Comments on the October 2011 Notification of Intent to Modify the WaterSense Final Specification for Single Family New Homes

April 16, 2012
Comments on the Notification of Intent to Modify the WaterSense Final Specification for Single Family New Homes

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April 16, 2012
Hello,

I feel strongly that there should be a limit on the amount of turfgrass allowed for WaterSense labeled new homes.

I also think that there should be a requirement that some kind of water budget be used in planning and in operating irrigation systems. This is, however, a completely different requirement than a limit on the amount of turfgrass in a landscape. A turfgrass landscape is inherently not water-efficient; other options are available. WaterSense should be a driver towards increased water efficiency. WaterSense, like EnergyStar, generally strives for 20% improvement over current technology or code. This suggests that a reasonable limit on turfgrass in a WaterSense landscape be no more than 80% of the amount of turfgrass in a “standard” landscape. Assuming that driveways and sidewalks take up part of the landscape, perhaps the limit of 40% turfgrass should remain as-is.

Thank you for your consideration.

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October 25, 2011

EPA WaterSense

RE: Comments from WaterSense Partner to NOI Changes to WaterSense New Home Specification

Forward
I am pleased to contribute further to your efforts to incentivize builders to build homes which are, by design, potentially efficiently managed real estate properties. The fact remains, a great system that is mismanaged is not worthy of any label of value. As I have argued, the plans should include incremental (as landscape matures) water budgets, plain and simple exemplifying system capacity during peak use period and at expected system irrigation efficiency, including management.

+++++++++++++++++++++++++++++++++++++++++++++++++++++++

Your NOI:
WaterSense believes that most of the criteria for a WaterSense labeled new home can be applied to a majority of low-rise multi-family buildings and is considering modification of the scope as stated in Section 1.0 to allow for multi-family buildings three stories or less and multi-family buildings of four or five stories under certain circumstances.

Comment:
There are significant distinctions between multi-family electric and multi-family water. If that’s the basis,

1. Water metering is usually different; it becomes feasible for exterior use.
2. Homeowner can prefer to maintain the front yard, allowing neglect of the rear.
3. Who manages the system is different; proud renter does not regulate irrigation.
Comments on the Notification of Intent to Modify the WaterSense Final Specification for Single Family New Homes

If Team WaterSense could delve into how the system is managed, we all could respond with more certainty. There seems to be a patent aversion to the complexities of soils, expanding rootzones, water, micro-climates, best practices, and economics that unsettles some; lipstick on a pig?

If WaterSense does this, I can’t imagine why you don’t include industrial and commercial facilities. As a designer, I design a system with a specific owner-operator in mind. I will have to consider this further, but for now this may have low, medium, or doubtful merit.

IV. Section 4.1.1: Landscape Design
The final specification for single family new homes includes two options for complying with the landscape design criteria:

Option 1 – Design of the landscaped area shall be developed using the WaterSense Water Budget Tool…

Option 2 – Turfgrass shall not exceed 40 percent of the landscaped area.

Of these two options, the Water Budget Tool (option 1) is recognized as the preferred option as it takes … that, as use of the Water Budget Tool became more widespread, the program would revisit the on-going need for the option in future versions of the specification.

Since the release of the final specification… WaterSense believes that it is appropriate to remove Option 2 from the specification. Homes receiving the WaterSense label would therefore be required to use the Water Budget Tool in order to comply with the landscape design criteria.

Comment:
I concur, but still hold definite disagreement that once labeled, benefits are automatic, like dual-pane windows. At least for those that register the anachronism, there should be a disclaimer that “a WaterSense labeled new home can never achieve any water sense if mismanaged by the owners. Regular inspections by qualified individuals, to fine-tune plant nutrition, system performance, input application scheduling, and landscape quality and health will be essential.”

V. Section 4.2.7: Irrigation Controllers
Section 4.2.7 of the new homes specification currently requires irrigation controllers that meet a list of criteria:

1. Multiple programming capabilities – shall be capable of storing a minimum of three different programs to allow for separate schedules.
2. Multiple … shall be capable of varying run times, for example one minute to a minimum of one hour.
3. Variable scheduling – shall be capable of interval scheduling (minimum of 14 days) to allow for watering on
even day scheduling, odd day scheduling, calendar day scheduling, and interval scheduling.
5. … moisture and/or rain sensors.
7. Non-volatile memory or self-charging battery circuit.
8. Complete shutoff capability for total cessation of outdoor irrigation.

WaterSense will release a final Specification for Weather-Based Irrigation Controllers by the end of 2011. Once WaterSense labeled weather based irrigation controllers are available, labeled products will be a quick and easy way … controllers.

Comment:
Humbly, “quick and easy” does not belong here. The Weather-based Test Protocol is already using the error-prone model (albeit a reference station) to evaluate the error-prone model (often low-Q/A data embedded in the controller). Seems nobody advised those involved that we are attempting to trim-back or ramp-up in 2%, 3%, 6% increments, which is never been proven possible when the reference comes from miles away, without ground-truthing corrections.
I hope the EPA will step up to the plate and take the results from the Irrigation Association, use them wisely by establishing 10 or so 3-acre sites across the US whereat the IA-vetted weather based controllers are evaluated in replicated plots for accuracy, using soil water measurement techniques. Put some people to work addressing the rest of the question, the “trimming back to deficit with statistical certainty” challenge, honoring GIGO.

Scope & Objective
• Are there additional uses of water in low-rise multi-family buildings that should be considered?
.... in section 3.6 regarding shower compartment size and the use of multiple showerheads clear?

Landscape Design
• Is the Water Budget Tool sufficient as the sole option for meeting the landscape design criteria?
• Do you have any suggestions on how we could make the online Water Budget Tool more user-friendly?
• Is a simple option similar to Option 2 still required? If so, what should it be?
• What parties are typically responsible for landscape design for multi-family buildings? What are the standard practices?

Irrigation Controllers
• Would requiring WaterSense labeled weather based irrigation controllers unintentionally exclude certain products?
Landscape Design Comments:
I think your considerations are solid, and the single option can be used. I retested the model and checked a number of the assumptions. The application rates (inches) per day seem reasonable. Some might be interested to see those underlying allotments by zip code and plant type.

The results looked liberal, if anything, to me. It appears you sought expert advice.

However, I found that the calculation of water consumption by a pool/spa/water feature was in rather gross error. The result indicated my pool would demand over 6” per day. Was there a technical paper in the factors and algorithms. The Florida work didn’t reduce it, did they?

I found the WBT sufficiently friendly. If we can move to thinking in terms of inches of water, that would be great.

As mentioned, the parties are so different between a single-family home and a multi-family. Not as much at the design level, as at the accountability level. When a family residence is built with the same efficiency elements as the golf course or the industrial park, seems like we all win. I have no problem thinking this way, but other designers should be queried. I just know that the tree has no clue it sits at a home or a park, and that’s what pre-occupies me.

Irrigation Controller Comments:

Not sure what you mean by the question, “Other products?”

I believe labeling the ET-based controller will disadvantage soil moisture Smart Water Application Technologies.

Other remarks:

Seems the stark distinction between turf and woody plants and trees is absent from the radar. Likewise, rooting habits under sprinkler irrigation versus drip irrigation is problematic.

Just how’s all the turf and sprinklers doing at all those sites using the existing tax-payer funded weather stations since 1980? What are the subscription rates and at (or with) what results?

I believe ET-based control on turf should have been made law 20 years ago, given the costs to society, and all it would have taken was a visit from a Certified Professional.

Expanding, constrained, genetically variable trees and shrubs under drip are not likely so easy to manage with weather-based only approaches. Fortunately ground-truthing
resolves the base schedule from historical ET (from university weather networks), ..in all landscape biomass materials. Turning a base hit into a home run.
The final specifications pick on turfgrass as a major water user. That is true of most turfgrass species but not all. As stated in the report most turfgrass takes water but putting all turfgrass in that category is unfair. It is like saying cars are bad and should be banned because they are gas hogs. A Hummer is, but a hybrid isn’t. Likewise, Bluegrass, fescues and St Augustine are use large amounts of water while Bermuda and Zoysia will reduce that water usage by 30 to 40%. I applaud the spec’s for pointing that out, but I wish they would make note of the only species that is native to the US and reduces water use and mowing up to 70-80%, Buffalograss. Buffalograss has been growing in this country for millions of years and has survived on its own during that time. Man plowing the buffalograss ranges during the 20’s and 30’s has been linked directly to the dust storms in the 30’s during the worst drought in American history. Where buffalograss flourished, no other plant would grow leaving the ground barren and subject to the wind. Today, natural breeding has turned a pasture grass into an environmental friendly turfgrass. Turfgrass has too many positives to be taken away from our landscapes. And everyone needs some common sense. It is crazy to grow bluegrass, fescue or St Augustine a desert.

