Results of RESNET Board of Directors Reconsideration Ballot on Adopting the HERS$_{H2O}$© Technical Guidelines

February 23, 2018

The following are the results of the initial ballot of the RESNET Board on adopting the HERSH2O Technical Guidelines:

Shall the RESNET Board of Directors adopt the RESNET HERS$_{H2O}$© Working Group's Proposed HERS$_{H2O}$© Technical Guidelines?

Yes (18)	No (2)	Abstain (0)	Not Voting (0)
Jim Amorin	Emelie Cuppernell*		
Jacob Attalla	Abe Kruger**		
David Beam			
Dave Bell			
Bob Eipert			
Philip Fairey			
Matt Gingrich			
David Goldstein			
Andrew Harris			
Roy Honican			
John Hensley			
Mark Johnson			
Cy Kilbourn			
Paulette McGhie			
Chris McTaggart			
Curt Rich			
Nancy St. Hilaire			
Clayton Traylor			

The following are Emelie Cuppernell's reasons for her no vote:

1) ***Equations need clarification and editing. For example, the very first equation is multiplied by 1. See below. This makes no sense. My assumption is that this was supposed to be 100, to make a whole number percentage? The 1 either needs to be removed, because it's pointless, or edited to whatever it was intended to be.***

1.0 Calculating HERS$_{H20}$ Index. A **HERS$_{H20}$** Index shall be calculated as:

$$= \frac{indoor\ and\ outdoor\ gpd\ for\ the\ rated\ home}{indoor\ and\ outdoor\ gpd\ for\ the\ reference\ home} * 1$$

2) ***There is inconsistency in the language in definitions. In 2.0 "Dishwasher use" vs "Fixture water use" vs "toilet" I think all should say "water use"?***
3) ***The equations are very cumbersome and constants should be simplified. Maybe they are specified separately to give more background? If so I think an explanation after is more appropriate For example in 2.4 - Simplify the constants in this equation, this seems overly confusing this way. Same for 3.0 equations, these should be simplified. See example below.***

shall be calculated as:

$$refCWgpd = \frac{4.52\,X\,(164 + 46.5 * Nbr) * \left[\frac{(3 * 2.08 + 1.59)}{(2.874 * 2.08 + 1.59)}\right]}{365}$$

Where:

4) ***Order of operations for equations not clear in some equations. For example if a+b*c is written, this could be (a+b)*c or a+(b*c) and these give different results. I assume this follows proper order of operations, but parenthesis should be added to eliminate confusion. Example included in comment #3 above and also in equation below.***

$$\text{Equation 2:}\left[\frac{\exp(B)}{1+\exp(B)}\right] * 1.22257 * [1.4233 + 0.6311 * \text{netET} + 0.9376 * \text{Ref\_Irr\_Area}]$$

** The following are Abe Kruger's reason for his no vote:

I think the HERSH2O Technical Guidelines show a great deal of work and effort went into their creation. Overall, I agree with the Guidelines, but I'm concerned that they do not adequately take into account water reuse systems (gray water) or onsite generation through rainwater harvesting. I raised this issue at the 2017 Fall Board meeting. It seems like HERSH20 should account for these types of systems similarly to HERS and onsite renewables. If this was intentional, I'd like to better understand why this decision was made. I also apologize if onsite generation/reuse is included and I'm just missing it.

According to the current board procedures for electronic ballots a reconsideration ballot took place for those board members who voted on the proposal.

Ms. Cuppernell's and Mr. Kruger's reasons for their no votes were sent to all of the Board members who voted.

The co-chair of the RESNET HERS$_{H20}$ Modeling and Development of Reference Home Subcommittee Philip Fairey has the following response to Emelie Cuppernell's comments:

Item #1. Emelie is correct. This is a typo and will be corrected.

Item #2. Will be corrected by adding "water use" at the appropriate point in each definition

Item #3. Yes, some equations, like 2.4 could be simplified but then it would be quite hard to impossible to trace the origin of values in the equations - can't have it both ways. This could prove important both for future improvements to the model or for harmonizing with the ERI. For example, the refCWgpd equation in 2.4 is identical to the equation used in Addendum A of 301-2014, which in turn comes from the combined solution of equations 4.2-9a and 4.2-9b in Standard 301-2014.

The current formulas is what is stated below equation 2.4: "This value is determined in accordance with ANSI/RESNET/ICC 301-2014 Addendum A-2015 Domestic Hot Water Systems."

Any "simplification" should be done in tandem with a future review and revision of Addendum A.

