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INTERPRETATION IC 90.1-2007-15 OF
ANSI/ASHRAE/IESNA STANDARD 90.1-2007
Energy Standard for Buildings Except Low-Rise Residential Buildings

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Request from: Susan Reilly (sreilly@group14eng.com), Group14 Engineering, Inc., 1325 E. 16th Avenue, Denver, CO 80218.

Reference: This request for interpretation refers to the requirements presented in ANSI/ASHRAE/IESNA Standard 90.1-2007, Section G3.1.1 and Table G3.1.1.A, regarding Baseline HVAC System Type.

Background: This interpretation requests clarification on the baseline system for projects that use both electricity and natural gas for heating. Section G.3.1.1 in Appendix G in ASHRAE/IESNA Standard 90.1-2007 identifies the HVAC system types in Table G3.1.1.A.

A building with electric zone heat (whether a VAV system with electric reheat or fan coil units with electric heat such as variable refrigerant flow systems or ground-coupled heat pump systems) may have natural gas heat in the AHU or the dedicated outdoor air unit. We identified the baseline as "Electric and Other" in Table G3.1.1.A and modeled natural gas preheat coils (Appendix G, Section G.3.1.2.3) in both the baseline and proposed designs.

We request clarification that the baseline for a building with electric heat and gas preheat is identified under "Electric and Other" and the preheat is modeled the same as in the proposed design.

Please consider the following in review of this request:

- ASHRAE/IESNA 90.1 claims to be based upon cost-effectiveness. Hydronic heat in the perimeter fan powered boxes served by boiler plant has a simple payback of well over 10 years when compared to a building with electric reheat and gas preheat. And, this is based upon current, low gas prices. We have calculated this payback on numerous commercial buildings in conjunction with contractors. With fixed budgets, forcing a project into hydronic heat would limit other, more cost-effective efficiency strategies. The comparison should be to a building with VAV with electric reheat, with the preheat as defined in G.3.1.2.3.
- The intent of ASHRAE/IESNA 90.1-2007 is to be fuel neutral. Establishing a baseline that is all gas for a building that uses both electricity and gas negates the neutrality.
- Requiring an all-gas baseline for a building with electric zone heat and gas preheat/outdoor air heating may result in the team changing to electricity for all space heating. We have had a number of teams consider this in order to maximize their LEED EAc1 points using an all-electric baseline, even though it increases operational costs and results in a more carbon-intensive building.
- In comparing HVAC design options, typically we look at everything from VAV with electric reheat or hydronic reheat, to variable refrigerant flow systems with dedicated outdoor air systems. Based upon life-cycle costs, numerous clients have selected the VRF with DOAS over the VAV with hydronic heat. But, based upon cost effectiveness criteria for the ASHRAE 90.1 standard, we argue that these systems should be compared to a VAV system with electric reheat and the same preheat source for performance ratings. Again, the VAV

with electric reheat is more cost effective than VAV with hydronic heat, which is why this is a common system.

Interpretation: A hybrid building with electric heat in the zones and gas preheat should be compared to an "All Electric" baseline with gas preheat: a VAV (or PVAV) system with electric reheat and gas preheat. This meets the cost-effectiveness test applied to the standard, is fuel neutral, will result in more efficient buildings, and eliminates bad decisions in order to game the LEED rating system.

Question: Is this interpretation correct?

Answer: No

Comments: The system described above is a fossil fuel and electric hybrid system and ASHRAE Standard 90.1-2007 Appendix G, Table G3.1.1A indicates that such a system follow Systems 1, 3, 5, 7 or 9 which are under the "Fossil Fuel, Fossil/Electric Hybrid and Purchased Heat" column of the table.