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Comments on the Notification of Intent to Modify the
WaterSense Final Specification for Single Family New Homes

Commenter: Chris Dundon
Affiliation: Contra Costa Water District
Comment Date: October 27, 2011

I recently read the NOI to revise the new development requirements. I applaud the EPA for standing up against the Turf industry. No matter how you slice it, turfgrass uses more water than most other landscape plants and it represents a large part of our annual use. When it is not functional, there is really no use for it. It is a remnant with the past and we need to move on. I wish the specification simply stated 0% turfgrass unless proven to be "Functional" and then up it to 40%. However, the budget approach seems to work, but I would tighten it up over time. Thanks

Chris Dundon, Water Conservation Supervisor, Contra Costa Water District

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925-688-8136
Greetings,

First, thank you for developing and fine tuning the WaterSense Homes specifications. I have a comment on Section 4.2.7 Irrigation controllers, criteria 5: Water Budget feature: Although in concept the idea of conserving water by easily reducing irrigation run times sounds good, in fact it is the wrong way to manage plant watering.

To develop good, deep root systems that are below hot, dry soil surfaces, we recommend that each watering be of a long enough duration to reach the root zone depth: 1 foot for small plants, 2 feet for shrubs and 3 feet for trees AT EACH WATERING. Once the irrigator knows how long (duration) to irrigate for the water to reach the prescribed depth, the duration of the watering schedule should not vary. What should vary is the frequency.

The water budget feature retains the same the frequency but reduces the run time. This reduces the amount of water the plant gets per watering which results in the water not reaching down to the root zone depth. This can result in shallow root systems that need more frequent watering and are poorly rooted, unable to withstand blow-overs.

Water Budgets on irrigation controllers are an unintentional deceptive conservation strategy.

Thank you,

Cado

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Comments on the Notification of Intent to Modify the WaterSense Final Specification for Single Family New Homes

**Commenter:** Jeff Smith  
**Affiliation:** Storr Tractor Company  
**Comment Date:** November 22, 2011

I would like to comment on the question:

Would requiring WaterSense Labeled weather based irrigation controllers unintentionally exclude certain products?

I support the use of WaterSense labeled weather based irrigation controllers as a requirement in the single (and multi-) family new home specification. I do not believe that this requirement will exclude any products from having an opportunity to be used in an irrigation system installed in a WaterSense-labeled new home landscape. I think that this requirement will encourage more manufacturers to implement the use of the most current weather based technology within their product lines in order to achieve the WaterSense label requirements. This can only serve to increase the effectiveness of our overall industry's water conservation goals.

I hope that any future irrigation product label would be required in the single-(multi-) family new home specification.

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Sec. 3.6 Shower heads are available everywhere, as are all other building materials.

Sec 4. I suggest Alternate Water sources be required for larger Turf areas. Rain is easily enough stored for the use even in 10" per yr rainfall the whole roof area of a large house that might want large turf could be proportionate. Gray Water is also an option. The budget minded people should not have disproportionate amount of expensive turf to maintain water. If a 5,000 sq. ft. house wants 5,000 sq. ft. lawn it can use 5,000 sq ft. roof to capture 3,000 gal of rain per inch of rain. Rain Water makes for a better lawn anyway. Why not make a req. of 51% of turf water needs to be alt. Water? If over 500 sq. ft. If that is a problem then use a smaller turf area, or move to area where lawn grows.

Sec. 3.2 I suggest Water Distribution piping be designed by qualified personnel. Pressure Gauges be required where multiple Pressure Zones exist. (more than 20' head). Also, water pressure be limited to 80 psi Max for outdoor Water systems, since that is the recommendation already using BMP. Higher pressures can lead to surges, blow-outs, noise, energy loss due to friction, misting and waste of spray water.

Sec. 3.3 The Hot Water Line needs to be Circulated, or the amount of .5 is unachievable, and a meaningless number.

Please ask if any doubt exists as to the relevance or accuracy of my comments. It is an honor to serve this cause, thank you for your part.

Greg Chick, Certified Green Plumbers Trainer
greg@ramonasplumber.com
Comments on the Notification of Intent to Modify the WaterSense Final Specification for Single Family New Homes

Commenter: Chris Pine
Comment Date: November 23, 2011

I support the changes to the WaterSense program proposed on 10/25.

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In the design of the initial law, I believe a basic consideration was somehow missed. That consider is that it is not as important as to what is planted and how much as compared to how much water is used to keep it alive. It is my belief that be it single family dwelling or multifamily dwellings, that an irrigation water allocation makes more sense that trying to control what is planted. Such an irrigation quote could be based on long term weather conditions, ET, total landscape area, and available water in the community.

If a site used all the current methods for water management, such as rain switches, smart controller, moisture sensors, and the site was properly designed for proper precipitation rate, and DU, it my very well use less water with more turf than a site with leaks, poor DU, water running on the sidewalks or into the street, and a "dumb" controller but having no turf. This is why having a water budget makes more sense that dictating what or how much is planted.

For single family homes a water budget could be constructed based on number of occupants, and potential landscaped area, leaving the homeowner to deal with the best method of allocating their water budget to their needs.

For multifamily dwellings, separate meters or sub meters for irrigation should be mandatory with the potential landscaped area having a water budget. That way it would be up to the owner to decide on using hardscape, vs, landscape, vs, turf. I see nothing wrong with a property owner having 100% turf providing they can keep within their water budget.

Given climatic and seasonal conditions, any water budget should be based on a yearly quota as opposed to a monthly quota.

So how is this enforced?

I am of the opinion that "water police" but that tiered pricing could become an excellent control and percentages could be set into the law.

- Tier 1: up to the water budget - basic rate
- Tier 2: up to 10% over the water budget - 2X basic rate
- Tier 3: 10%-50% over the water budget - 4X basic rate
- Tier 4 - Over 50% of the water budget - 8X basic rate or more.

I suspect that such a rate structure would lead to owner corporation rather quickly.
Additionally encouraging water districts to offer year end rebates in the forms of some credits towards the following years statements show the user maintain their water usage significantly under budget, thus rewarding those who save.

In an ideal world, any irrigation design work should be done by a certification landscape designer or contractor. However from a practical standpoint for a small area or retrofit, this may be bypass due to increased costs. Forcing the dwelling owner to adhere to a water budget somewhat to completely eliminates this written requirement as unless the dwelling has practical experience in this area, they are likely to do this anyway in order to stay within their water budget.

Besides, the ultimate purpose of water conservation is to conserve water, not to make more jobs for the landscaping industry. If the desire is to make jobs for the landscaping industry, then it should not be done under the guise of water conservation. Without jobs, life is tough. Without palatable water, the planet dies.

Regards,

James Weil, CLIA
EPA Watersense Partner
IEEE Life Member
Hello,

Although I am a member of the Irrigation Association, I do not agree with their stance on removing the proposed turfgrass restrictions. I have been in the sprinkler repair and installation business for 30 years. I agree with restricting turfgrass in all facilities. The ridiculous overuse of turf on nearly every landscape that I see is astounding. I have been very successful in encouraging many commercial and residential clients in reducing the size of their turf area. Turf reduction on existing sites is a current goal of the Denver Water Department Conservation Program, which I support.

The vast majority of landscape professionals that I have talked with are asleep, and have no genuine interest in saving water whatsoever. Large numbers of business owners are simply attempting to stick to the same formulas they have been using for years. There is an overwhelming lack of creativity, a complete disregard for the environment, and total disregard for how the current assault on our resources can be sustained. Self regulation is no regulation at all.

Would requiring WaterSense labeled weather based irrigation controllers unintentionally exclude certain products?

The irrigation industry has leaned toward weather based control not because it is the superior method, but because it is easy to sell and sounds great. Emphasis on weather based methodology completely ignores time tested root zone sensor technology.

