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I-937 Technical Working Group
Analytic Guidance: Nucor Steel – Waste Heat to Power Project

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Mr. Kale:

In August 2011, Nucor submitted a letter to Commerce seeking interpretation on whether a waste heat to power project fits the conservation definitions under Initiative 937. In September 2011, the I-937 Technical Working Group (TWG) met with Washington State University Extension Energy Program to discuss your inquiry and review WSU's March 2011 engineering analysis of Nucor's project. Based on the information provided and discussed, the TWG provides the following opinion: *The Nucor Steel waste heat to power projects qualify as high efficiency cogeneration.*

Background

Nucor has been working with Seattle City Light for the past two years designing a mechanism to capture waste heat from their reheat furnace and convert that into electricity. Nucor is ready to proceed with this innovative effort, but they are unable to confirm that the project will fit under the I-937 conservation project definitions. This uncertainty has prevented final commitment of resources to the project.

Relevant sections of the Energy Independence Act, WAC 194-37-080

- (10) "A utility may count towards the utility's biennial end-use conservation target, twelve individual months' worth of conservation during the first twelve months of a high efficiency cogeneration facility's operations in its service territory. The high efficiency cogeneration facility shall be owned and used by a retail electric consumer to meet that consumer's heat and power needs. Only that output used by that customer to meet its own needs can count toward the utility's conservation target. In order to count this in its conservation target, the utility shall prepare the following documentation, certified by a registered professional engineer licensed by the Washington department of licensing:
- (a) That the cogeneration system has a useful thermal energy output of no less than thirty-three percent of the total energy output; and
 - (b) An analysis that indicates the reduction in annual electricity consumption due to high efficiency cogeneration. This reduction is calculated as the net facility's annual electrical energy production times the ratio of the fuel chargeable to power heat rate of the cogeneration facility divided by

the heat rate on a new and clean basis of a best-commercially available technology combined-cycle natural gas-fired combustion turbine.”

TWG Analysis

WSU’s original analysis and the TWG’s subsequent review reconfirmed that both projects do qualify as high efficiency cogeneration under WAC 194-37-080. For the complete analysis refer to *Engineering Analysis of Nucor Steel Waste Heat to Power Projects* (WSU-EEP, September 2011). Technical information used in this analysis was obtained from the engineering report, *Organic Rankine Cycle Waste Heat Recovery: Prefeasibility Study Report, Nucor Steel Seattle* (Worley Parsons, 2009).

WAC 194-37-080 (10) (a) requires that the “cogeneration system has a useful thermal energy output of no less than thirty-three percent of the total energy output.” The total energy output for the Electric Arc Furnace is 49.9 MWt (megawatt thermal power) and the useful thermal energy output, calculated as the difference in energy entering and exiting the heat exchanger, is 18 MWt (49.9 minus 31.9 MWt). Therefore, the ratio of useful to total thermal energy output in this case is 35%, which meets the requirements of the WAC as a “high efficiency cogeneration system.” Similarly for the Reheat Furnace, the total energy output is 7.9 MWt and the useful thermal energy output is 2.8 MWt or 36% of the total, which also meets requirements.

WAC 194-37-080 (10) (b) requires calculation of the reduction in annual electricity consumption due to the high efficiency cogeneration. In the case of waste heat recovery cogeneration systems, the fuel chargeable to power heat rate is zero. Therefore, the reduction in annual electricity consumption is the net electricity generated or 2.5 MWe (megawatt electrical power) for the electric arc furnace Organic Rankine Cycle and 320 kWe for the reheat furnace ORC.

TWG Response

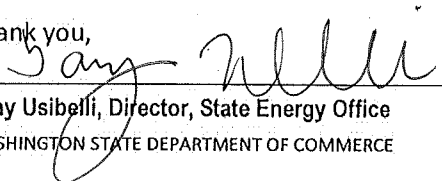
The TWG offers analytic guidance to provide more clarity on issues related to I-937; however, the guidance does not represent pre-qualification under I-937, nor does it represent a legal opinion. This guidance contains staff opinions based solely on facts presented in your letter and assumes those facts to be true and correct. Agency staff reserve the right to change their opinion should additional information come to their attention. These views are solely those of the agency staff and cannot be considered to be binding in any formal proceeding on this matter. It is incumbent on the stakeholder using this process to make their case to the State Auditor or UTC, as appropriate.

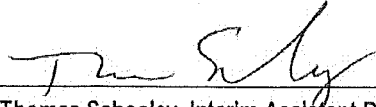
Based on the information provided by Nucor, the TWG provides the following opinion:

- The Nucor Steel waste heat to power projects qualify as high efficiency cogeneration.

If you have questions, please contact Meg O’Leary at meg.oleary@commerce.wa.gov or (360) 725-3121.

Thank you,


Tony Usibelli, Director, State Energy Office
WASHINGTON STATE DEPARTMENT OF COMMERCE


Thomas Schooley, Interim Assistant Director, Energy Section
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