EPA Response to RESNET's Comments on the Proposed ENERGY STAR 2011 Qualified New Homes Guidelines

Introduction

In June 2009, RESNET provided comments on EPA's proposed ENERGY STAR 2011 New Homes guidelines, the main discussion points of which are contained in the following two documents:

1. RESNET's position paper on the proposed guidelines, titled "*RESNET Summary and Positions On EPA's Proposed ENERGY STAR New Homes Guidelines (v3.0)", located at:* http://www.resnet.us/hotnews/2009-06-19.pdf and;
2. Dr. Philip Fairey's June 14, 2009, FSEC Research Report entitled *"Analysis of the ENERGY STAR Reference Home Concept as Proposed for EPA's 2011 National Program Requirements",* located at: http://resnet.us/EPAv3-HERS.pdf.

EPA has reviewed these documents, along with all other comments submitted by respondents. In response, it has prepared a document titled "EPA Responses to ENERGY STAR 2011 Qualified New Homes Comments", located on EPA's Web site, that details all policy changes that resulted from the first comment period and provides accompanying rationale. The EPA response document addresses the points raised by RESNET. However, given the breadth and depth of RESNET's comments on this topic, EPA has also prepared this extended response to address their concerns.

Overview of EPA Objectives for the 2011 Guidelines

To frame EPA's response to RESNET, it is worth first noting EPA's objectives during the development of the proposed 2011 guidelines:

1. To maintain a viable public/private voluntary partnership whose primary objective is to transform the residential construction market through the construction of homes that save energy and reduce associated greenhouse gas emissions;
2. To continue to achieve meaningful savings in qualified homes, which has historically been defined as at least 15% energy savings over non-qualified homes built to the prevailing energy code;
3. To integrate key building science principles that promote an effective thermal enclosure system, a quality-installed HVAC system, and a complete water-management system, so that qualified homes will achieve savings without sacrificing comfort, indoor air quality, or durability.
4. To improve the consistency of savings between homes that are built to the performance path and those built to the prescriptive path.
5. To minimize the chance that changes in features that are not dictated by the guidelines, such as fuel type, house size, housing type (i.e., single- vs. multi-family), geographic location, number of stories, quantity of bedrooms, and foundation type, will adversely affect the measures selected for qualification.

Relying on its experience of designing and implementing the program for nearly 15 years, EPA believes that its proposal for the 2011 guidelines effectively meets the objectives listed above. In addition, the proposed guidelines achieve this while continuing to fully embrace RESNET HERS rating algorithms, the use of the RESNET HERS Reference Home, and the use of RESNET-certified HERS Raters to implement the program.

Summary and Discussion of RESNET's Comments

RESNET prepared a response documenting their positions on various aspects of EPA's proposed 2011 guidelines, including the ENERGY STAR Reference Design, the performance path, the inspection checklists, and the cost of implementation. Each topic is summarized and discussed below.

ENERGY STAR Reference Design

The primary concern expressed by RESNET regarding the proposed ENERGY STAR Reference Design, which forms the basis of the prescriptive and performance path, is that it will not meet EPA's stated policy goal of achieving at least 15% savings with respect to prevailing minimum codes (presumed to be the 2009 IECC). RESNET was particularly concerned about the performance of heatpumps in cold climates and strongly recommended that EPA not allow homes with heat pumps in climate zones 4-8 to qualify through the prescriptive path, but instead require homes with heat pumps to qualify through the performance path.

EPA has clarified and modified several key components of the ENERGY STAR Reference Design as a result of the first comment period, which should resolve the concerns about the savings that will be achieved. Changes that will increase savings include:

- A reduction of infiltration levels by 1 ACH50 in all climates to reflect improved practices for air sealing.
- An increase in heatpump efficiency for cold climates, as follows:
  - CZ 4: ≥ 8.50 HSPF / 14.5 SEER / 12 EER air-source heatpump with electric backup;
  - CZ 5: ≥ 9.25 HSPF / 14.5 SEER / 12 EER air-source heatpump with electric backup;
  - CZ 6: ≥ 9.50 HSPF / 14.5 SEER / 12 EER air-source heatpump with electric backup;
  - CZ 7-8: ≥ 3.3 COP / 14.1 EER ground-source heatpump.
- A modification of the window area to align with the 2009 IECC, which sets the window area equal to the rated home window or to 15%, whichever is less.
- A clarification that the window performance will be aligned with the ENERGY STAR Program Requirements for Residential Windows, Doors, and Skylights – Version 5.0.

