by John Bachmann

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Natural Gas Power and Climate

Existing Salem Harbor coal-fired generating station and (inset) artist’s rendering of the rebuild conversion to a new LEED-certified gas-fired combined-cycle generating plant (see article on page 27).

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Rendering © COOKFOX Architects
Coming to the U.S. Environmental Protection Agency’s (EPA) air office in the midst of the energy crisis in the early 1970s, one of my first projects involved the “Clean Fuels Policy,” which was prompted by new energy and Clean Air Act legislation. That legislation required that the federal Energy Administrator prohibit any power plant from burning natural gas or oil, if the conversion to coal was feasible and environmental standards were maintained. Concerned by the lack of progress, as well as continued gas shortages, Congress passed new legislation superseding this law that banned the use of natural gas for new power plants and encouraged curtailment of its use in existing plants after 1990.

The causes of the twin energy crisis of that era were complex, but it is the case that U.S. production of both oil and natural gas peaked in the early 1970s. While the oil embargo of 1973 triggered the crisis in global oil and gasoline supply, the contemporaneous shortages of natural gas in the United States are generally regarded as caused by federal price controls. Indeed, U.S. natural gas production continued to decline until the late 1980s, following a two-step process deregulating wellhead gas prices in 1985 and 1989. Trends in natural gas use for electrical generation were similar, falling from a peak in 1971 to lows in the late 1980s. The 1990 U.S. Clean Air Act contributed to an increasing use in the power sector that by the late 1990s had passed the 1971 peak.

Without price controls, production expanded until the turn of the century, with the even faster increase in demand met by Canadian imports. But production declined between 2001 and 2005 and prices soared. A 2003 article in *Time* decried the “first big energy squeeze since the 1970s” in an article titled, “Why U.S. Is Running Out of Gas.” Federal Reserve Chairman Alan Greenspan told Congress that he saw the likelihood of increased imports of liquefied natural gas. At that time, no one forecast the dramatic increase in natural gas production from deep shale formations that by 2011 had already passed the former U.S. production peak of 1972.

The increasing supply of shale gas made possible by hydraulic fracturing has already resulted in...

“Almost since we found natural gas we have been busy finding ways to abuse it, waste it, literally throw it away on uses that we are now finding are absolutely the wrong thing to do, and basic among those that are wasteful are ... the use of natural gas to generate electricity.”

—Sen. Pete Domenici, NM, 1978

“Well it’s all right now, in fact it’s a gas!”

—Jumping Jack Flash (M. Jagger/K. Richards)
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benefits for the economy, energy security, and the environment. In the power sector, lower prices have increasingly prompted switching from coal to gas in order to meet more stringent targets for emissions of sulfur, nitrogen oxides, and mercury. Yet questions remain as to how long this boom can continue to supply increasing demand for power generation, the public’s concern about local impacts of increased production, as well as the implications of current and future air pollution and greenhouse gas regulations on production and end use.

The July 2014 issue of EM discussed broad questions for a sustainable energy future, as well as the debate over potential local environmental impacts. This issue focuses on additional issues related to the power sector, climate, and permitting. In the first article, Martin and Hodge of the U.S. Energy Information Administration (EIA) present EIA’s most current assessment of recent and future dispatch of natural gas- and coal-fired power plants through 2040. EIA’s reference forecast includes the most recent applicable regulations from EPA, nine eastern states, and California. It does not include the potential effects of EPA’s proposal to reduce carbon pollution from the existing power sector by 30% in 2030. Switching some plants from coal to gas is a major “building block” in EPA’s proposed guidance to states. However, the EIA work does include three alternate scenarios, one of which includes a hypothetical carbon tax that achieves carbon dioxide reductions similar to EPA forecasts for its rule.

Also in this issue, Drew Nelson of the Environmental Defense Fund outlines the environmental risks that accompany the continued expansion of natural gas production and consumption, as well as the potential for further regulations of this sector. Nelson focuses on climate concerns raised by emerging evidence of higher than expected methane emissions. These increases come not just from production, but the entire system, which also includes processing, transmission, storage, and distribution.

Some have argued that this system leakage is high enough that switches to methane as a “bridge” fuel for power generation would have little or no benefits to climate. While more results on leakage rates are expected in the near future, most recent analyses suggest they are not high enough to negate the substantial greenhouse gas reductions that accompany switching from coal to gas. Moreover, EPA’s impact analysis for the proposed power sector carbon rule suggests that the guidelines actually might reduce net methane emissions. The agency projects the increases from natural gas production would be more than offset by methane decreases from reduced coal mine methane emissions. Of course, such analyses must be revisited in light of the most recent emission factors.

In our third article, Wehland and Hayes take a look at a definitional issue relevant to permitting for hydraulic fracturing activities. They examine the regulatory and legal reviews surrounding EPA’s policy regarding aggregation of industrial activities into a single source to determine if it is large enough to require Title V or PSD permitting.

And in our last article, Golumb, Zemba, and Arak document a specific example of an indirect fuel switch—the construction of a new gas-fired combined-cycle generating plant on the site of a former coal-fired station, the Salem Harbor Generating Station.

Finally, I want to thank Gary Bramble of Dayton Power and Light for his help in championing this issue. em

References