Thank you,

mark petersen
Water Ketch Sprinkler
303-660-8360
Comments on the Notification of Intent to Modify the WaterSense Final Specification for Single Family New Homes

**Commenter:** Dan Stever  
**Affiliation:** Klausing Group, Inc.  
**Comment Date:** December 13, 2011

Please keep the 40% turf restriction in the code. Reducing turf area has benefits well beyond saving water. Of all areas of a landscape, turf has the lowest up-front cost for installation, but turf also has the highest lifetime cost because it requires the most labor and resources to maintain. Turf is essentially an ecological dead zone as it provides no benefits to wildlife and turf’s shallow roots make it a bad choice for soil stabilization.

Additionally, the following article is a strong argument against turf:

ScienceDaily (Jan. 19, 2010) — Dispelling the notion that urban "green" spaces help counteract greenhouse gas emissions, new research has found that total emissions might be lower if lawns did not exist.

Turfgrass lawns help remove carbon dioxide from the atmosphere through photosynthesis and store it as organic carbon in soil, making them important "carbon sinks." However, greenhouse gas emissions from fertilizer production, mowing, leaf blowing and other lawn management practices are four times greater than the amount of carbon stored by turfgrass, a UC Irvine study shows. These emissions include nitrous oxide released from soil after fertilization. Nitrous oxide is a greenhouse gas that's 300 times more powerful than carbon dioxide, the Earth's most problematic climate warmer.

I am a member of PLANET and have been active in the ‘green industry’ for more than a decade. PLANET’s politics and short sighted goals are not based in scientific fact, nor do they represent proper ecological management. Please keep the 40% turf restriction in the code.

Thank you for your time,

**Dan Stever**  
Master of Science, Environmental Horticulture  
Account Manager

**Klausing Group, Inc.**  
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Thank you for the opportunity to make comments in support of the elimination the 40% turfgrass limitations in the WaterSense Final Specification for Single New Homes Program.

WaterSense Questions with Responses:

WaterSense Question: Which products or criteria mentioned here or in the specification differ substantially between single-family and multi-family dwellings?

Landscape design of a multifamily dwelling, unlike single-family homes, is usually performed (and sometimes required to be performed) by a landscape designer or landscape architect.

The installation of a multifamily dwelling, unlike single-family homes, is usually performed (and sometimes required to be performed) by a landscape contractor.

The multifamily dwelling specification should take these factors into account, as landscape design and installation are performed differently for a single-family new home landscape design/build/installation process.

Certain residential applications require the use of irrigation components to be used for dust control, cooling, or other non-traditional applications. These include, but are not limited to dust control of horse riding areas and other surfaces used in human recreation such as clay tennis courts and baseball or softball infields. Irrigation components are also utilized for cooling of artificial playing surfaces. While these applications are more common in multi-family residential projects, they can also sometimes be found in single family homes. We are concerned that the use of a water budget or any other globally limiting water management tool may unintentionally prohibit irrigation components to be used in such non traditional manners. Such a prohibition would have negative affects on not only the use of the site, but also on the ability of our members and others in the construction and green industries to address the specific, unique needs of their client's site needs. Thus we feel there should be exceptions allowed to the landscape area for examples like these and not subject to the same limitations on a WaterSense property.

WaterSense Question: Is the Water Budget Tool sufficient as the sole option for meeting the landscape design criteria?

The use of water budgets has proven to be a very successful management tool when determining the water-use requirements of a landscape; taking into account local data such as rainfall, ET, and other locally derived climatologic factors.
Landscape design based on the WaterSense Water Budget Tool allows local landscape experts to design a landscape using climate appropriate plantings that creatively meets the needs of the family living in the home and the neighborhood, thus enhancing its marketability.

Builders, landscape design professionals, irrigation professionals, and property owners will all benefit from the appropriate use of the Water Budget Tool’s single-family new home specification to provide a water-efficient outdoor environment over a one-size-fits-all approach.

Having a single option of using the Water Budget Tool facilitates training of builders and irrigation professionals, minimizing confusion when multiple options are presented.

**WaterSense Question:** Do you have any suggestions on how we could make the online Water Budget Tool more user-friendly?

The beta version of the Water Budget Tool works nicely and is less intimidating than the Excel spreadsheet. Suggested improvements regarding the irrigation options are as follows:

*For turfgrass irrigation:* Fixed spray; rotor (needs to be added as a choice); drip (pressure compensating), which would allow for the use of subsurface drip irrigation if chosen, and micro-irrigation, which includes micro-sprays, micro-bubblers, micro-streams, and standard drip which non-pressure compensating, etc.; and no irrigation. Very little “drip” irrigation used in landscape applications is not pressure compensating, and the difference in water requirement between drip (standard) and micro sprays is exactly the same. Fewer categories that are unique would make it more relevant to the marketplace and easier to choose an irrigation method.

*For the other plantings:* Irrigation choices for other plantings, such as trees, shrubs, ground covers, etc., could likewise be simplified to drip (pressure compensating) and micro-irrigation, as described above, and no irrigation. In addition, it would be nice to have a simple “drop-down” explanation or description of the irrigation terms for those not familiar with the industry’s terminology.

**WaterSense Question:** Is a simple option similar to Option 2 still required? If so, what should it be?

Appropriate landscape and irrigation design and installation are complex and should be treated as such. Just trying an easy approach is not an appropriate solution to something that is as important as landscape plant-material choice and irrigation design and installation.

The Water Budget Tool is a user-friendly way to afford builders and landscape design professionals the opportunity to determine appropriate landscape plant material, based on local variables.

**WaterSense Question:** What parties are typically responsible for landscape design for multifamily buildings? What are the standard practices?
Unlike single-family new homes, multifamily buildings use and/or require a professionally designed and installed landscape by either a landscape designer or landscape architect and a landscape contractor.

The use of the Water Budget Tool is appropriate for both single-family homes and multifamily units.

**WaterSense Question:** Would requiring WaterSense labeled weather based irrigation controllers unintentionally exclude certain products?

We are concerned in the exclusion of soil moisture based control systems from the specifications.

Specifying weather based control systems may preclude other technologies. It could exclude new, as yet undeveloped, technologies which may stifle R&D and innovation.

Tom Delaney  
Director of Government Affairs

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Jonah,

We recently completed a national rollout where we will be offering WaterSense in every community, coast to coast. This will allow us to gain more traction in the marketplace, and begin delivering even greater water savings in the homes we build. The WaterSense label will be available in all communities starting 1/1/12.

During the rollout, the consistent challenge we see is the Outdoor Water Efficiency Criteria (section 4.0). Below are the challenges we face:

4.1.1. Landscape Design
- In most markets, a landscape design is not typically done for each home. In most cases, two to four generic layouts are available to each home buyer, that buyer selects the generic layout at sale, and the landscape is installed within reasonable adherence to the layout. Because of this, the landscape contractors that are contracted for the installations, typically won’t have design services at their disposal.

4.2.1. Irrigation Design & Installation
- In most markets, the landscape and irrigation companies, that are contracted, are not WaterSense Irrigation partners. We do have a few companies that are, but the majority are not. It is not to say that there are insufficient irrigation partners. But, most are custom landscape contractors that come at a much higher cost.

I believe this is a challenge the program will face with all large production builders. However, I do believe there is a solution. If the WaterSense program had a prescriptive path for Outdoor Water Efficiency that could be verified by the same WaterSense inspector that does the Indoor Water Efficiency, this would eliminate the complexity of having two parties (indoor and irrigation) performing inspections on the home.

In most cases, the builders that will be participating in the WaterSense program will already be participating in the Energy Star for Homes program, therefore, they will have an Energy Rater contracted. The Energy Raters, that we use, already are, or are willing to become, WaterSense providers. Adding WaterSense certification to their scope of work, while already performing Energy Star inspections, makes the program more practical.

I truly believe that this will allow the WaterSense Program to better fit in the production building process.

Please let me know if I can be of any help in further development of the program.

Michael Mancini
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Comments on the Notification of Intent to Modify the WaterSense Final Specification for Single Family New Homes

Commenter: Neal Shapiro  
Affiliation: Santa Monica Office of Sustainability and the Environment  
Comment Date: December 20, 2011

Topic: Is the Water Budget Tool sufficient as the sole option for meeting the landscape criteria?