Note that the prescriptive path will also allow the use of dual-fuel air-source and ground-source heatpumps in any climate for compliance. Also note that the performance path will allow any system type, window area, or infiltration level, as long as the selected bundle of measures achieves a HERS index that is equal or better than the ENERGY STAR HERS index target.

EPA has also eliminated several energy-saving measures as a result of the first comment period, but doesn't believe that this will adversely impact the goal of obtaining at least 15% savings. Changes include reduction of the furnace efficiency from 92% to 90% AFUE to align with the current ENERGY STAR Furnace guidelines and the elimination of the requirements for low-flow showerheads and efficient hot water distribution systems to reduce confusion with EPA's new Water Sense guidelines. It does not appear that FSEC's analysis included any savings for the water-efficiency measures; therefore, this should not impact RESNET's concerns about overall savings. Furthermore, the modifications regarding window area, window performance, and infiltration should more than offset the reduced furnace efficiency.

As a means of developing illustrative savings, EPA evaluated fourteen typical homes across hot, mixed, and cold climates. Each home was a single-story detached home with 2,200 square feet of conditioned floor area, an even width and length, 8 foot ceiling height, and three bedrooms. Window area to floor area ratio was 15% with windows evenly distributed on all four sides of the home. Slab on grade homes were modeled in climate zones 1 through 3, while unconditioned basements were modeled for homes in climate zones 4-8. Two homes were modeled in each climate zone; one was configured with a gas furnace, gas water heater, and electric air conditioner while the other was configured with an electric heatpump and electric water heater.

The energy efficiency features of the baseline homes were aligned with the 2009 IECC prescriptive path, though Grade III insulation installation was assumed for walls and Grade II insulation installation was assumed for ceilings and floors. The assumption of degraded insulation installation reflects EPA's experience with typical homes built to code. The rated homes were aligned with the requirements of the prescriptive path of the 2011 guidelines, referred to as the ENERGY STAR Reference Design.

Because not all of the features proposed for the 2011 ENERGY STAR guidelines are currently recognized or credited within RESNET's current implementation of the HERS guidelines, the energy savings were estimated for each rated home using a two-step process.

First, each of the homes was modeled in REM/Rate v12.7 software with all of the features recognized by RESNET's HERS guidelines and able to be entered into the software program.

Second, improvement factors were developed to account for the impacts of the quality-control checklists that are not currently credited in the RESNET standards (i.e., Fully-Aligned Air Barrier and Air Sealing Sections of the Thermal Enclosure System Rater checklist and HVAC System Quality Installation Contractor and Rater checklists). One of these factors was accounted for using modifications to the REM/Rate inputs (i.e., 15% improvement in duct leakage, from 4.0 to 3.4 CFM per 100 sq. ft. of conditioned floor area, to account for the HVAC System Quality Installation Rater checklist). The others were accounted for by modifying the consumption outputs from REM/Rate. First, the heating and cooling energy consumption was reduced by 15% to account for the Fully-Aligned Air Barrier and Air Sealing Sections of the Thermal Enclosure System Rater checklist. Second, to reflect the HVAC System Quality Installation Contractor checklist, the heating consumption was reduced by 2.5% for combustion heating equipment or

by 5% for electric heatpumps and the cooling consumption was reduced by 5% in all homes. More details about the savings assumed for each of these factors is included in the supporting savings and cost summary for each of the checklists, contained within the ENERGY STAR Qualified Homes 2011 Savings & Cost Estimate Summary document and posted on EPA's Web site. These improvement factors were applied to the energy consumption, in Mbtu's, reported by REM/Rate for each home.