Item #4. Of course, additional parenthesis can be added but the order of operations in mathematics has to be followed whether the parenthesis are there or not PEMDAS (Parenthesis, Exponents, Multiplication, Division, Addition, Subtraction).

The co-chairs of the RESNET HERS$_{H2O}$ Working Group Jacob Attalla, Ed Osann and Jonah Schein have the following response to Abe Kruger's objection:

Abe obviously brings up some good points.

The central question in play is "Should HERSH2O account for water reuse systems (gray water) or onsite generation through rainwater/storm water harvesting?"

The committee considered this issue, and think there's broad agreement that yes, we'd ultimately like to be able to account for this as parallel to how HERS accounts for onsite renewables. BUT, we need to be able to do so in a dependable, data driven, safe way. Ultimately the committee felt that incorporating "alternative water sources" (gray water, storm/rain water capture, etc.) in a way that matched the rest of the guidelines for technical rigor just wasn't possible right now.

To play on the comparison to onsite renewable energy a bit, let's consider all the standards that exist today regarding solar panels in terms of manufacture, installation, maintenance, and estimation of energy likely to be produced. It's quit an ecosystem that not only lets us account for the presence of solar panels in a home's total energy usage, but also lets us ensure that the solar panels will work the way that we intend them to. Of course it wasn't like this always. The original HERS calculations for example, had no means of calculating the contribution of onsite renewables and incorporating them into a score. But over time as the solar

industry matured and developed its own suite of industry standards, protocols, and calculations, HERS was able to incorporate this information and ultimately yield a better, more accurate score.

To bring things back to onsite alternative water sources, we're at the early stages still. Even the most basic standards for the design and operation of these systems are just a couple of years old (NSF 350 for reuse and ARCSA/ASPE 63 for storm and rain water). Relative to where these industries were ten years ago, we think those standards are cause for a great deal of optimism. But how do we take the next step and be able to describe (for example) the impact that a rain water harvesting system with a specific treatment technology with XX gallons of storage in a climate with XX inches of rainfall distributed in a certain way throughout the year will make total water use in a home? While this and similar questions will eventually yield to analysis, the committee simply did not have the time and resources to take this on in version 1.0 of a rating system that, even without it, will provide great value to builders and homeowners.

We certainly do need to begin looking at additional technologies and strategies that can start to bring a home's HERSH2O score down near zero. But we will need more data on each of these measures, and we remain concerned about bringing a version of HERSH2O into the market that has calculations for alternative sources that aren't well documented or properly vetted. That's not meant to discredit the accomplishments of net-zero water homes, dismiss the role they play in the industry as technology incubators, or discourage raters and builders from pursuing water efficiency. After all, homes are a water-intense user so most stock and new home's today have ample room to aggressively pursue efficiency. But when we start talking about large numbers of near net-zero water use homes we have start asking questions about water quality and infrastructure that we don't think anyone is prepared to answer. We need to exercise an abundance of caution on the issue.

RESNET's HERS$_{H20}$ program manager Ryan Meres has the following comments on Abe's objections:

The purpose of this first version of the HERS$_{H2O}$ Guidelines is to provide the basis for a pilot study and the ANSI standard development process for the Water Rating Index. Since the Guidelines will need to go through the full ANSI process, including consideration by the new Water Rating Index Standard Development Committee and public review, there will be additional opportunities to consider rainwater and gray water systems, if a sufficient level of documentation is available.

During the development of the HERS$_{H2O}$ Guidelines, the Guidelines Working Group did consider the inclusion of gray water and rainwater. However, there was not enough data available to support the impact of either type of system on a home's water use, so the Working Group decided not to include them in version

one. Members wanted the guidelines to be defensible before associating their names to it.

The draft guidelines were amended to address the issues raised and is attached as Attachment A. The following are the results of the reconsideration ballot:

Shall the RESNET Board of Directors adopt the February 16, 2018 amended RESNET HERS$_{H20}$© Working Group's Proposed HERSH2O© Technical Guidelines?

Yes (19)	**No (1)**	**Abstain (0)**	**Not Voting (0)**
Jim Amorin	Abe Kruger		
Jacob Attalla			
David Beam			
Dave Bell			
Emelie Cuppernell			
Bob Eipert			
Philip Fairey			
Matt Gingrich			
David Goldstein			
Andrew Harris			
Roy Honican			
John Hensley			
Mark Johnson			
Cy Kilbourn			
Paulette McGhie			
Chris McTaggart			
Curt Rich			
Nancy St. Hilaire			
Clayton Traylor			

The RESNET Board adopted the February 16, 2018 amended RESNET HERS$_{H2O}$© Technical Guidelines.

