RESNET
Residential Energy Services Network

Setting the STANDARD for QUALITY

Results of Electronic Ballot of RESNET Board of Directors on Adopting Position Paper on EPA's Proposed Changes to the ENERGY STAR Specifications

June 17, 2009

The following are the results of the electronic ballot of the RESNET Board:

Shall the RESNET Board of Directors adopt the June 15 draft position paper to EPA's proposed changes to the ENERGY STAR Homes specification (Attachment A)?

Yes (18)	No (0)	Abstaining (2)	Not Voting (1)
Ben Adams		C.T. Loyd	Erin Wiggnis
Steve Byers		Bill Prindle	
Dennis Creech			
Richard Faesy			
Philip Fairey			
David Goldstein			
Andy Gordon			
Tom Hamilton			
Bruce Harley			
Michael Holtz			
Mark Jansen			
Lee O'Neal			
Greg Nahn			
Kelly Parker			
Robert Scott			
Daran Wastchak			
David Wilson			
Barb Yankie			

The draft position on the proposed changes to the ENERGY STAR specifications was adopted.

Attachment A

RESNET Summary and Positions On
EPA's Proposed 2011 ENERGY STAR New Homes Guidelines (v3.0)

EPA has proposed to significantly revise their current ENERGY STAR Homes Guidelines to promote advanced building practices and accommodate more rigorous energy codes. EPA proposes that homes permitted after January 1, 2011, will be required to qualify for the ENERGY STAR label using the proposed new guidelines. To review and comment on EPA's proposed changes to the ENERGY STAR Homes program click here.

The following is a brief summary of the three principle changes proposed by EPA, each followed by RESNET's current position on the impact of the proposed change on the building and home energy rating industries. The comments below represent the position of RESNET as of June 19, 2009, and do not constitute RESNET's formal comments to EPA on their draft program requirements.

I. Checklists

In addition to an updated Thermal Bypass Checklist, EPA has added five new checklists, as follows:

1. Quality Framing Checklist requires that advanced framing techniques be employed including minimum framing requirements for raised heel trusses, exterior wall corners, window and door headers, and ladder blocking at interior-exterior wall intersections.

2. HVAC Quality Installation Contractor Checklist requires the HVAC contractor to certify that systems have been designed in accordance with ACCA Manuals J, D, S and T (or equivalent) and that systems in CZ 1-3 have a sensible heat ratio (SHR) less than or equal to 0.70 (i.e. minimum 30% moisture removal capability at ARI test conditions). The contractor is also required to "commission" the system through field measurements, including measurement of air flows, static pressures and refrigerant charge and temperatures.

3. HVAC Quality Installation Rater Checklist requires the Rater to verify that design conditions are met in the field installation, that duct systems are installed in accordance with best practice, that ducts are properly insulated, that total duct leakage is less than or equal to 6 cfm25 per 100 ft^2 of conditioned area, that leakage to outdoors is less than or equal to 4 cfm25 per 100 ft^2 of conditioned area and that bedrooms have 1 in^2 of transfer area per cfm of supply air delivery

4. Indoor Air Quality Checklist requires mechanical ventilation that meets requirement of ASHRAE Standard 62.2, including limits on exhaust air flow in hot humid climates and supply air flow in very cold climates. Requires that air inlets

avoid specific locations, obstructions and provide rodent and insect control. Requires conditioned space to be isolated from garages and disallows ductwork in garages. Disallows unvented combustion devices (except kitchen cooking devices) and requires installation of at least one centrally located carbon monoxide detector in homes with attached garages or combustion devices. Requires HVAC air filtration using minimum MERV 8 filters.