Finally, the site energy consumption across all end-uses of each 2009 IECC baseline home and each ENERGY STAR Reference Design home was converted into source energy using the source energy multipliers utilized by FSEC and reported within the 2009 IECC (i.e., 3.16 for electricity and 1.1 for fuels other than electricity). Percent savings of each ENERGY STAR Reference Design home relative to the 2009 IECC baseline home was then calculated. The savings are reported in Exhibit 1.

Exhibit 1: Illustrative Percent Source Savings for ENERGY STAR Reference Design Homes, All End-Uses

	Climate Zone						
	1	2	3	4	5	6	7
Gas Furance / Gas Water Heater Home	19%	17%	19%	18%	19%	23%	25%
Electric Heatpump / Electric Water Heater Home	18%	16%	19%	18%	22%	26%	49%

Note that the particularly high savings achieved for the electric-fuel home in climate zone 7 occurs because the ENERGY STAR Reference Design is configured with a ground-source heatpump in climate zones 7 & 8.

EPA believes that with the modifications that were made as a result of the first comment period, described above, the proposed 2011 guidelines will achieve its stated objective of qualifying homes that are at least 15% better than prevailing energy codes. In addition, EPA believes that as the stringency of prevailing codes increases in the future, the ENERGY STAR Reference Design can be updated accordingly.

Performance Path

For the 2011 guidelines, EPA has proposed a new approach for determining the maximum (i.e., worst) HERS index value that must be achieved to qualify a home. Under the current and past guidelines, a single HERS target was assigned to all homes within a geographic region.

Under the first iteration of the guidelines, all homes had to achieve a HERS score of 86 or better. In the second, current, iteration, all homes qualified in 2004 IECC climate zones 1-5 must achieve a maximum HERS index of 85, while homes in climate zones 6-8 must achieve a maximum HERS index of 80.

With the 2011 guidelines, EPA is proposing to shift from a fixed HERS target for a given region to one that is variable for each qualified home. In brief, this is done through the ENERGY STAR Reference Design. The reference design is a set of energy efficiency measures selected by EPA to be cost-effective, climate-appropriate, available in the marketplace, and, when combined, to achieve at least 15% savings. The ENERGY STAR reference design defines the requirements of the prescriptive path and also forms the basis for the performance path. When the rated home is configured with the ENERGY STAR reference design features and modeled using RESNET-accredited software, the resulting HERS index value becomes the basis for the HERS target for that home. An additional size adjustment factor is applied to large homes to arrive at the final ENERGY STAR HERS index target. Partners may then mix and match upgrade measures in the rated home until the resulting HERS index is at or below the ENERGY STAR HERS index target. For additional details about the proposed performance path and size adjustment factor, please see the document titled "2011 ENERGY STAR HERS Index Target Procedure", posted on EPA's Web site.

RESNET expressed concern about the proposed performance path for two reasons. They believed that EPA's proposal was unnecessarily complex and that allowing the ENREGY STAR Reference Design to be manually configured by Raters would invite gaming, offer many more opportunities to make mistakes, and would require saving, tracking, and providing QA on two rating files for every address. As a result of these concerns, RESNET offered a counter-proposal advocating that EPA adopt a set of fixed HERS index values that is dependent upon benchmark house size and number of bedrooms.

To develop this proposal, FSEC first used EnergyGauge USA v.2.8.02 to calculate the HERS index for 56 housing configurations. All homes modeled had 3-bedrooms, a single-story, wood-frame walls, and a slab-on-grade foundation. While the fuel and system type are not specified, it is assumed that gas furnaces, gas water heaters, and

electric air conditioning equipment were used. For each of eight size/bedroom pair sets, an IECC 2009 Standard Reference Design Home was constructed for each of the seven contiguous U.S. climates, yielding the 56 distinct IECC 2009 Standard Reference Design homes. The HERS index reported by FSEC for each housing configuration is shown in Exhibit 1, along with the average value across each climate zone and the value representing 85% of the average.