Comment: No, option 2 should still be allowed as simpler alternative.  
Rationale: Oversimplification of the water budget tool may make it ineffective. If simplification is the goal, then leave an option to limit the known high water using plants like turfgrass. Consider lowering limit to 20 percent of landscape.  
Suggested change (or language): Leave option 2 but define turfgrass.

Topic: Would requiring WaterSense labeled weather-based irrigation controllers unintentionally exclude certain products?

Comment: Yes, an alternative means provision should be offered however, WaterSense labeled weather-based irrigation controllers should be required on all new homes.  
Rationale: In theory, a weather based irrigation controller will act as a water budgeting tool on a properly maintained irrigation system.  
Suggested change (or language): Require WaterSense labeled weather-based irrigation controllers on all new homes with new irrigation systems.

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Rain Bird Comments on the Notification of Intent to Modify the WaterSense Final Specification for Single Family New Homes

December 21, 2011

The Rain Bird Corporation supports the EPA WaterSense recommendation to remove Option 2 – Turfgrass shall not exceed 40 percent of the landscaped area from the WaterSense Single Family Home Specification under Section 4.1.1 Landscape design. We concur that the WaterSense Water Budget Tool (Option 1) is the preferred method for determining how water efficient the landscape and irrigation design is likely to be. We believe a less prescriptive and more science-based approach is appropriate and much more meaningful than enforcing an arbitrary maximum amount of turfgrass allowable. The fact that a majority of the Home Builders participating in the program have selected the Water Budget Tool (Option 1) further supports EPA’s position to remove Option 2 from the specification.

In addition, we agree with the EPA WaterSense that most of the criteria for a WaterSense labeled new home can be applied to many low-rise multi-family buildings and support the inclusion of multi-family buildings three stories of less and multi-family buildings of four or five stories under certain circumstances.
The following represents Rain Bird’s responses to some of the questions that EPA WaterSense has raised.

**Landscape Design**

**WaterSense Question:** Is the Water Budget Tool sufficient as the sole option for meeting the landscape design criteria?

The Rain Bird Corporation supports the use of the Water Budget Tool (Option 1) as the sole option for meeting the landscape design criteria for single-family homes. Rain Bird believes that this tool, utilizing local data such as rainfall, ET, and other locally derived climatologic factors to determine the site specific plant water requirements for each irrigation zone, has proven to be very successful in determining the efficient water use requirements of a landscape. We oppose the use of an arbitrary standard to limit the plant material selection inherent in Option 2 as it is not based in science nor does it account for local weather conditions.

Landscape design, based on the WaterSense Water Budget Tool, allows local landscape professionals to design a customized landscape utilizing climate and appropriate vegetation that uniquely meets the needs of the family living in the single-family home and the neighborhood, thus enhancing its sustainability and marketability.

In addition, having a single option of using the Water Budget Tool facilitates the training of builders and irrigation professionals. This has the dual benefit of allowing these professionals to gain proficiency in using the tool while minimizing the confusion that could arise when multiple options are presented.

**WaterSense Question:** Do you have any suggestions on how we could make the online Water Budget Tool more user-friendly?

The beta version of the Water Budget Tool is much easier to use and less intimidating than the current tool that uses a Microsoft Excel® spreadsheet format. Suggested improvements regarding the irrigation options are as follows:

For turfgrass irrigation: modify the choices to: “Fixed Spray”, “Rotor”, “Rotary Nozzle”, “Subsurface Drip” (which would allow for the use of subsurface drip irrigation if chosen) and “No Irrigation”. Eliminate Micro-Spray as a choice for irrigating turfgrass as this sprinkler type is rarely used as a method of irrigating turfgrass. They are much more applicable to irrigating non-turfgrass areas.

Irrigation choices for the non-turf landscape applications such as trees, shrubs, ground covers, etc., could likewise be simplified to: “Drip”, “Micro Irrigation” (as described above), and “No Irrigation”. Additionally, we recommend adding a simple “pop-down” description of each of the plant material options, the water use classifications for each of plant material types (low, medium, high), and the irrigation emission device types for those not as familiar with the industry’s terminology.
Comments on the Notification of Intent to Modify the WaterSense Final Specification for Single Family New Homes

For those that are more familiar with the methodology associated with determining water budgets, it would be highly desirable to have a more advanced version of the tool that showed the default values used for each of the menu options for each choice from the pull down menu. The user could either accept the “default” values or enter a “custom” value that more accurately reflects the actual values of the landscape and irrigation design. For example: “Fixed Spray” is selected and the default value for this selection is a precipitation rate of 1.5 inches per hour and an overall efficiency of 65%. The designer determines that the actual precipitation rate of the designed zone is actually only 1.2 inches per hour and that the efficiency will be over 75% based on calculations. In this case, the default values would be modified to the calculated values and the overall water usage estimate would be significantly less than that estimated using the default values.

**WaterSense Question:** Is a simple option similar to Option 2 still required? If so, what should it be?

No, a simple option similar to Option 2 is not required. Rain Bird believes that water efficient landscape and irrigation designs and installations are complex and should be treated as such. Finding a “one answer fits all” approach is not an appropriate solution to something that is as important as landscape plant-material choice and water efficient irrigation design and installation. We believe the Water Budget Tool, incorporating our recommendations above, is a less prescriptive, user-friendly way to afford builders and landscape design professionals the opportunity to determine appropriate landscape plant material based on local and site-specific variables as they design and install an efficient irrigation system.

**WaterSense Question:** Would requiring WaterSense labeled weather based irrigation controllers unintentionally exclude certain products?

Rain Bird supports the use of WaterSense-labeled irrigation controllers as a requirement in the Single-Family (and if adopted Multi-Family) New Home Specification. We do not believe that this requirement will exclude any “smart” controllers from having an opportunity to be used in an irrigation system installed in a WaterSense-labeled new home landscape if they meet the criteria that is stated in Section 4.2.7 and conformance is certified by a licensed certifying body accredited in accordance with the WaterSense product certification system.
To Whom It May Concern:

We agree with EPA’s Notification of Intent to make changes to the Water Sense Final Specification for Single Family Homes. We particularly agree with the removal of Option 2, within Section 4.1.1: Landscape Design. The 40% turfgrass limit prescribed by Option 2 does not address or necessarily contribute to reduction in water use in the landscape. We have always stated that the water budget tool was a much better option and a prescription for success in landscape water conservation. Therefore, we are pleased that EPA has suggested dropping Option 2 from Section 4.1.1.

Thanks for your diligent work on these changes and if we can help in any way in the future, please let us know.

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Mobile (301) 873-6545
Dear Veronica,

Attached is our formal reply to the WaterSense NOI. Thanks again for providing us this opportunity to opine.

With best regards and the warmest of holiday greetings,

Ralph

Ralph Egües, Jr.
Executive Director
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December 21, 2011

Veronica Blette
Chief, WaterSense Branch
Office of Water
Environmental Protection Agency
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Via electronic mail to watersense-homes@erg.com

Dear Ms Blette:

Thank you for sharing with us the Notification of Intent (NOI) to Modify the WaterSense Final Specification for Single Family New Homes. While your NOI outlines several modifications to the specification currently under consideration including expanding the scope of the specification so that some types of multi-family buildings will qualify for the WaterSense label, modifying the landscape design options, and addressing other minor technical issues, we specifically wish to address your intent to modifying the landscape design options.

We are grateful for the opportunity to provide these comments as an interested party. The National Hispanic Landscape Alliance (NHLA) is a trade association organized as a 501(c)(6) corporation. The NHLA facilitates and promotes the advancement of Hispanics as landscape industry professionals and leaders, and provides U.S. Hispanic landscaping professionals a voice in the national dialogue on environmentally responsible landscape practices, and a means through which to advance the interests of their businesses, the livelihood of their employees, and the quality of life in the communities in which they live and work. Being keenly aware of the significant body of academic research findings attesting to a wide range of environmental and human health benefits derived from the use of natural turfgrass, we are opposed to arbitrary limits on its use.

The NHLA is pleased that your office believes that it is appropriate at this time to remove Option 2 from Section 4.1.1: Landscape Design of the WaterSense specification limiting turfgrass to 40% of the landscaped area, and we strongly support your doing so as soon as possible. We believe that creating greater awareness of the many benefits of turfgrass is a key first step in achieving our goal of better educated homeowners who readily adopt sustainable landscaping practices, and that we and others can best accomplish this goal in close collaboration with the EPA.

