exits the power plant at substantially higher temperatures—up to 18º F hotter at power plants in summer.[4] This "thermal pollution" can harm local aquatic ecosystems, especially during the summer months when species are at or near their heat tolerance thresholds.
Minerals unearthed during fuel mining and drilling can contaminate groundwater, which in turn affects drinking water and local ecosystems. Known as “acid rock drainage,” the pollution can change the pH of nearby streams to the same level as vinegar.
Coal mining and combustion create wastes with dangerous toxins such as mercury, lead, and arsenic. Improper storage or disposal of these wastes can contaminate water supplies. Coal combustion can also create acid rain, increasing the acidity of lakes and streams and harming aquatic ecosystems.
These and other issues combine to make water a serious consideration when siting and sourcing electricity production. Clean energy technologies like wind and solar power tend to have far fewer—if any—impacts on water.
References:
[1] US Department of Energy (DOE). 2006. Energy Demands on Water Resources: Report to Congress on the Interdependency of Energy and Water. Washington, DC.
[2] J. Macknick, R. Newmark, G. Heath, and K.C. Hallet. 2012. Operational water consumption and withdrawal factors for electricity generating technologies: a review of existing literature. Environmental Research Letters. 7 doi:10.1088/1748-9326/7/4/045802.

[3] K. Averyt, J. Fisher, A. Huber-Lee, A. Lewis, J. Macknick, N. Madden, J. Rogers, and S. Tellinghuisen. 2011. Freshwater use by US power plants: Electricity's thirst for a precious resource. A report of the Energy and Water in a Warming World Initiative. Cambridge, MA: Union of Concerned Scientists. November.
[4] N. Madden, A. Lewis, and M. Davis. 2013. Thermal effluent from the power sector: ananalysis of once-through cooling system impacts on surface water temperature. Environmental Research Letters. 8 doi:10.1088/1748-9326/8/3/035006.

Heatwaves test the limits of energy and water systems in Europe.

These links provide access to the attachments provided as part of this comment.

Comments Attachment: water and power.pdf

Please contact me if you have any questions.

Sincerely,
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