Exhibit 2: HERS Index for 2009 IECC Standard Reference Design Homes of Specified Size and Number of Bedrooms across U.S. Climate Zones

Cond. Floor Area (ft2):	1,000	1,600	2,200	2,800	3,400	4,000	4,600	5,200	Range
Number of 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**

While FSEC's analysis was self-admittedly a limited exercise, RESNET proposed that the analysis be expanded using a similar process to develop a single HERS index target for each size/bedroom pair set, towards the development a compliance table in the format illustrated in Exhibit 2.

Exhibit 3: RESNET's Example Format for Defining the HERS Index Threshold for the Performance Path

No. of Bedrooms	1	2	3	4	5	6	7	8
Benchmark CFA	1000	1600	2200	2800	3400	4000	4600	5200
Base HERS Index	78	77	77	76	76	76	76	75

While RESNET's analysis found relatively small variation in HERS index values (i.e., $\leq$ 4 HERS index values within a single location), EPA believes that the more robust analysis that RESNET suggested would reveal a much larger range in results. As a result, adopting RESNET's proposal of selecting a single HERS index value for each size/bedroom pair or even for each climate zone would not meet several of EPA's objectives. These include improving the consistency of savings between homes that are built to the performance path and those built to the prescriptive path and minimizing the chance that changes in features that are not dictated by the guidelines, such as fuel type, house size, housing type (i.e., single- vs. multi-family), geographic location, number of stories, quantity of bedrooms, and foundation type, adversely affect the measures selected for qualification.

As a further illustration of the variation in HERS index values that can be caused by changes in parameters that are not influenced by the guidelines, EPA modeled a series of homes using REM/Rate v12.7. Seven baseline homes were first configured. Each was a single-story detached home with 2,200 square feet of conditioned floor area, an even width and length, 8 foot ceiling height, and three bedrooms. Window area to floor area ratio was 15% with windows evenly distributed on all four sides of the home. Slab on grade homes were modeled in climate zones 1 through 3, while unconditioned basements were modeled for homes in climate zones 4-8. Each home was configured with a gas furnace, gas water heater, and electric air conditioner. The energy efficiency features were aligned with the 2009 IECC prescriptive path, though Grade III insulation installation was assumed for walls and Grade II insulation installation was assumed for ceilings and floors. The HERS index value was calculated for each home and is shown in Exhibit 3.

Exhibit 4: HERS Index Value of Seven Sample Homes Configured to 2009 IECC

	Climate Zone						
Parameter Description	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Baseline	88	90	86	86	88	88	87

These seven baseline homes were then modified by changing a single parameter of the home to illustrate the impact that the change can have on the HERS index value. Each parameter modified was one that is not influenced by the ENERGY STAR guidelines, such as space heating and water heating fuel type, foundation type, housing type (ie., detached, attached), house size and number of bedrooms, and geographic location. The purpose of this exercise was to illustrate the range of HERS index values that occur in homes that are minimally compliant with the 2009 IECC, or,

in other words, the baseline from which savings of the 2011 ENERGY STAR guidelines would be measured for each house.

For the first parameter, the fuel type and HVAC equipment of the baseline homes were changed from a NAECA-minimum gas furnace and gas water heater to a NAECA-minimum heatpump and electric water heater.

Exhibit 5: Sample Deviation of HERS Index Values Due to Change in Fuel Type

	Climate Zone						
Parameter Description	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Baseline: Gas Space & Water Heating	88	90	86	86	88	88	87
Electric Space & Water Heating	89	91	87	87	90	90	90
Max Deviation from Baseline	1	1	1	1	2	2	3

For the second parameter, the foundation type was modified. In addition, the duct location was altered because homes often locate ducts based upon the foundation type. Note that the HERS index value for the conditioned basement configuration in climate zone 3 was omitted, because it had unusually high deviation (HERS 71).