As we remarked during our meeting in September and have noted in prior correspondence, we applaud the WaterSense program for creating a race to the top
among indoor appliance manufacturers and for doing much to raise awareness among consumers and educate them on best practices. The result has been broad popularity of the most efficient manufacturer offerings not only in new construction but in the remodeling of existing homes as well. This success has been the result of a broad collaborative effort which we believe can be duplicated on landscape matters subsequent to the removal of the turfgrass limitation (Option 2) from Section 4.1.1.; a specification which you have pointed out has no scientific basis.

Rather than focusing on one landscape material, we urge the WaterSense program to focus instead on promoting sustainable practices and creating an environment where ever more efficient irrigation system components and landscape materials will be developed and adopted over time. We believe that focusing attention on the most efficient water delivery devices and materials will significantly impact consumer preferences and practices; particularly once they come to better understand the environmental benefits of their landscape choices. More than just a pretty place and refuge the exteriors of their homes can be important oxygen generators and carbon sinks, they can control erosion and capture and filter storm water helping to recharge ground water sources and reducing demand on municipal sewer systems, and they can provide natural cooling that lessens our dependence on solutions dependant on the burning of fossil fuels. Educating consumers to these facts is an important part of the NHLA’s mission and we know that we will be more successful if we can work together with the EPA.

We will not detail the significant body of academic finding that have uncovered a wide range of benefits associated with the use of natural turfgrass, but recognize Cockerham, S. T., and Leinauer, B. eds. 2011. Turfgrass Water Conservation. II. University of California Agriculture and Natural Resources Publication 3523 as a useful resource that summarizes more than fifty years of turfgrass research findings. We also note that turfgrass breeding programs have made considerable progress in improving turfgrass performance and adaptation, as a result of greater focus on the production of varieties that are more drought–tolerant, heat-tolerant, and salinity stress tolerant. A WaterSense program that rewards performance, rather than limiting options, encourages the continuation and expansion of such efforts. By removing the turfgrass limitation, equipment manufacturers and developers of landscape materials will both be encouraged to provide a continually evolving array of better choices. Our vision for the future is one where better informed consumers make more enlightened choices fully aware of their impact on our collective well being, and we believe much more will be accomplished with respect to our water conservation goals and other ecological objectives in this fashion than through rationing and limits.
In the NOI you included a number of questions which we are happy to opine on below.

**WaterSense Question:** Which products or criteria mentioned here or in the specification differ substantially between single-family and multi-family dwellings?

The design and installation of the landscaping of a multifamily dwelling, unlike single-family homes, is usually performed (and sometimes required to be performed) by a landscape designer/architect and a landscape contractor. Residential developments sometimes use irrigation system components for dust control, cooling, and other non-traditional applications in a variety of sites including horse riding areas, clay tennis courts, and artificial grass playing surfaces. These applications are most common in multi-family residential projects. We are concerned that the use of a water budget or any other globally limiting water management tool may unintentionally prohibit the use of irrigation equipment for such uses and impede on the ability of our members and others in the construction and green industries to address the specific, unique needs of their client’s site needs, we thus agree with others in our industry that accommodations should be made for such uses of irrigation systems on a WaterSense property.

**WaterSense Question:** Is the Water Budget Tool sufficient as the sole option for meeting the landscape design criteria?

While recognizing that opportunities to make further refinements may present themselves from time to time as a result of a number of factors including the advancement of equipment and materials, and the use thereof, and suggesting that the best solutions available at any point in time should be adopted, we favor the use of a water budget tool as the sole option for meeting the landscape design criteria at this time and urge removal of Option 2. The use of water budgets that recognize local climatologic factors such as rainfall and evapotranspiration (ET) have proven useful in determining the water-use requirements of a landscape. They also allow local landscape experts to design a landscape using climate appropriate plantings that creatively address the needs of homeowners and neighbors; enhancing the marketability of residential properties. Having the single option of a water budget tool minimizes confusion, and facilitates the promotion and adoption of the program and the training of builders and irrigation professionals on program requirements.
WaterSense Question: Do you have any suggestions on how we could make the online Water Budget Tool more user-friendly?

We endorse the following improvements also suggested by others:

For turfgrass irrigation: Fixed spray; rotor (needs to be added as a choice); drip (pressure compensating), which would allow for the use of subsurface drip irrigation if chosen, and micro-irrigation, which includes micro-sprays, micro-bubblers, micro-streams, and standard drip which non-pressure compensating, etc.; and no irrigation. Very little “drip” irrigation used in landscape applications is not pressure compensating, and the difference in water requirement between drip (standard) and micro sprays is exactly the same. Fewer categories that are unique would make it more relevant to the marketplace and easier to choose an irrigation method.

For the other plantings: Irrigation choices for other plantings, such as trees, shrubs, ground covers, etc., could likewise be simplified to drip (pressure compensating) and micro-irrigation, as described above, and no irrigation. In addition, it would be nice to have a simple “drop-down” explanation or description of the irrigation terms for those not familiar with the industry’s terminology.

WaterSense Question: Is a simple option similar to Option 2 still required? If so, what should it be?

We maintain that Option 2, while simple, was flawed and encourage the removal of Option 2. We favor the use of a water budget tool as the sole option for meeting the landscape design criteria at this time. Landscape and irrigation design and installation, plant-material selections, and other related matters are complex and rather than offering flawed over-simplified alternatives, we encourage the EPA to adopt the best scientifically-supported solutions and make their adoption as user-friendly as possible.

WaterSense Question: What parties are typically responsible for landscape design for multifamily buildings? What are the standard practices?

The design and installation of landscaping for multifamily developments is typically performed (and often required to be performed) by a professional (i.e. a landscape designer or landscape architect and a landscape contractor.) The use of a water budget tool is appropriate for both single-family homes and multifamily sites.
WaterSense Question: Would requiring WaterSense labeled weather based irrigation controllers unintentionally exclude certain products?

Requiring that only weather based control systems be eligible for use would preclude existing soil moisture based control systems and may stifle R&D on alternative approaches. We suggest that whenever possible, program specifications be goal oriented rather than prescriptive as to acceptable solutions.

Thank you for the opportunity to provide these comments. We are delighted to see progress being made towards the removal of the 40% turf limitation from the WaterSense program. We believe Option 2 of Landscape Design specification to be inconsistent with a WaterSense program that does so much right. There is, we believe, much that we can accomplish together once this obstacle is removed. We look forward to hearing from you again soon, and close by wishing you and yours a greater measure of joy and peace during this holiday season.

Sincerely,

Ralph Egües, Jr.
Executive Director

cc: Jesus “Chuy” Medrano
President, National Hispanic Landscape Alliance
President, Co-Cal Landscapes (Denver, CO)
Via electronic mail to chuy@cocal.com

Raul Berrios
President-elect, National Hispanic Landscape Alliance
President, RulyScapes (Centreville, VA)
Via electronic mail to raul@rulyscapes.com
Commenter:  Gerry Coons  
Affiliation:  Outdoor Power Equipment Institute  
Comment Date:  December 22, 2011  

Please find attached the comments from OPEI to the Notification of Intent to Modify the WaterSense Final Specification For Single Family New Homes.

We look forward to meeting with your office on January 10 for further discussions.

Thank You,

Gerry Coons  
OPEI  
VP Industry Affairs  

703-549-7600
December 22, 2011

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Re: OPEI Comments to the Notification of Intent to Modify the WaterSense Final Specification for Single Family New Homes

Dear Ms. Blette:

On behalf of the Outdoor Power Equipment Institute (OPEI), we submit these comments in response to the October 25th Notification of Intent (NOI). In that NOI, the WaterSense Office proposes to delete the 40% turfgrass restriction in the current Water-Efficient Landscape Design – Section 4.1.1.2 (option #2). OPEI strongly supports the proposed deletion and urges EPA to make this needed improvement on an expedited basis.

OPEI would like to partner closely with the WaterSense Office to educate key stakeholders on the benefits of a water budget and the use of such a tool. As part of this education, EPA should adopt and endorse a water budget tool that includes regional climate conditions. The EPA should also highlight the problems and unintended consequences with any “one size fits all” restriction on the amount of turfgrass.