5. Water-Managed Construction Checklist requires that patios, walkways, driveways and grades be properly sloped away from foundations. Requires capillary breake for concrete slabs, crawlspace and below grade walls, air sealed sump pumps and properly installed drain tile. Requires flashing and weep holes at the base of masonry wall, fully-sealed continuous drain plane behind exterior cladding, and full flashing of window and door openings. Requires step and kick-out flashing at roof-wall intersections, guttering and downspouts depositing on sloping grade 5 feet from foundation, self sealing bituminous membranes in all roof valleys and at eaves, extending a minimum of 2 feet in climate zones 5 or greater. Disallows wall to wall carpeting in toilet and bathing areas. Requires cement board or equivalent backing material for tub and shower enclosures and high permeability interior finish materials in hot, humid and mixed-humid climates. Requires that piping in exterior walls be fully insulated and that interior finishes not be applied to wet framing materials.

These new checklists, along with the updated Thermal Bypass Checklist, may be viewed or downloaded from EPA's web site.

RESNET Position on Proposed Additional Checklists

RESNET believes that the proposed new checklists are, in many respects, well-grounded in building science. However, RESNET also believes that proper implementation of these checklists is likely to come at a high price. EPA's price estimates for the addition of these checklists is $1,200 per home in inspection costs alone. These costs, when added to the additional construction costs, may prove burdensome in the current housing crisis and EPA has not shown evidence that builders or consumers would be willing to bear these additional costs. The HVAC and moisture checklists in particular represent the largest risk to EPA's program in terms of cost, credibility, and participation.

RESNET is also concerned that the HVAC checklist, signed off by the installing technician, will end up being a rubber-stamp with no accountability and no real quality review. This can have two negative effects, first, it threatens the credibility of the whole program; second, it requires the Rater to "sign off" that the installer signed off, but without adequate training or authority to really inspect and enforce the application of the requirements. For those Raters doing the minimum, it has high potential to be a rubber-stamp; for those who really understand HVAC, it will put them in an awkward position with no real mandate to enforce if their understanding differs from the installer's.

There are other areas of concern regarding the HVAC checklists. First, the proposed requirements impose a heavy burden for AC and ASHP installations but ignore similar potential installation problems with GSHP and boiler systems. Second, when compared to ANSI/ACCA 5 QI, which has been adopted by ENERGY STAR as its HVAC quality installation standard, EPA's proposal is significantly more stringent in several areas, and in some cases requires conformance to a standard that is more stringent that the resolution of the test methods themselves. Finally, this proposal will necessarily require substantial training of HVAC technicians -- who will train them? Most Raters do not have this level of training, and even when they do, Raters often don't have a mandate with HVAC contractors or local code officials to ensure this level of complinace.

RESNET recommends that EPA seriously reconsider the HVAC checklist, and in its place provide an incentive, rather than a requirement, for compliance with ACCA 5 QI. The incentive could be to allow a relaxed threshold on the HERS index (perhaps by 2-4 points) for those who can show compliance.

RESNET is also concerned that the water management checklist goes beyond the mandate of an energy-efficiency program. While the requirements represent good building practice that all builders should be incorporating, most of them are beyond the scope of a rating, beyond what a Rater is trained to do, and many are not able to be inspected at times a Rater would be on the site. This checklist will add significant cost to construction and the rating, with no tangible energy benefit.

The updated thermal bypass and the new framing and IAQ checklists represent additional work for the Rater that will increase the cost of an ENERGY STAR compliance rating, as well as increase the cost of compliance to the builder. Adding the HVAC and moisture checklists further increases costs and the potential for alienating the building industry becomes greater. RESNET strongly recommends that EPA carefully consider the potential down side for these additional requirements and that they conduct builder and consumer surveys and focus groups to ensure that these requirements do not hurt the program more than they help

II. Qualifying Criteria

EPA proposes to significantly alter the energy efficiency requirements and the procedures used to qualify homes for the ENERGY STAR label. The proposed guidelines for prescriptive qualification will require that all envelope insulation requirements of IECC 2009 be met, that measured envelope leakage be within specified bounds, that windows, doors and HVAC equipment meet ENERGY STAR standards (or better in some climate zones) and that attic radiant barriers be installed in CZ 1-3 if more than 10 linear feet of ductwork is located in unconditioned attics. Measured duct leakage to outdoors is required to be less than or equal to 4 cfm25 per 100 ft^2 of conditioned floor area and ENERGY STAR thermostats (programmable with adaptive recovery) are required. An ENERGY STAR refrigerator, dishwasher, ceiling fans and 80% fluorescent bulbs are also required.

