

ASHRAE/IES Standard 100-2006R  
Comments from  
American Public Gas Association  
June 18, 2012

## INTRODUCTION

The American Public Gas Association (APGA) appreciates this opportunity to submit comments in response to proposed revisions to ASHRAE/IES Standard 100-2006, Energy Efficiency in Existing Buildings. APGA is the national association for publicly-owned natural gas distribution systems. There are approximately 1,000 public gas systems in 36 states and over 700 of these systems are APGA members. Publicly-owned gas systems are not-for-profit, retail distribution entities owned by, and accountable to, the citizens they serve. They include municipal gas distribution systems, public utility districts, county districts, and other public agencies that have natural gas distribution facilities.

## SUMMARY

The proposed revision of ASHRAE/IES Standard 100-2006, Energy Efficiency in Existing Buildings relies on a site-based measurement of energy. Using a site-based energy metric is inappropriate if the goal is to achieve greater energy efficiency, as stated in the "Purpose" section of the proposed revision. Site (or point-of-use) measurement fails to account for the energy losses expended between the processes of energy extraction through delivery to the point of final consumption, when comparing energy use intensity of optional fuels. Both the Environmental Protection Agency (EPA) and APGA has long maintained that the only equitable way to measure the relative energy contents of natural gas and electricity is on a full-fuel cycle basis. A full fuel cycle analysis examines all impacts associated with energy use, including those from extraction/production, conversion/generation, transmission, distribution, and ultimate energy consumption.

*EPA has determined that source energy is the most equitable unit of evaluation. Source energy represents the total amount of raw fuel that is required to operate the building. It incorporates all transmission, delivery, and production losses, thereby enabling a complete assessment of energy efficiency in a building. (EPA Energy Star Performance Ratings, page 3)*

Further, LEED O&M, the International Green Construction Code (IgCC) and ASHRAE's Building Energy Quotient (bEQ) have rejected site-based energy metrics in favor of full-fuel-cycle energy metrics. The ASHRAE/IES Standard 100-2006R Committee should do the same.

## DEFINITIONS

The basis of definition for the term energy use intensity (EUI) does not account for the energy lost and emissions created throughout the extraction, processing, transportation, conversion, and distribution of energy to the point of final consumption. This is evidenced in Table 5.2.3 where site-based values are assigned to natural gas and electricity. These are shown as 1,030 Btu/ft<sup>3</sup> for natural gas and 3,412 Btu/kWh for electricity. Equitably, the EUI's and values in Table 5.2.3 should reflect the energy content of each fuel as well as the full-fuel-cycle energy expended to deliver these fuels to consumers. On a national average basis, full fuel-cycle energy contents for natural gas and electricity would be as follows:

$$\begin{aligned} \text{Natural gas: } & 1,030 \text{ Btu/ft}^3 \div .92 = 1,120 \text{ Btu/ft}^3 \\ & 3,412 \text{ Btu/kWh} \div .32 = 10,663 \text{ Btu/kWh} \end{aligned}$$

The proposed revision's use of site-based energy metrics, effectively gives electricity a "energy use target" head start in Tables 7.1, 7.2 and Table C in NORMATIVE ANNEX A (and elsewhere) that are technically indefensible. These site-based energy metrics should be replaced with full-fuel-cycle based energy metrics.

Natural gas is the cleanest, safest, and most useful of all fossil fuels. The inherent cleanliness of natural gas compared to other fossil fuels, as well as strong domestic supply projections and superior wells-to-wheels efficiency of natural gas equipment, means that substituting gas for the other fuels will reduce the emissions of the air pollutants that produce smog, acid rain and exacerbate the "greenhouse" effect. Natural gas is the lowest CO2 emission source per BTU delivered of any fossil fuel. Using gas-fired appliances for homes instead of electric ultimately reduces greenhouse gas emissions by one-half to two thirds. Simply put, increasing the direct-use of natural gas is the surest, quickest, and most cost-effective avenue to achieve significant reductions in greenhouse gases and therefore should be a critical component of any energy efficiency standards. One consequence of using a site-based metric is to promote fuel switching in the design decision away from more full-fuel-cycle energy efficient and lower greenhouse gas emitting technologies toward more site energy efficient technologies. To promote energy efficiency and lower greenhouse gas emissions, a full fuel cycle metric should be used.

Comment [BK1]: Is this term the appropriate one for building code comments?

On August 18, 2011 the Department of Energy (DOE) issued a Statement of Policy (SOP) announcing its plans to adopt Full-Fuel-Cycle (FULL-FUEL-CYCLE) analyses into their Energy Conservation Standards Program, based on recommendations to that effect by The National Academies (of Science, of Engineering, Institute of Medicine and the National Research Council). Specifically, DOE intends to use FULL-FUEL-CYCLE measures of energy use and emissions, rather than site energy measures.

This more accurate FULL-FUEL-CYCLE measurement will provide consumers with more complete information on energy use and environmental impacts. For this reason and as noted above, the EPA uses source energy in calculating the ENERGY STAR performance rating for buildings, designed to improve building efficiency and reduce carbon emissions nationally.

The proposed revision's reliance on site-based energy metrics is contrary to LEED O&M, IgCC, DOE's stated policy, and even ASHRAE's bEQ. These existing and developing codes reject site-based energy metrics in favor of full-fuel-cycle energy metrics. At present, the IgCC represents the more comprehensive implementation of full fuel-cycle analyses. However, LEED O&M and bEQ, which incorporate EPA's Portfolio Manager, are also moving in the right direction and another option for the ASHRAE/IES Standard 100-2006R Committee to consider.

#### INFORMATIVE ANNEX D

The following statements within INFORMATIVE ANNEX D have the effect of moving markets to higher levels of electrification rather than higher levels of efficiency, environmental stewardship and monetary savings for consumers:

- 4.1.2. Install point of use water heaters.
- 4.1.6. Use heat pump water heaters
- 5.3.7. Replace air conditioning and heating units with heat pumps. Consider geothermal heat pumps.
- 5.3.8. Electric heater replacement on standby generators with a heat pump.
- 5.3.9. Replace electric water heaters with heat pump water heaters.

The above cited statements are evidence of ASHRAE/IES fostering an unlevel playing field between energy choices. American consumers deserve a level playing field that is built upon sound science, not driven by ideology and politics. The marketplace does not promise equality in results, but it is a forum where competitors play by the same rules and are judged by the same standards.

If this ASHRAE/IES Standard is to allow fuel switching, it should be a two-way street. If the goal is to use an objective criterion such as environmental benefits, then the only equitable energy efficiency metric is the full-

fuel-cycle. This two-way street accommodates situations where natural gas direct-use technologies are preferable to “electrotechnologies.” The opposite result will also be possible.

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