There is no compelling reason to retain either the 40% turf-restriction option - or any other similarly inflexible option. If such a default option is made available, it will further confuse the stakeholders and make it more likely they select an approach that does not account for regional climate conditions and other factors.

Given the influence of the EPA WaterSense program, green building codes and standards may continue to consider and incorporate the 40% turfgrass limitation as long as it is a designated option in the WaterSense program. We therefore recommend that EPA notice a specific date as soon as possible to close the comment process (on at least Section 4.1.1) and to proceed on finalizing that change.
We also urge the EPA WaterSense Office to brief other departments in the EPA and other contacts on the Interagency Sustainable Working Group (ISWG) developing the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings Guidance. It is our understanding that this draft guidance currently includes the problematic 40% turf restriction.

Finally, OPEI urges the EPA WaterSense Office to participate in a new ANSI consensus process to develop a "Standardized Procedure for Determining Available Water for Landscapes and Estimating Landscape Water Use." This process will be administered by the American Society of Agricultural and Biological Engineers (ASABE) and will include national experts and engineers in turf, soil, and water management, among others. The expertise, experience, and insight of the WaterSense Office will benefit the ASABE process and its committee leadership. ASABE and its assigned technical committee is currently developing the scope of the proposed standard. We will keep you informed of new developments, especially when there is opportunity for EPA and other stakeholder input, per the ASABE process.

* * *

We look forward to meeting with you on January 10th to further discuss developments and opportunities for collaboration.

Sincerely,

Gerry Coons
V.P. Industry Affairs
Outdoor Power Equipment Institute (OPEI)
Comments on the Notification of Intent to Modify the WaterSense Final Specification for Single Family New Homes

Commenter: Rachel DellaValle  
Affiliation: Southern Energy Management  
Comment Date: January 17, 2012

Comments to NOI suggesting to remove Section 4.4.1 Landscape Design Option 2:

I would like to highlight the importance of a prescriptive path for the Section 4.4.1 Landscape Design item. We have not worked on many homes since the WaterSense Program became official, but we did work on several homes in the Pilot Phase with Anderson/Vanguard Homes. Anderson/Vanguard Homes selected Option 2, also known as the prescriptive path of "Turfgrass shall not exceed 40 percent of the landscaped area." for all homes that they built in the WaterSense Pilot Program. They chose it because it was a more simple, straight forward method that they could apply to all of their projects, whether they were in different cities or different climate zones. It was a method that the landscape design professional could easily understand and plan for, the landscape technician could simply install, and the WaterSense Field Inspector could verify on site.

In our experience working with builders and developers in building certification programs there is always a prescriptive and performance path. This can apply to the whole program (IE: Energy Star) or a part of a program (IE: LEED for Homes or NGBCP Energy Sections). I wouldn't limit the pathways of achieving water efficiency, only enhance them.

Comments on Outstanding Issues for Integrating Multifamily Buildings:

General: The Energy Star for New Homes program certifies each unit in a Multifamily building and does not approach common areas or the building IE: hall ways, storage areas, laundry, kitchen, game rooms. It would be most simple to copy that standard for the WaterSense for New Homes program.

1.) There are additional water uses in low-rise Multifamily buildings besides residential uses. There are common areas, common kitchens, common laundry areas, common landscaping etc. I would say most Multifamily buildings we work on have shared laundry space shared landscaping area/use.

2.) Most Multifamily buildings we work with have implemented water heating per unit. Each unit has their own water heater and hvac system. Typically the equipment is in a closet within the unit. We see a lot of low-boy water heaters.

3.) One thing to look at that might differ between Single family and Multifamily buildings in the WaterSense criteria is item 3.3 Hot Water Delivery System. You may want to look at the average distance/efficiency in the hot water heating systems in Single Family versus Multifamily. The requirement of "no more than 0.5 gal of water in any piping/manifold between the hot water
source and the fixture" may differ when dealing with one multifamily unit based on the area of the unit and number of bathrooms/kitchen.

4.) WaterSense labeled showerheads are available in our area.

5.) Yes, a simpler option similar to Option 2 of the Landscape Design is still necessary for the programs success. No more than 40% turf is fine, but it does not have to 40%. Aligning this item with other green building programs makes sense. I recommend researching what they are doing and what they plan to change.

We look forward to the Public Meeting tomorrow. Thank you.

Rachel Della Valle, Building Performance Project Manager

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Dear WaterSense,

The attached document contains the Southern Nevada Water Authority’s comments relating to the WaterSense New Home NOI.

Sincerely,

Doug Bennett
Conservation Manager
Southern Nevada Water Authority
Dear WaterSense,

The Southern Nevada Water Authority (SNWA) appreciates the opportunity to comment on the Notification of Intent to Modify the WaterSense Final Specification for Single Family New Homes.

Section 3.6: Showerheads and Shower Compartments

SNWA supports inclusion of a requirement that only WaterSense labeled showerheads may be used in WaterSense labeled new homes.

Section 4.1.1: Landscape Design

Option 1 (water budget), and Option 2 (turfgrass allowance), both have strengths and weaknesses. Ideally, the landscape component should be governed by an approach that is:

1. Effective at managing landscape water demand
2. Based upon principles supported by research
3. Equitable among users
4. Regionally flexible
5. Understandable
6. Simple and affordable to implement

SNWA suggests that WaterSense consider a completely new approach based upon estimated supplemental irrigation demands (ESID). We believe the ESID approach captures many of the strengths of both Option 1 and 2, while diminishing many of the weaknesses. More detail on the ESID concept accompanies this letter.

Additionally, we suggest WaterSense postpone revision of this section until completion of a formal standard for water budget development, which is currently being developed by the ASABE. SNWA intends to submit the ESID concept for consideration in ASABE’s standard development process, as well.
Section 4.2.7: Irrigation Controllers

SNWA supports revision of the standard to require Water Sense labeled irrigation controllers.

Section 3.2: Service Pressure

The specification should be clarified such that no water-emitting indoor plumbing fixture is subjected to pressure in excess of 60 psi. There should also be content explaining the benefit of pressure management.

Section 3.3: Hot Water Delivery System

Since there is already a defined compliance test, the language should be modified to eliminate the words “stored” and “source.” For example, “the plumbing system shall be designed so that not more than one-half gallon of water must be drawn from a fixture before hot water is discharged.” The builder would have the option to achieve compliance through any available method, whether it is structured plumbing design or on-demand circulation.

Applicability to large, multi-dwelling buildings

SNWA supports development of a program or program component that applies to larger, multi-dwelling buildings. However, such an expansion of scope should be accommodated through a stakeholder development process.

As always, we are eager to support and collaborate with EPA WaterSense. Please feel free to contact me if I may provide additional information regarding these topics.

Sincerely,

Doug Bennett
Conservation Manager
Southern Nevada Water Authority
Estimated Supplemental Irrigation Demand (ESID) Overview

Estimated Supplemental Irrigation Demand (ESID) estimates how much water will need to be applied to a landscape to supplement natural precipitation. In short, ESID allows homes in high-precipitation regions to have bigger lawns and water features than homes in arid regions. In regions where rainfall is frequent and plentiful, there would be little demand for supplemental water, thus high water use plants and water features have less impact on water supplies than in arid climates.

Effective precipitation relates to both the amount and frequency of rainfall. ESID proposes utilizing historic rainfall and ET on a monthly basis. Historic precipitation that exceeded historic ET in any given month would not be banked for use in subsequent months. The attached proposal suggests using ESID to determine what percentage of the landscape can be allocated to high use water features such as irrigated turfgrass, swimming pools and water features.

There are several advantages to the ESID Proposal, all of which help assure the efficacy and protect the integrity of WaterSense:

1. **ESID provides a more comprehensive assessment of annual water demands.** The current water budget tool assesses weather and precipitation only in the peak demand month. While evapotranspiration (demand) typically follows a relatively symmetrical demand profile that may support this approach, the same cannot be said for rainfall. ESID uses historic ET and rainfall data from all twelve months and is similar in approach to methodologies used and supported by the Irrigation Association for developing irrigation schedules.

