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February 20, 2012

MEMORANDUM

TO: Power Committee

FROM: Terry Morlan

SUBJECT: Direct Use of Natural Gas Analysis

Is it better to use natural gas directly in water heaters and furnaces or to generate electricity for electrical space and water heating systems that provide these services? The Council has deliberated on this question since its inception. Over the years, the Council has performed several studies and issued papers addressing the issue. The topic has gone under different names; total-energy efficiency, fuel switching, direct use of gas, and others.

In light of changing technologies and energy prices and of growing climate concerns, in 2008 the Council was again asked to look at the direct use of natural gas issue. The analysis is called for in the Action Plan (ANLYS-16) for the Sixth Power Plan. With the financial support and cooperation of the Northwest Gas Association and Puget Sound Energy, the Council has updated its economic analyses. The Council's Regional Technical Forum oversaw the study and its scope.

This is the most detailed and complete analysis of the direct use of natural gas issue to date. The analysis found that from both a societal and individual consumer perspective that most consumers should remain with their current space and water heating fuels. There are few cost effective fuel conversions in space heating, but up to 26 percent of water heating choices could involve changes in fuels. Most of the water heating fuel conversions involve shifting to natural gas water heating away from electric resistance where natural gas is already in the home for space heating. However, there are also fewer situations where it is cost-effective to shift from natural gas water heaters to heat pump water heaters when the water heaters are greater than 55 gallons.

Two technologies no longer appear cost-effective; electric resistance water heating, and electric forced air furnace space heating. The analysis found that it is cost-effective to shift away from these technologies. Replacement technologies are quite competitive between natural gas and electricity. Gas forced air furnaces, air source heat pumps, ductless heat pumps and electric zonal are all competitive replacements for electric forced air furnaces depending on home characteristics, climate, and fuel prices. For water heating replacements heat pump water heaters and condensing gas water heaters are very close in both first cost and life cycle cost.

The overall potential effects on gas and electricity use if all of the cost-effective conversion choices were made is small. Across all households, regional electric loads decrease around 340 average megawatts or about 1.5% of projected loads in 2030. Natural gas use by customers increases 13 trillion BTU. However, less natural gas is used by the power generation turbines that would otherwise have served those electric space and water heating systems. After netting out the 21 trillion BTU decrease of gas use by these turbines, total regional natural gas consumption falls 8 trillion BTU per year by the end of the 20–year study.

Staff has written a paper describing the analysis and findings. It has been reviewed by the RTF and the Northwest Gas Association. The Council released the paper for public comment in January. The comment period ended on February 17th with two comments received. Both are supportive of continued Council attention to the interplay between natural gas and electricity. A comment that suggests that the Council create a forum in coordination with PNUCC seems to miss the fact that the RTF, which is funded by electric utilities, co-managed this analysis with representatives of the natural gas industry. In addition, the RTF helped verify the assumptions about technology costs and performance that are questioned in the comments. Comments raised some issues that support continued evaluation fuel choice in the Council’s planning. One is the value of electric water heaters as a storage device for electricity, as the Council has discussed extensively in the power plan and elsewhere, but did not address in this analysis. Another is rapidly changing technologies, such as ductless heat pumps. Such advancements, however, are generally indicative of active competition between natural gas and electricity in the residential sector, and support the Council’s policy of allowing that choice to be made by consumers while monitoring markets to ensure that electricity efficiency incentives don’t lead to energy inefficient fuel choices.

The final paper is attached to the Council packet along with a decision memorandum. The decision memorandum contains two decisions, 1) to adopt the final paper, and 2) to reaffirm the Council’s stated policy on direct use of natural gas with minor editorial revisions. A statement of the existing policy with proposed revisions is attached to this memorandum and the Council packet.

Attachment

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