Attachment A

RESNET HERS$_{H2O}$

Draft Technical Guidelines

February 16, 2018

1.0 Calculating HERS$_{H2O}$ Index. A **HERS$_{H2O}$** Index shall be calculated as:

$$= \frac{indoor\ and\ outdoor\ gpd\ for\ the\ rated\ home}{indoor\ and\ outdoor\ gpd\ for\ the\ reference\ home} * 100$$

Indoor and outdoor gallons per day (GPD) values for the reference and rated home shall be determined in accordance with sections 3 and 4.

2.0 Determining the Indoor Reference Home GPD. The indoor reference home shall be calculated as:

$$ref_{in}gpd = refFgpd + refWgpd + refDWgpd + refCWgpd + refTgpd + refSofgpd + totOther$$

Where:
refFgpd= daily fixture water use for the reference home
refWgpd= daily water use wasted for the reference home
refDWgpd= daily dishwasher water use for the reference home
refCWgpd= daily clothes washer water use for the reference home
refTgpd= daily toilet water use for the reference home
refSofgpd= daily water softener water use for the reference home
totOther= total other/unidentified water use for the reference home

2.1 Determining Reference Fixture Water Use. Reference fixture water use shall be calculated as:

$$refFgpd = 14.6 + 10 * Nbr$$

Where:
Nbr= number of bedrooms in the rated home

This value is determined in accordance with ANSI/RESNET/ICC 301-2014 Addendum A- 2015 Domestic Hot Water Systems.

2.2 Determining Reference Water Use Wasted. Reference fixture water use wasted shall be calculated as:

$$refWgpd = 9.8 * Nbr^{0.43}$$

Where:
Nbr= number of bedrooms in the rated home

This value is determined in accordance with ANSI/RESNET/ICC 301-2014 Addendum A- 2015 Domestic Hot Water Systems.

2.3 Determining Reference Dish Washer Water Use. Reference dish washer water use shall be calculated as:

$$\text{refDWgpd} = \frac{(88.4 + 34.9 * Nbr) * 8.16}{365}$$

Where:

Nbr= number of bedrooms in the rated home

This value is determined in accordance with ANSI/RESNET/ICC 301-2014 Addendum A- 2015 Domestic Hot Water Systems.

2.4 Determining Reference Clothes Washer Water Use. Reference clothes washer water use shall be calculated as:

$$refCWgpd = \frac{4.52\ X\ (164 + 46.5 * Nbr) * \left[{(3 * 2.08 + 1.59)} \Big/ {(2.874 * 2.08 + 1.59)} \right]}{365}$$

Where:
Nbr= number of bedrooms in the rated home

This value is determined in accordance with ANSI/RESNET/ICC 301-2014 Addendum A-2015 Domestic Hot Water Systems.

2.5 Determining Reference Toilet Water Use. Reference toilet water use shall be calculated as:

$$refTgpd = refFPO * refGPF * Occ$$

Where:
refFPO= the reference flushes per person per day = 5.05
refGPF= the reference gallons per flush for toilets = 1.6
Occ= the number of occupants = 1.09 + 0.54 * Nbr
Nbr= number of bedrooms in the rated home

2.6 Determining Reference Water Softener Use. Reference water softener water use shall be calculated as:

IF

$the\ rated\ home\ has\ a\ water\ softener$

AND

$$water\ hardness\ at\ the\ rated\ home\ location\ is\ \geq 180\ \frac{miligrams}{liter}$$

THEN

$$\text{refSofgpd} = \frac{grains\ of\ hardness}{gallon\ of\ water} * sum\ of\ indoor\ water\ uses\ in\ the\ reference\ home * \frac{5\ gallons\ used}{1{,}000\ grains\ removed}$$

IF NOT: refSofgpd $= 0$

2.7 Determining total other usage. Total other shall be determined as:

$$totOther = 5.93 * Nbr$$

Where:
Nbr= the number of bedrooms in the rated home

3.0 Determining the Outdoor Reference Home Annual Water Use (in thousands of gallons per year)**.** The reference home outdoor annual water use shall be calculated using the following two equations

*If the rated home has a netET of less than 12 inches/year **OR** the rated home has an automatic irrigation system, use Equation 1.*

