APGA Comments on RESNET PDS 301-01 *Draft Standard for the Calculation and Labeling of the Energy Performance of Low-Rise Residential Buildings using the HERS Index*

Comment 133

Primary Energy Performance Methodology

(Please refer to comment # 113 for technical considerations)

The current normalized modified loads method (NMLM) rewards best efforts and accounts for technology limitations, while acknowledging, at least for heating, the poor energy efficiency and cost of resistance heating. However, if the goal of the Home Energy Rating System (HERS) is to equitably rate the impact of home energy use on primary energy resource consumption, HERS should adopt a primary energy performance methodology.

Site measurement methods calculate the energy consumed by an appliance at the end-use point (in the home) and do not properly account for the total energy consumed when more than one energy source is used in an appliance (such as a gas furnace) or when comparing the consumption of different fuels that can be used for the same application (such as water heating or combined heat and power). In addition, site measurement does not account for the energy lost and emissions created throughout the extraction, processing, transportation, conversion, and distribution of energy to the home. Source (full-fuel-cycle) measurement of the energy consumption of appliances and the overall building from the point of extraction to the point of use does account for energy losses that occur (e.g., in the production of natural gas or in the generation of electricity).

Furthermore, a unit of primary and a unit of secondary energy consumed at the site are not directly comparable because one represents a raw fuel while the other represents a converted fuel. When primary energy is consumed on site, the conversion to source energy must account for losses that are incurred in the storage, transport and delivery of fuel to the building. When secondary energy is consumed on site, the conversion must account for losses incurred in the production, transmission, and delivery to the site. Therefore, in order to assess the relative efficiencies of buildings with varying proportions of primary and secondary energy consumption, it is necessary to convert these two types of energy into equivalent units of raw fuel consumed to generate that one unit of energy consumed on-site. To achieve this equivalency, a full fuel cycle methodology should be used.

Focusing on site energy efficiency alone without consideration of upstream energy consumption and emissions perversely incentivizes the decision maker to choose the less expensive “efficient” technology. The 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. Codes, standards, regulations, voluntary initiatives, and incentive programs that focus on site energy create and maintain an unfair and unearned market advantage to qualifying technologies such as electric resistance heating and water heating that are lower initial cost, but that have higher operating cost, lower full-fuel-cycle efficiency and higher GHG emissions. To promote energy efficiency and lower greenhouse gas emissions, a full fuel cycle metric should be used. This is a key reason source energy-based criteria are used by several private and public sector stakeholders, including RESNET.

Moreover, the Department of Energy (DOE) issued a Statement of Policy on August 18, 2011 announcing its plans to adopt 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). DOE intends to use source-based 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, the EPA uses source energy in calculating the ENERGY STAR performance rating for buildings, designed to improve building efficiency and reduce carbon emissions nationally.

Existing and developing codes reject site-based energy metrics in favor of full-fuel-cycle energy metrics. Such reliance on site-based energy metrics is contrary to LEED O&M, IgCC, DOE's stated policy, and even ASHRAE's bEQ. 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.

The primary energy performance methodology provides equitable treatment of all energy consuming technologies based on their primary energy impact, not their site energy impact (or normalized modified site energy load impact). It does not prohibit any technology, but equitably rewards and penalizes technologies in the home rating based on their primary energy performance. It uses single national primary energy factors to avoid rewarding or penalizing a home simply based on its location (similar to the EPA Energy Star Buildings methodology). Primary energy methodologies are easily implemented and are now widely recognized and used both in the United States and internationally.

Comment 137

Single Gas Reference

(Please refer to comment # 114 for technical considerations)

PDS 301-01 currently uses multiple reference mechanical systems, depending on fuel type, for heating and service water heating (but not cooling). These systems have varying annual primary energy consumption, energy cost, and pollutant emissions, and are thus not equivalent. Instead of this mix of equivalencies, HERS should shift to a single reference design for all rated home design alternatives. The current HERS Index and energy savings methodology rewards electric heating and service water heating technology options and penalizes other heating and water heater options, including natural gas, in spite of their advantageous energy and environmental performance. This constraint eliminates the credit for creative design choices that would significantly reduce energy cost, energy use, and pollutant emissions.

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 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.

A single technology-blind baseline would provide an equitable credit to all technologies that have lower annual primary energy consumption compared to the single baseline level irrespective of energy form or technology design. It would promote better consumer choices by establishing fixed reference home performance requirements prior to making the technology and energy choices for the rated home.

A single reference design methodology would create an even playing field for all technology and energy forms and provides equitable treatment of advanced renewable, waste heat recovery, hybrid, and multi-fuel technology options. Furthermore, such a methodology will improve the adoptability of PDS 301-01 by ensuring transparency and equity for all technologies and eliminating confusion at jurisdictional levels.