Exhibit 6: Sample Deviation of HERS Index Values Due to Change in Foundation Type

	Climate Zone						
Parameter Description	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Baseline: Slab in CZ 1-3; Unc. Bsmt in CZ 4-8	88	90	86	86	88	88	87
Slab Foundation, Ducts in Attic	88	90	86	87	88	87	86
Unc. Bsmt Foundation; Ducts in Bsmt	83	86	84	86	88	88	87
Cond. Bsmt Foundation; Ducts in Bsmt	82	85	-	84	86	82	81
Crawlspace Foundation; Ducts in Crawlspace	83	86	84	86	88	88	87
Max Deviation from Baseline	6	5	2	3	2	6	6

For the third parameter, the housing type was changed from detached to attached. The attached homes were modeled as interior top-level units with one exposed wall, ducts in the attic, one exterior door, all windows located on the exterior wall, and window area set equal to 15% window area to floor area ratio multiplied by 0.56 to emulate RESNET's rules for calculating the window area of the HERS reference homes with common walls.

Exhibit 7: Sample Deviation of HERS Index Values Due to Change in Housing Type

	Climate Zone						
Parameter Description	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Baseline: Detached Home	88	90	86	86	88	88	87
Attached Home, Interior Unit, Top Level	88	89	86	84	85	84	82
Max Deviation from Baseline	0	1	0	2	3	4	5

For the fourth parameter, the conditioned floor area and number of bedrooms was modified to match other EPA-proposed Benchmark Home configurations: 1,100 sq ft with 1 bedroom and 3,400 sq ft with 5 bedrooms.

Exhibit 8: Sample Deviation of HERS Index Values Due to Change in House Size & Bedrooms

	Climate Zone						
Parameter Description	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Baseline: 2,200 sq ft / 3 Bedrooms	88	90	86	86	88	88	87
1,000 sq ft / 1 Bedroom	91	92	88	88	89	89	88
3,400 sq ft / 5 Bedrooms	87	89	85	84	87	87	86
Max Deviation from Baseline	4	3	3	4	2	2	2

For the fifth parameter, the geographic location used in the baseline home was altered to other locations within the same climate zone.

Exhibit 9: Geographic Location Used for Baseline and Modified Homes

	Climate Zone						
Parameter Description	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Baseline: Geographic Location 1	Miami, FL	Daytona, FL	Dallas, TX	St. Louis, MO	Indianapolis, IN	Burlington, VT	Duluth, MN
Geographic Location 2	Key West, FL	Mobile, AL	Greensville, SC	Raleigh, NC	Harrisburg, PA	Pierre, SD	Fargo, ND
Geographic Location 3	-	Brownsville, TX	Macon, GA	Dodge City, KS	Grand Rapids, MI	St. Cloud, MN	Juneau, AK

Exhibit 10: Sample Deviation of HERS Index Values Due to Change in Geographic Location

	Climate Zone						
Parameter Description	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Baseline: Geographic Location 1	88	90	86	86	88	88	87
Geographic Location 2	88	90	87	89	90	85	87
Geographic Location 3	-	91	89	84	89	87	91
Max Deviation from Baseline	0	1	3	5	2	3	4

Other parameters were also modeled, such as number of bedrooms and number of stories, but these resulted in smaller deviations from the baseline and were not included.

When multiple parameters are modified, the results can be even larger. Several of the parameters modeled in the preceding section were combined into a single home to illustrate this point.

In climate zones 1 through 4, one configuration modified the baseline home by configuring it with a slab-on-grade foundation, 1000 sq ft, 1 bedroom, and in one geographic location. A second configuration modified the baseline home by configuring it with a crawlspace foundation, 3,400 sq ft, 5 bedrooms, and located in a second geographic location.

In climate zones 5 through 7, one configuration modified the baseline home by selecting a particular geographic location. A second configuration modified the baseline home by configuring it as an attached home, and in a different geographic location. The geographic location used for each configuration is listed in Exhibit 10. The resulting HERS index for each configuration is shown in Exhibit 11.