Equation 1: $\left[\frac{exp(A)}{1+exp(A)}\right] * 1.18086 * [2.0341 * netET^{0.7154} * Ref\_Irr\_Area^{0.6227} + 0.5756 * ind\_Pool * netET]$

*If the rated home has a netET of greater than 12 inches/year **AND** the rated home does NOT have an automatic irrigation system, use Equation 2.*

Equation 2: $\left[\frac{\exp(B)}{1+\exp(B)}\right] * 1.22257 * [1.4233 + 0.6311 * \text{netET} + 0.9376 * \text{Ref\_Irr\_Area}]$

Either equation shall be constrained as follows:

IF

Rate_Irr_Area < Ref_Irr_Area

THEN

Ref_Out= equation 1 or 2 (as identified above) equation 1 (Using Rate_Irr_Area and pool indicator=0) equation 1 (with Ref_Irr_Area and pool indicator=0)

AND

Outdoor Reference Home GPD shall never be lower than equation 2

Where:
Exp(A)= exponent of [1.4416 + 0.5069 * (Rate_Irr_Area/1,000)]
Exp(B)= exponent of [0.6911 + 0.00301 * netET * (Rate_Irr_Area/1,000)]
Ref_Irr_Area= The size of the irrigated area in the reference home, calculated in accordance with section 3.1
Rate_Irr_Area= The size of the irrigated area in the rated home
netET= The annual historic sum of mean reference evapotranspiration minus the mean precipitation for all months that evapotranspiration exceeds precipitation
ind_Pool= Indicator representing the presence or absence of a swimming pool in the rated home

3.1 Reference Irrigated Area. Reference irrigated area shall be calculated as:

IF

the lot size of the rated home is < 7,000 ft^2

THEN

$$Ref\_Irr\_Area = \text{Lot\_Area} * (0.002479 * \text{Lot\_Area}\text{^}0.6157)$$

IF

The lot size of the rated home is ≥7,000 ft^2 Then

*Ref_Irr_Area = lot_area * 0.577*

Where:

Ref_Irr_Area= The size of the landscape that receives supplemental water in the reference home

Lot_Area= The size of the lot on which the rated home is being constructed

4.0 Determining Indoor Rated Home GPD. The rated home's indoor GPD shall be calculated as:

$$Indoor_{gpd} = Shower_{gpd} + KitchF_{gpd} + LavF_{gpd} + Waste_{gpd} + CW_{gpd} + DW_{gpd} + Toilets_{gpd} + Soft_{gpd} + Other + EP_{gpd}$$

Where:

$Shower_{gpd}$ = daily shower water use for the rated home

$KitchF_{gpd}$ = daily kitchen faucet water use for the rated home

$LavF_{gpd}$ = daily lavatory water use for the rated home

$Waste_{gpd}$ = daily water use wasted for the rated home

CW_{gpd} = daily clothes washer water use for the rated home

DW_{gpd} = daily dishwasher water use for the rated home

$Toilets_{gpd}$ = daily toilet water use for the rated home

$Soft_{gpd}$ = daily water softener water use for the rated home

$Other_{gpd}$ = daily other/unidentified water use for the rated home

EP_{gpd} = daily excess pressure adjustment

4.1 Determining Rated Shower Water Use. Rated home shower water use shall be determined as:

$$Shower_{gpd} = FixtureTot * shower_{pc} * SHeff$$

Where:

FixtureTot= Determined in accordance with ANSI/RESNET/ICC 301-2014 Addendum A-2015 Domestic Hot Water Systems $= \frac{adjFmix}{Fmix} * refFgpd * VintFact$

Shower_pc= Percent of fixture water use consumed by showers = 54%

SHeff= the ratio of the average rated flow rate of showerheads to the reference home flow rate $= \frac{average\ flow\ rate\ of\ showerheads\ in\ the\ rated\ home}{2.5}$

This value is derived from ANSI/RESNET/ICC 301-2014 Addendum A-2015 Domestic Hot Water Systems.

4.2 Determining Kitchen Faucet gpd for the rated home. Kitchen faucet gpd shall be determined as:

$$\mathrm{KitchF}_{\mathrm{gpd}} = FixtureTot * faucet_{pc} * KitchFeff * kitch$$

Where:
FixtureTot= Determined in accordance with ANSI/RESNET/ICC 301-2014 Addendum A-2015 Domestic Hot Water Systems $=\frac{adjFmix}{Fmix} * refFgpd * VintFact$
$faucet_{pc}$= Percent of fixture water use consumed by faucets = 46%
KitchFeff= the ratio of the average rated flow rate of kitchen faucets to the reference home flow rate $=\frac{average\ flow\ rate\ of\ kitchen\ faucets\ in\ the\ rated\ home}{2.2}$
Kitch= the percentage of faucet use that is attributed to kitchen faucets= 69%

This value is derived from ANSI/RESNET/ICC 301-2014 Addendum A-2015 Domestic Hot Water Systems.