2. **ESID does not require users to make subjective determinations of plant water use.** The ESID approach essentially assumes that irrigated turfgrasses and open bodies of water are high water use landscape types and provides a maximum percentage of the landscape that may be developed with these treatments. Currently, the lack of a crop coefficient library that can be referenced for purposes of water budget calculations means each applicant is allowed to make subjective determinations about whether a plant has low, moderate or high water demands. The potential for users to apply subjective judgment to accidentally or intentionally misuse the water budget tool and compromise water efficiency is largely eliminated by ESID, vastly improving the equity and reliability of the water budget option.

3. **ESID is equitable and simple to administer.** The current Water Budget requires a unique assessment for every single landscape in the WaterSense New Homes program. While that may be achievable where the necessary expertise is readily available, it creates difficulty and expense for new users who do not have access to appropriately trained professionals. This dynamic presents itself as a barrier to use of the specification in many areas. ESID
calculations, however, need only be done once for a given location, greatly
simplifying compliance and potentially making WaterSense more attainable in
regions with limited professional talent to implement the water budget. Having
just one result per region eliminates the differences in allocation to high water
uses that results from subjective judgments of individual users. Under ESID, the
potential of vastly different water use outcomes between competing builders is
largely eliminated.

4. **ESID provides for the regionalism WaterSense seeks, without risking the
   integrity of the New Homes program.** The ESID approach accommodates
   regional differences in a pattern similar to those that would be obtained by
   honest, professional and judicial use of the Water Budget Tool, but without
   jeopardizing the integrity of the program as a result of users who grossly
   underestimate the water demands of certain landscape styles. Relative to the
   Water Budget Tool, the ESID proposal does broadly allocate less area to high
   uses in the drier West and more to such uses in the wetter East (see
   attachment). Far from being a disadvantage, this seems appropriate and
desirable.

5. **ESID-derived water budgets have a more defensible foundation than the
   current approach.** There is currently no research data that demonstrate a
   relationship between water demand projections derived from the Water Budget
   Tool and actual water demand in the landscape, nor does WaterSense expect to
   have the resources to conduct such research in the foreseeable future.
   Currently, WaterSense runs a very real risk that labeled homes will use as much
   or more water than unlabeled homes in the same region. Such outcomes
   eventually become publicized and undermine the credibility of the program.
   More than 20 years of research have correlated the use of irrigated turfgrass with
   increasing irrigation water demand. Creating an allowance for such high water
   use areas is a well-accepted conservation technique and numerous jurisdictions
   use similar principles in their code. Furthermore, the widespread availability of
   aerial imagery will allow remote review of WaterSense certified homes to assess
   compliance since areas of lawn and open water are easily discernable and can
   be remotely measured. Using ESID as a baseline, WaterSense will have ample
   ability to make modifications to the thresholds over time to achieve desired water
   savings.
Calculating Estimated Supplemental Irrigation Demand Option

**Option 2: Estimated Supplemental Irrigation Demand.** High Demand Areas\(^1\) allowance shall be based upon the Estimated Supplemental Irrigation Demand (ESID) percentage. ESID is the net difference between historic monthly evapotranspiration (ET) rates in the region and historic average precipitation and shall be calculated using the High Demand Areas\(^1\) Allowance Table. Where ESID percentage is 60 or more, the property shall be allowed to have up to 40 percent of the installed landscape areas as High Demand Areas\(^1\). In no cases shall the property have more than 80 percent of the installed landscape areas as High Demand Areas\(^1\).

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ESID Percentage = (Sum ESID / Sum HET\(_0\) OR NPE)  
High Demand Areas\(^1\) Allowance (1-ESID Percentage)

High Demand Areas\(^1\) include areas with irrigated turfgrass, pools, spas, and other water features.
Though the calculation of Method 1 is straightforward, an example with real data is included below for the aid of the reviewer:

<table>
<thead>
<tr>
<th>MONTH</th>
<th>HISTORIC EVAPOTRANSPIRATION RATE (HETO) OR NORMAL PAN EVAPORATION (NPE) (INCHES/MONTH OR MM/MONTH)</th>
<th>NORMAL PRECIPITATION(^1) (NP) (INCHES/MONTH OR MM/MONTH)</th>
<th>ESTIMATED SUPPLEMENTAL IRRIGATION DEMAND (ESID=(HETO OR NPE)-NP) (INCHES/MONTH OR MM/MONTH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>0.63</td>
<td>0.59</td>
<td>0.04</td>
</tr>
<tr>
<td>February</td>
<td>0.84</td>
<td>0.60</td>
<td>0.24</td>
</tr>
<tr>
<td>March</td>
<td>1.84</td>
<td>1.51</td>
<td>0.34</td>
</tr>
<tr>
<td>April</td>
<td>3.60</td>
<td>2.28</td>
<td>1.32</td>
</tr>
<tr>
<td>May</td>
<td>5.63</td>
<td>3.45</td>
<td>2.19</td>
</tr>
<tr>
<td>June</td>
<td>6.50</td>
<td>4.03</td>
<td>2.46</td>
</tr>
<tr>
<td>July</td>
<td>6.96</td>
<td>3.96</td>
<td>3.00</td>
</tr>
<tr>
<td>August</td>
<td>5.79</td>
<td>3.70</td>
<td>2.10</td>
</tr>
<tr>
<td>September</td>
<td>3.78</td>
<td>2.75</td>
<td>1.04</td>
</tr>
<tr>
<td>October</td>
<td>2.61</td>
<td>1.87</td>
<td>0.74</td>
</tr>
<tr>
<td>November</td>
<td>1.20</td>
<td>1.35</td>
<td>0</td>
</tr>
<tr>
<td>December</td>
<td>0.63</td>
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</tr>
<tr>
<td>Sum Columns</td>
<td>40.04</td>
<td>26.92</td>
<td>13.47</td>
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</table>

ESID Percentage = (Sum ESID / Sum HETO OR NPE) \(34\%\)

High Demand Areas Allowance (1-ESID Percentage) \(66\%\)
Comparison of Estimated Supplemental Irrigation Demand Approach and Existing WaterSense Water Budget

- Existing Option 2 - 40% Turf
- ESID High Demand Areas Allowance
- EPA Water Budget Effective HIGH Demand Turf Allowance
- EPA Water Budget Effective MED Demand Turf Allowance

Notes:
- ESID High Demand Areas Allowance calculated per ESID Attachment using IWMS data for selected locations assuming 4000 square feet of landscape.
- EPA Water Budget Effective Turf Allowance calculated using beta version of WaterSense Interactive Water Budget Tool for 4000 square foot landscape assuming low water use, standard drip irrigated shrubs and high and medium demand turfgrass irrigated by fixed sprays. Repeat runs of the online budget tool were made to determine the maximum allowed turf for the given location.

Data sorted by decreasing estimated annual irrigation demand.
Dear Ms. Thornton, here is the data concerning the waste of water due to having a bad hot water circulation system. Please call me at 818-9942613 so I can explain the various sheets. Hope these are of some use to you.
Domestic Water Heating Design Manual

Published by American Society of Plumbing Engineers
end of the line and the size of the line. Depending on the water flow rate of the plumbing fixtures, the distance between the hot water main and system and the fixtures within these acceptable time limits. Normally, this means to provide some means of getting hot water to the fixtures unacceptable and a significant waste of water and energy. There is a time delay longer than 31 seconds is normally considered delay of 11 to 30 seconds is marginal, but possibly acceptable; a delay of 0 to 10 seconds is normally considered acceptable for most residential occupancies and public fixtures in office buildings. A delay of 0 to 10 seconds is normally considered acceptable for most industrial facilities, or certain fixtures in office buildings, a delay of 0 to 10 seconds is normally considered acceptable for most fixtures used in office buildings.
<table>
<thead>
<tr>
<th>Fittings</th>
<th>Maximum Flow Rates</th>
<th>800 GPM</th>
<th>600 GPM</th>
<th>400 GPM</th>
<th>200 GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential dishmachine</td>
<td></td>
<td>1.87</td>
<td>1.25</td>
<td>0.87</td>
<td>0.62</td>
</tr>
<tr>
<td>Residential washing machine</td>
<td></td>
<td>1.75</td>
<td>1.25</td>
<td>0.87</td>
<td>0.62</td>
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<tr>
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<td></td>
<td>1.41</td>
<td>1.41</td>
<td>1.41</td>
<td>1.41</td>
</tr>
<tr>
<td>Service sink faucet</td>
<td></td>
<td>1.43</td>
<td>1.43</td>
<td>1.43</td>
<td>1.43</td>
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<tr>
<td>Two-handle single-handle</td>
<td></td>
<td>0.87</td>
<td>0.87</td>
<td>0.87</td>
<td>0.87</td>
</tr>
<tr>
<td>Bath tub faucet</td>
<td></td>
<td>0.87</td>
<td>0.87</td>
<td>0.87</td>
<td>0.87</td>
</tr>
<tr>
<td>Showehead</td>
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<td>0.87</td>
<td>0.87</td>
<td>0.87</td>
<td>0.87</td>
</tr>
<tr>
<td>Sink faucet</td>
<td></td>
<td>0.87</td>
<td>0.87</td>
<td>0.87</td>
<td>0.87</td>
</tr>
<tr>
<td>Public metinging</td>
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<td>0.87</td>
<td>0.87</td>
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<tr>
<td>Public non-metinging</td>
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<td>0.87</td>
<td>0.87</td>
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<tr>
<td>Laboratory faucet</td>
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<td>0.87</td>
<td>0.87</td>
<td>0.87</td>
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</tr>
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<td></td>
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<td>0.87</td>
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</tbody>
</table>