The most significant change to EPA's proposed qualifying criteria occurs within the performance path. EPA has stated that a specific HERS Index is not the most appropriate means of representing their ENERGY STAR home criteria, and has outlined their reasoning for this position in "Overview of Evolving ENERGY STAR Qualified Homes Program & Methodology for Estimating Savings", posted as "Technical Background" on the EPA's website. As such, EPA has proposed a new ENERGY STAR Reference Design home. The characteristics of this new ENERGY STAR Reference Design home closely follow EPA's prescriptive qualification requirements. For the ENERGY STAR Reference Design home, any given proposed home would be modeled using accredited rating software and these prescriptive requirements, as modified by EPA's reference home modeling rule set. The resulting HERS Index would then be used as the base HERS Index for that home. This base HERS Index would be further modified by a Size Adjustment Factor, if necessary, to arrive at the qualifying HERS Index for the proposed home.

The Florida Solar Energy Center (FSEC) has conducted a limited analysis of the ENERGY STAR Reference Design Home concept across the seven standard continental U.S. climate zones. Figure 1 illustrates the results of the analysis. While the analysis is limited to only one home size and type, it is clear from Figure 1 that, with respect to the minimum requirements of the 2009 IECC, EPA's proposed ENERGY STAR Reference Design home does not achieve EPA's stated ENERGY STAR policy objective of achieving new homes that save at least 15% compared with prevailing code minimums. The ENERGY STAR Reference Design Home meets or comes close to meeting this object in southern climates. However, it falls significantly short of the goal in northern climates when heating is provided by electric heat pumps. In fact, St. Louis (CZ4) appears particularly problematic in that it does not come close to this goal regardless of heating fuel type.

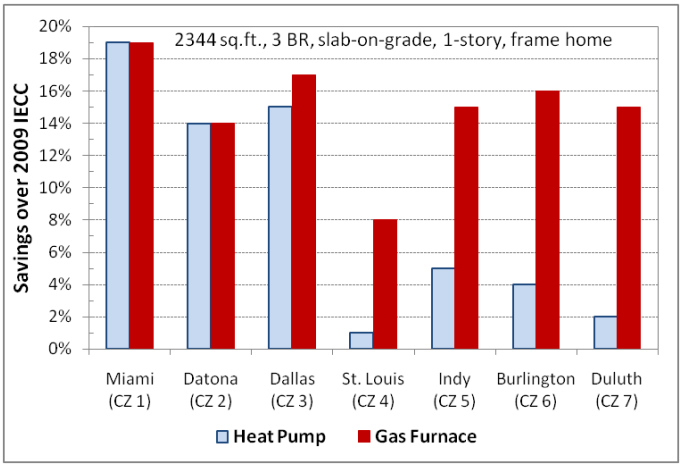

Figure 1. Energy savings of the proposed ENERGY STAR Reference Design Home as compared with the 2009 IECC across the continental U.S. by fuel type.

This FSEC analysis also shows two other salient facts.

- There is a strong correlation between the 2009 IECC source energy use savings shown in Figure 1 and the HERS Index achieved by the ENERGY STAR Reference Design Home.

- If the HERS indices for the 2009 IECC Standard Reference Design for the 8 different home size/bedroom pair sets of EPA's Exhibit 3: Benchmark Home Size table are calculated for all seven climates at 85% of their value (indicating 15%

savings over the 2009 IECC), the results fall within a narrow band width of only about two HERS Index points – from about 76 to about 78.

Additional results and details from this analysis are available on the RESNET web site at http://resnet.us/EPAv3-HERS.pdf.

RESNET's Position on Changing Qualifying Criteria

RESNET recommends that EPA reconsider their proposed ENERGY STAR Reference Design Home concept. It is EPA's stated policy goal that they will achieve at least 15% savings with respect to prevailing standards. In 2011, the prevailing standard for homes will be the 2009 IECC. The preliminary analysis provided above indicates that EPA's proposal falls short of their stated policy goal. As such, EPA should consider an alternative to their proposed ENERGY STAR Reference Design Home.