4.3 Determining Lavatory Faucet gpd for the rated home. Lavatory faucet use shall be determined as:

$$\text{LavF}_{\text{gpd}} = FixtureTot * faucet_{pc} * LavFeff * Lav$$

Where:
Lav= the percentage of faucet use that is attributed to lavatory faucets= 31%
FixtureTot= Determined in accordance with ANSI/RESNET/ICC 301-2014 Addendum A-2015 Domestic Hot Water Systems $=\frac{adjFmix}{Fmix} * refFgpd$
faucet_pc= Percent of fixture water use consumed by faucets = 46%
LavFeff= the ratio of the average rated flow rate of lavatory faucets to the reference home flow rate = 1 for standard faucets and 0.95 for high efficiency faucets

This value is derived from ANSI/RESNET/ICC 301-2014 Addendum A-2015 Domestic Hot Water Systems.

4.4 Determining Daily Water Use Wasted gpd in the rated home. Waste water use gpd in the rated home shall be determined as:

$$\text{Waste}_{\text{gpd}} = F_{eff} * (oWgdp + sWgdp * WDeff)$$

Where:
F_{eff}= Fixture efficiency of showerheads, kitchen faucets, and lavatory faucets weighted by contribution to total fixture use (by volume)
oWgpd= daily standard operating condition waste hot water quantity as determined by ANSI/RESNET/ICC 301-2014 Addendum A-2015 Domestic Hot Water Systems
sWgpd = daily structural waste hot water quantity as determined by ANSI/RESNET/ICC 301-2014 Addendum A-2015 Domestic Hot Water Systems
WDeff= distribution system water use effectiveness from Table 4.2.2.5.2.11(3) of ANSI/RESNET/ICC 301-2014 Addendum A-2015 Domestic Hot Water Systems

This value is determined in accordance with ANSI/RESNET/ICC 301-2014 Addendum A- 2015 Domestic Hot Water Systems.

4.5 Determining clothes washer gpd in the rated home. Clothes washer gpd in the rated home shall be determined as:

$$\mathrm{CW}_{\mathrm{gpd}} = CAPw * CWwf * ACY/365$$

Where:

CAPw= washer capacity in cubic feet = the manufacturer's data or the CEC database or the EPA Energy Star website or the default value of 2.874 ft^3

CWwf= clothes washer water factor= manufacturer's data

ACY= Adjusted cycles per year determined in accordance with ANSI/RESNET/ICC 301-2014 Addendum A-2015 Domestic Hot Water Systems

This value is determined in accordance with ANSI/RESNET/ICC 301-2014 Addendum A- 2015 Domestic Hot Water Systems.

4.6 Determining dish washer gpd in the rated home. Dish washer gpd in the rated home shall be determined as:

$$DW_{gpd} = ((88.4 + 34.9 * Nbr) * \frac{12}{dWcap} * \frac{\left[4.6415 * \left(\frac{1}{DW\_EF}\right) - 1.9295\right]}{365}$$

Where:

Nbr= number of bedrooms in the rated home

dWcap= capacity of the dishwasher in the rated home (in cubic feet) as included in the manufacturer's data

DW_EF= The energy factor of the dishwasher installed in the rated home

This value is determined in accordance with ANSI/RESNET/ICC 301-2014 Addendum A- 2015 Domestic Hot Water Systems.

4.7 Determining Toilet gpd in the rated home. Toilet gpd in the rated home shall be determined as:

$$Toilet_{gpd} = refFPO * gpf * Occ$$

Where:

refFPO= the reference flushes per person per day = 5.05

gpf= the average gallons per flush of all toilets installed in the rated home

Occ= the number of predicted occupants in the rated home= 1.09 + 0.54*Nbr

Nbr= the number of bedrooms in the rated home

4.8 Determining Water Softener gpd in the rated home. Water softener gpd in the rated home shall be determined as:

$$Soft_{gpd} = \frac{grains\ of\ hardness}{gallon\ of\ water} * sum\ of\ indoor\ water\ uses\ in\ the\ rated\ home * gallons\ used\ per\ 1{,}000\ grains\ of\ hardness\ removed$$