Exhibit 11: Geographic Location Used for Baseline and Modified Homes

	Climate Zone						
Parameter Description	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Geographic Location 1	Key West, FL	Brownsville, TX	Macon, GA	Raleigh, NC	Harrisburg, PA	Burlington, VT	Kodiak, AK
Geographic Location 2	Miami, FL	Daytona, FL	Dallas, TX	St. Louis, MO	Grand Rapids, MI	Pierre, SD	Duluth, MN

Exhibit 12: Deviation in HERS Index Between Baseline & Multiple Modeled Attributes

	Climate Zone						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Configuration 1	91	91	89	91	90	88	93
Configuration 2	81	85	82	84	85	81	82
Deviation	10	6	7	7	5	7	11

As can be seen in Exhibit 11, just modifying a few parameters that are not dictated by the ENERGY STAR guidelines can results in 5 to 11 point variations in HERS index value within a single climate zone. Again, this does not include all possible permutations, so the absolute range in results would grow as more parameters were modeled.

Because of this natural variation in values, selecting a single HERS index value for each climate zone, or for a range of climate zones as is done under the current guidelines, presents a significant challenge to the success of the ENERGY STAR New Homes program. That is, it is not possible to fully align the stringency of the performance path and prescriptive path. Every home minimally compliant with the 2009 IECC will achieve a specific HERS index value that is often different from other baseline homes, as illustrated in the preceding exhibits. Therefore, when the prescriptive path is applied to each home, the resulting HERS index will also be variable. If all homes using the performance path are required to achieve a single HERS index value, then the variation between homes utilizing the performance and prescriptive path would be significant. For example, if the HERS index value was set at the midrange of the variations shown in Exhibit 12, then the discrepancy would be between 2.5 and 5.5 points. If additional modeling was done, this variation would grow even larger.

There are two primary implications of having a performance path and prescriptive path that are not aligned in stringency:

- Home configurations that naturally score better on the HERS scale (e.g., large homes in favorable cities or climates) will be able to eliminate a number of measures required in the prescriptive path and still qualify for the program.
- Home configurations that naturally score worse on the HERS scale (e.g., small homes in less favorable cities or climates) will have to add measures that go well beyond the prescriptive path to qualify for the program.

RESNET's proposal does not resolve this central challenge. To achieve parity between the performance and prescriptive path, many more than the proposed eight HERS index target values would be needed. Just to overcome the significant variations caused by location, foundation type, and house size, at least dozens of targets would need to be set. In fact, to achieve true parity between the two paths, a separate target would need to be designated for each home, which is what EPA has proposed.

EPA's proposal for the performance path resolves this challenge because, by definition, it will set the HERS index target for the performance path equal to the performance that would be achieved if the prescriptive path was followed for each individual home (albeit, with a size modification factor to increase the stringency of the target for large homes). As a result, homes that have variable parameters that EPA has little to no influence over (e.g., foundation type, number of stories, house size) will not be able to significantly reduce the stringency of the measures selected for participation in the program.

Another important outcome of this approach is that natural variations in RESNET-accredited software programs will be neutralized. Because the HERS index target will be determined by modeling the prescriptive path in the same software that is used for the performance path, the process remains internally consistent. For example, consider two software programs evaluating a home with an electric heatpump in a cold climate. If one program produces a score of 85, while the other produces a score of 90, then which program should be used to set a static HERS index target that is 15% better? With EPA's approach, the performance target and the measures that are traded off to achieve that target are modeled using the same software program and version.

For these reasons, EPA feels that its proposal will best meet the objectives for the 2011 ENERGY STAR guidelines. Furthermore, it believes that RESNET's proposal will not satisfy these objectives to the same degree.

Regarding manual versus automatic configuration of the ENERGY STAR Reference Design, EPA would prefer that all homes be automatically configured within RESNET-accredited software programs. However, because it cannot require private developers to implement such features, it has proposed a performance path that can be modeled manually until such software becomes available. EPA has clarified within the national program requirements that Raters shall manually configure the ENERGY STAR Reference Design only until a version of the RESNET-accredited software program used by each Rater becomes available that automatically configures the ENERGY STAR Reference Design and calculates its associated HERS index value and then applies the appropriate Size Adjustment Factor to determine the ENERGY STAR HERS index target. Upon announcement of the release of such a version, Raters using that software program shall have 60 days to begin all new ratings with this updated version.