FSEC has conducted an analysis of all of the home size and number of bedroom pair sets provided in Exhibit 3: Benchmark Home Size of the EPA proposal. For each of the eight size/bedroom pair sets, an IECC 2009 Standard Reference Design Home is constructed for each of the seven contiguous U.S. climates, yielding 56 distinct IECC 2009 Standard Reference Design homes. For each of these homes, the HERS Index is computed using EnergyGauge® rating software, producing the data shown in Table 1, below.

Table 1. HERS Index for IECC 2009 Standard Reference Design Homes of Specified Size and Number of Bedrooms across U.S. Climate Zones

Cond. floor area (ft^2):	**1000**	**1600**	**2200**	**2800**	**3400**	**4000**	**4600**	**5200**	**Range**
No. bedrooms:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**(max-min)**
Miami (CZ1)	90	89	88	88	87	87	87	87	3.0
Daytona Bch (CZ2)	91	90	89	89	88	88	88	88	3.0
Dallas (CZ3)	89	88	87	87	86	86	86	86	3.0
St. Louis (CZ4)	91	90	89	88	88	88	88	87	4.0
Indianapolis (CZ5)	92	91	91	90	90	90	89	89	3.0
Burlington (CZ6)	93	93	93	93	92	92	92	92	1.0
Duluth (CZ7)	93	93	93	92	92	92	92	92	1.0
Average:	**91.3**	**90.6**	**90.0**	**89.6**	**89.0**	**89.0**	**88.9**	**88.7**	**2.6**
85% of Average:	**77.6**	**77.0**	**76.5**	**76.1**	**75.7**	**75.7**	**75.5**	**75.4**	**2.2**

Data such as that in Table 1 would allow EPA to establish program guidelines that would accomplish EPA's policy goal of achieving 15% energy savings with respect to prevailing minimum code standards in ENERGY STAR new homes.

Consistent with the FSEC analysis, RESNET recommends that EPA add a third row to their Exhibit 3: Benchmark Home Size table. This row should contain the Base HERS Index that is required to achieve a performance level that exceeds national model codes by 15%. Table 2, below, is provided as an example:

Table 2. Example Expansion of EPA Exhibit 3: Benchmark Home Sizes

No. of Bedrooms	1	2	3	4	5	6	7	8
Benchmark CFA	1,000	1,600	2,200	2,800	3,400	4,000	4,600	5,200
Base HERS Index	78	77	77	76	76	76	76	75

It is important to point out that Table 2 is only presented as an example and that the values shown for the Base HERS Index should be considered "placeholders." While these values stem from legitimate analysis, the analysis is limited to only a single home type. If EPA chooses to adopt this approach, it is recommended that they conduct a national analysis to develop a final set of Base HERS Indices. It is recommended that such analysis consist, at a minimum, of the following steps:

1. Determine the HERS Index for IECC 2009 Standard Reference Design for all home sizes, in all climates for all reasonable foundation types using electric space air conditioning, gas furnace space heating and gas hot water heating in all climates.
2. Determine the average HERS Index for each home size across all climates and all building foundation types (this average could also be a weighted average that is based on expected or historic home starts).
3. Multiply the resulting average HERS Indices by 85% to establish the Base HERS Index for each base home size (Benchmark CFA).
4. Use the actual home size (CFA) and EPA's proposed Size Adjustment Factor (SAF) to establish the "Qualifying HERS Index" for proposed ENERGY STAR homes.
5. Adjust all BOP requirements to be in line with the above.

The above procedures will resolve some of the largest challenges with respect to advancing the ENERGY STAR new homes program. It will document and explicitly remove the home size factor that currently advantages larger homes and disadvantages smaller homes. It will achieve EPA's policy objective of providing ENERGY STAR new homes that are at least 15% more efficient than prevailing national model codes. It will provide clear guidance to builders and consumers regarding the HERS Indices that are expected from ENERGY STAR labeled homes.