4.9 Determining Other gpd in the rated home. Other gpd in the rated home shall be determined as:

$$Other = TotOther_{br} * Nbr$$

Where:
TotOther_br= the average value (in gpd) of other/unidentified usage per bedroom= 5.93 gpd
Nbr= the number of bedrooms in the rated home

4.10 Determining Excess Pressure Adjustment in the rated home. Excess pressure adjustment gpd in a rated home without a pressure-reducing valve or a pressure tank shall be determined as:

$$EP_{gpd} = \text{MAX}\{[(Showergpd + (0.5 * (LavFgpd + KitchFgpd + Othergpd))) * .006 * (PR - 90)],0\}$$

Where:
PR = Static water pressure (in psi) measured at the indoor fixture outlet on the lowest floor and (if more than one) closest to the water service entry to the house

Note: Shower and lavatory faucets controlled by integral or accessory pressure-compensating devices may be excluded from this equation.

5.0 Determining Outdoor Rated Home GPD. The rated home outdoor GPD shall be calculated as:

If the rated home has an automatic irrigation system

$$\left[\frac{exp(A)}{1 + exp(A)}\right] * 1.18086 * \left[2.0341 * netET^{0.7154} * Rate_{Irr_{Area}}{}^{0.6227} + 0.5756 * ind_{Pool} * netET\right]$$

If the rated home does not have an automatic irrigation system

$$\left[\frac{\exp(B)}{1 + \exp(B)}\right] * 1.22257 * [1.4233 + 0.6311 * \text{netET} + 0.9376 * \text{Rate\_Irr\_Area}]$$

Outdoor Rated Home GPD shall never be lower than

$$\left[\frac{\exp(B)}{1 + \exp(B)}\right] * 1.22257 * [1.4233 + 0.6311 * \text{netET} + 0.9376 * \text{Rate\_Irr\_Area}]$$

Where:
Exp(A)= exponent of [1.4416 + 0.5069 * (Rate_Irr_Area/1,000)]
Exp(B)= exponent of [0.6911 + 0.00301 * netET * (Rate_Irr_Area/1,000)]
Irr_Area= The size of the landscape that might receive supplemental water in the rated home
netET= The annual historic sum of mean reference evapotranspiration minus the mean precipitation for all months that evapotranspiration exceeds precipitation
ind_Pool= Indicator representing the presence or absence of a swimming pool

5.1 Smart Controllers. Sensor and weather based irrigation controllers that are certified by the U.S. EPA WaterSense program shall decrease the portion of predicted rated home outdoor water use associated with irrigation (less the water use associated with pools) by 15% in homes that have automatic irrigation

5.2 Residential Irrigation Capacity Index (RICI). In rated homes where documentation is provided, a RICI may be calculated as

$$RICI\_rat = \frac{sum\ of\ flow\ (gpm)\ of\ all\ irrigation\ valves}{ft^2\ irrigated\ area}\ X\ 1{,}000$$

5.2.1 Applying RICI. A rated home where documentation for a RICI is provided may adjust the portion of water use associated with irrigation (less the water use associated with pools) in the rated home's outdoor gpd by 10% for every point from a baseline RICI (RICI_ref) of 5.

5.3 Commissioning of an Automatic Irrigation System. In rated homes where documentation has been provided, the water use associated with irrigation shall be decreased by 5% were a certified professional (as identified by a certification labeled by the U.S. EPA WaterSense program or other certification program identified by RESNET) in accordance with ASABE 626 verifies:

- DU is at least 65% on turf areas
- Sprinklers are operating at the correct pressure +/- 10%
- The system operates without leaks
- The system prevents runoff and overspray from leaving the property (checked during the audit)
- Two seasonal water schedules (initial grow-in period and established landscape) are posted at the controller

Appendix A: Applying adjustments to the outdoor water use of rated homes. Because the HERS$_{H20}$ Index model includes a number of percent adjustments for the outdoor water use of the rated home, the order of application becomes important. The correct order in which to apply these adjustments is as follows:

1	Use of a smart controller	Reduces the outdoor water use in the rated home by 15% for using a smart controller as defined in section 5.1
2	Use of the RICI adjustment	Adjusts the outdoor water use in the rated home by 10% for every point of RICI reduction below a baseline of 5 as defined by section 5.2
3	Commissioning adjustment	Adjusts the outdoor water use in the rated home by 5% when a certified irrigation professional commissions the system as defined in section 5.3.