In addition, if vendors don't automate the process, EPA believes that the proposed performance path should not impose a significant burden. This is because the ENERGY STAR Reference Design is very similar to the rated home. Therefore, once the ENERGY STAR Reference Design has been modeled, minimal additional effort will be required to model the rated home, which is a task that all Raters must already do under the current guidelines.

Inspection Checklists

RESNET also expressed concern about the new checklists. In addition to general cost concerns, which are discussed in the next section, RESNET provided specific feedback about the HVAC System Quality Installation checklists and the Water Management System checklists.

Regarding the HVAC System Quality Installation checklists, RESNET is concerned that some Raters won't have sufficient training to properly review the contractor checklist, while other Raters with advanced knowledge won't have the authority to correct contractor mistakes. In addition, RSENET is doubtful that contractors will have the knowledge to complete the checklist and is unsure of how these requirements will be conveyed.

RESNET is also concerned that certain system types are excluded from the checklist (e.g., boilers and ground-source heatpumps) and that the checklist is not aligned with the ACCA/ANSI 5 QI-2007 protocol.

As a result of these concerns, RESNET recommends that these checklists be optional, rather than mandatory, and that they be fully aligned with the ACCA / ANSI protocol.

Regarding the Water Management System checklists, RESNET is concerned that the requirements extend beyond those typically included in a rating, that significant training will be required, and that verification of many of the items will require additional site visits.

While EPA encourages Raters to engage the contractors regarding the HVAC System Quality Installation Contractor checklist, it has revised the program requirements to state that "the Rater is only responsible for ensuring that the Contractor has completed the Contractor checklist in its entirety, not for assessing the accuracy of the load calculations or field verifications included. It is the contractor's exclusive responsibility to ensure the system design and installation comply with the Contractor checklist specifications".

EPA agrees with RESNET that the HVAC checklists should be aligned with industry standards and has revised the proposed guidelines to align with ANSI / ACCA 5 QI-2007 protocol, including the addition of requirements for proper sizing and installation of furnaces and heatpumps. While commissioning of other types of HVAC equipment would also be valuable, the current ANSI / ACCA protocol only encompasses furnaces, heatpumps, and vapor-compression cooling equipment. At this time EPA does not intend to invest in the development of additional protocols for system types that are not covered by the ANSI / ACCA protocol.

Regarding the Water Managed Construction Checklist, which has been renamed to the Water Management System Checklist, EPA recognizes that it does not contribute to energy savings, but considers it inextricably linked to the other thermal enclosure requirements that contribute to the meaningful energy savings promoted by the program. Specifically, the requirements for reduced infiltration, continuous air barriers, and quality-installed insulation substantially reduce the tolerance of the home to handle unintended water flows.

To help reduce verification time and costs associated with the Water Management System checklist, EPA has divided it into one checklist for builders and one checklist for Raters. Approximately half of the number of the items originally proposed have been relocated to the builder checklist, including the items related to roof inspections, moisture content, and water damage. The remainder of the items have been relocated to the Rater checklist. Builders will be responsible for verifying all of the items on the builder checklist and two additional allowances have been provided on the Rater checklist for further flexibility.

EPA agrees with RESNET that significant training will be required to successfully implement the new checklists. EPA is planning to develop training for all partners and, in particular, more comprehensive training for Raters on the new guidelines. General trainings will be available online. More complex and in-depth trainings will be available in multiple markets, and will cover the new checklists and the Raters' responsibilities and requirements for each checklist. Additionally, EPA already has plans for developing supplemental technical guidance corresponding to each of the new checklists to provide further technical support to its partners. Lastly, EPA is working with ACCA and other HVAC professionals regarding the development of appropriate training for Raters and HVAC contractors regarding the new guidelines.