When coupled with EPA's proposed Size Adjustment Factor, it is likely to seriously impact home size selection. For example, if a builder or homeowner chooses to build a 5,000 ft^2, 3-bedroom home, they will quickly and easily be able to determine from EPA's qualification guidelines that the required qualifying HERS Index for this home is $77*(2200/5000)^{0.25} = 62$. This level of explicitness likely will result in additional success for EPA's home size initiative.

It is also strongly recommended that EPA not allow homes with heat pumps in climate zones 4-8 to qualify through EPA's Builder Option Package but instead require homes with heat pumps in these climates to qualify through the performance path, achieving a specified HERS Index.

RESNET also has strong concerns about "gaming" with EPA's proposed ENERGY STAR Reference Design home concept. It is unclear whether a Rater would be allowed to manually create the "ENERGY STAR reference home", find out the target index, do additional calculations to adjust the index if the home is bigger than the benchmark size, and then do a rating on the proposed home. This would create a nightmare from the perspective of quality assurance. It invites gaming, offers many more opportunities to make mistakes, and would require saving, tracking, and providing QA on two rating files (the standard design home and the rated home) for every address. This is simply not a viable option.

III. Size Adjustment Factor (SAF)

EPA proposes to limit the prescriptive qualification path to homes of specific size. This size limitation is tied to the number of bedrooms in the home. This home size limitation starts at 1000 ft^2 for 1 bedroom homes and is incremented by 600 ft^2 for each additional bedroom, such that the three bedroom home baseline size is 2200 ft^2, and so forth. Homes that exceed these size limits must qualify for the ENERGY STAR label using the performance path, for which EPA has proposed a Size Adjustment Factor (SAF). The proposed SAF is equal to the forth root of the home size ratio, which is the baseline size established by EPA for the specified number of bedrooms divided by the size of proposed home.

Figure 2 illustrates how the proposed SAF will impact an ENERGY STAR home's threshold qualifying HERS Index. As proposed homes exceed EPA's baseline size, SAF decreases in value. The threshold qualifying HERS Index is determined by multiplying the ENERGY STAR Reference Design home's HERS Index by SAF. Thus, as home size increases beyond EPA's baseline, the threshold qualifying HERS Index decreases by the factor SAF. A proposed home that is twice as large as the EPA baseline would have a threshold qualifying HERS Index that is 84% of the HERS Index for the ENERGY STAR Reference Design home.

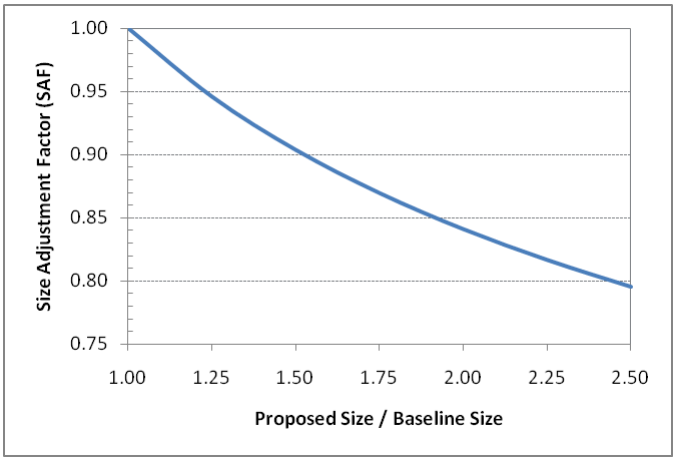

Figure 2. EPA's proposed Size Adjustment Factor (SAF) shown relative to the ratio of the proposed size divided by EPA's baseline size.

RESNET's Position on Size Adjustment Factor

RESNET lauds EPA's proposal to account for the size of a home in labeling of ENERGY STAR Homes. It is good energy policy. The proposed method of using the forth root of the size ratio appears to strike the correct balance and could be fairly easily incorporated into rating software programs.