Finally, EPA believes that it is critical that the new guidelines, in addition to producing meaningful savings, provide a comprehensive building science package that helps to ensure a complete and effective thermal enclosure system, HVAC system, and water-management system. These additional components are interrelated with the energy efficiency requirements and research indicates that their omission is the major cause of consumer complaints and possible defects in qualified homes. Moreover, these additional components allow EPA to market qualified homes as being both energy efficient and high quality to American homebuyers. Thus, EPA must define the guidelines in a way that qualified homes will offer both meaningful energy savings, accompanied by associated reductions in greenhouse gas emissions, and compelling value for partners and consumers.

Cost of Implementation

Regarding implementation of the proposed 2011 ENERGY STAR guidelines, RESNET was concerned that the high costs may prove to be burdensome in the current housing crisis and noted that EPA has not shown evidence that builders or consumers would be willing to bear these additional costs.

While EPA recognizes that the costs have increased for the proposed 2011 guidelines, it is willing to accept some drop in initial builder participation to ensure a cost-effective and comprehensive whole-house approach that offers meaningful savings and is grounded in building science principles. EPA believes that these guidelines will offer builders a much more competitive product relative to new homes that are minimally code-compliant and to existing homes through increased customer satisfaction, reduced risk, and substantially reduced energy consumption and

related greenhouse gas emissions. Ultimately, by committing to guidelines that emphasize added value over first cost, EPA believes long-term builder participation will increase.

With that said, EPA has made a number of changes that should help ease the cost burden for partners.

First, EPA has added an additional one year transition period from January 1, 2011 to January 1, 2012 during which lack of compliance with the new checklist requirements will not result in disqualification of the home. That is to say, for each home qualified during the 2011 calendar year, all requirements of the new performance path and prescriptive path shall be met and all mandatory checklists shall be completed, but only Sections 3 and 5 of the new Thermal Enclosure System Checklist shall be enforced. These checklist sections are similar to the requirements in the current Thermal Bypass Checklist. Effectively, this plan allows partners a full two years to educate and train partners and allow them to integrate the new mandatory checklists into their workflows prior to full implementation.

Second, EPA has split the Water-Managed Construction checklist that was originally proposed into two new checklists – one Water Management System checklist for builders and one for Raters. Builders will be responsible for verifying all of the items on the builder checklist and two additional allowances have been provided on the Rater checklist for further flexibility. In addition, EPA has eliminated the stand-alone Quality Framing checklist and current Thermal Bypass Checklist and, instead, relocated the requirements to a new Thermal Enclosure System Rater checklist and increased the total allowances for builder-verified items to eight. These two changes should address the majority of concerns about the need for more than two site visits and help to minimize cost increases.

Third, EPA has eliminated mandatory requirements for lighting, appliances, ceiling fans, R-8 duct insulation, and efficient hot water distribution measures. The exhaust fan requirements will be maintained as a mandatory requirement for full-baths only. The efficient hot water distribution measures have been removed from this iteration of the guidelines altogether. The other items will be maintained in the prescriptive path and within the ENERGY STAR Reference Design to influence their use in labeled homes. This should provide partners using the performance path with extra flexibility to meet the ENERGY STAR requirements with the most cost-effective bundle of measures that they can devise.

Fourth, EPA intends to help defray costs by providing extensive training resources to partners, including field guides, webinars, and regional training classes; and by developing and providing new marketing materials for partners.

While EPA understands that the 2011 guidelines will entail higher incremental costs, it believes that these costs are warranted as part of maintaining a cost-effective and meaningful program.

Conclusion

EPA appreciates RESNET's valuable input regarding the development of the 2011 ENERGY STAR New Homes guidelines. It has carefully considered the comments provided, along with the comments from all respondents, and has made significant modifications to the original proposal as a result. These changes help to ensure the anticipated savings, clarify the requirements of the guidelines, increase flexibility to select preferred measures under the performance path, and ease the time and cost burden of implementing the new checklists.