Table 10.2: Approximate Fixture and Appliance Water Flow Rates

<table>
<thead>
<tr>
<th>Fitting</th>
<th>Flow Rate (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential dishmachine</td>
<td>1.87</td>
</tr>
<tr>
<td>Residential washing machine</td>
<td>1.75</td>
</tr>
<tr>
<td>Laundry tray faucet</td>
<td>1.41</td>
</tr>
<tr>
<td>Service sink faucet</td>
<td>1.43</td>
</tr>
<tr>
<td>Two-handle single-handle</td>
<td>0.87</td>
</tr>
<tr>
<td>Bath tub faucet</td>
<td>0.87</td>
</tr>
<tr>
<td>Showehead</td>
<td>0.87</td>
</tr>
<tr>
<td>Sink faucet</td>
<td>0.87</td>
</tr>
<tr>
<td>Public metinging</td>
<td>0.87</td>
</tr>
<tr>
<td>Public non-metinging</td>
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</tr>
<tr>
<td>Laboratory faucet</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>0.87</td>
</tr>
</tbody>
</table>
### ASPE Domestic Water Heating Design Manual

3 delays longer than 30 seconds are not acceptable.

The primary delays in the piping, the water in the piping, and the heat loss from the piping.

**Note:** Table based on various fixture flow rates, piping materials, and dead-end branch lengths. Calculations are based on the amount of heat required to heat the piping, the water in the piping, and the heat loss from the piping.

<table>
<thead>
<tr>
<th>Schedule</th>
<th>PVC Pipe</th>
<th>COP</th>
<th>Schedule</th>
<th>1-in.</th>
<th>1.5-in.</th>
<th>2-in.</th>
<th>1.5-in.</th>
<th>2-in.</th>
<th>1.5-in.</th>
<th>2-in.</th>
<th>1.5-in.</th>
<th>2-in.</th>
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</thead>
<tbody>
<tr>
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<td>32</td>
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<td>19</td>
<td>22</td>
<td>2384</td>
<td>9.5</td>
<td>64</td>
<td>1.574</td>
<td>63.4</td>
<td>4.1</td>
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<td>32</td>
<td>19</td>
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<td>64</td>
<td>1.574</td>
<td>63.4</td>
<td>4.1</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Length (ft)</th>
<th>Flow Rate (gpm)</th>
<th>Delivery Time (sec)</th>
<th>Hot Water to a Fixture</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.5</td>
<td>1.5</td>
<td>2.5</td>
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<td>25</td>
<td>1.5</td>
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<td>25</td>
<td>1.5</td>
<td>2.5</td>
<td>2.5</td>
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</tbody>
</table>

Table 10.3 Approximate Time Required to Get Hot Water to a Fixture
NOTE

NOT SHOWN FOR SAKE OF CLARIT

VALVES AND ADDITIONAL RISERS

LEGEND

UNINSULATED PIPING
INSULATED PIPING
# Water and Heat Consumption for Showers at Various Conditions

<table>
<thead>
<tr>
<th>Number of Showers</th>
<th>Water Supply 1.0 GPM</th>
<th>1.4 GPM</th>
<th>1.4 GPM</th>
<th>2.6 GPM</th>
<th>2.6 GPM</th>
<th>4.8 GPM</th>
<th>4.8 GPM</th>
<th>7.6 GPM</th>
<th>7.6 GPM</th>
<th>Temperature</th>
<th>Time Water Hot Water</th>
<th>Cold Water</th>
<th>Flow Rate</th>
<th>Flow Volume during 5-Minute Showers Total Water Volume</th>
<th>Flow Volume during 5-Minute Showers Total Water Volume</th>
<th>Flow Volume during 5-Minute Showers Total Water Volume</th>
<th>Flow Volume during 5-Minute Showers Total Water Volume</th>
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</thead>
<tbody>
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<td></td>
<td></td>
<td>90°F Shower</td>
<td>78.6% Hot Water</td>
<td>70°F Water</td>
<td>100°F Water</td>
<td>100°F Water</td>
<td>100°F Water</td>
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<td>90°F Shower</td>
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<td>90°F Shower</td>
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<td>90°F Shower</td>
<td>78.6% Hot Water</td>
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<td>90°F Shower</td>
<td>78.6% Hot Water</td>
<td>70°F Water</td>
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<tr>
<td>% of Mixed Water</td>
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<td>% of Cold Water</td>
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<td>90°</td>
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</tr>
</tbody>
</table>

Mixture of Hot and Cold Water

Temperature °F

\[
\text{% of hot water} = \frac{T_{\text{hot water}} - T_{\text{mixed water}}}{T_{\text{mixed water}} - T_{\text{cold water}}} \times 100\%
\]

Formula

Percentage of hot water in cold water
### Gas Consumption and Comparison for 20' and 68' Unit Condo Projects

<table>
<thead>
<tr>
<th>Person Bed Room</th>
<th>Per Toilet</th>
<th>Building Condo</th>
<th>Number of Occupants</th>
<th>Number of Rooms</th>
<th>Number of Toilet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra Cost Per Month</td>
<td>$2.08</td>
<td>$2.02</td>
<td>$2.00</td>
<td>$1.98</td>
<td>$1.95</td>
</tr>
<tr>
<td>Extra Consumption in Therm per Month</td>
<td>6.6</td>
<td>6.5</td>
<td>6.2</td>
<td>6.0</td>
<td>5.9</td>
</tr>
<tr>
<td>Percent Increase in Use</td>
<td>16.2%</td>
<td>16.0%</td>
<td>15.7%</td>
<td>15.5%</td>
<td>15.3%</td>
</tr>
<tr>
<td>Rooms</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
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<tr>
<td>Total Gas Consumption in Therm</td>
<td>607</td>
<td>601</td>
<td>595</td>
<td>589</td>
<td>583</td>
</tr>
<tr>
<td>Gas Cons. for Period 6/14 through 6/13 1996</td>
<td>363</td>
<td>356</td>
<td>349</td>
<td>342</td>
<td>335</td>
</tr>
</tbody>
</table>

### Water Consumption and Comparison for 20' and 68' Unit Condo Projects

<table>
<thead>
<tr>
<th>Person Bed Room</th>
<th>Per Toilet</th>
<th>Building Condo</th>
<th>Number of Occupants</th>
<th>Number of Rooms</th>
<th>Number of Toilet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra Cost Per Month</td>
<td>$3.38</td>
<td>$3.34</td>
<td>$3.30</td>
<td>$3.26</td>
<td>$3.22</td>
</tr>
<tr>
<td>Extra Consumption in Gals per Month</td>
<td>172</td>
<td>168</td>
<td>164</td>
<td>160</td>
<td>156</td>
</tr>
<tr>
<td>Percent Increase in Use</td>
<td>21.7%</td>
<td>21.5%</td>
<td>21.3%</td>
<td>21.1%</td>
<td>20.9%</td>
</tr>
<tr>
<td>Rooms</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
</tr>
<tr>
<td>Total Water Consumption in 100 Cubic Ft</td>
<td>714</td>
<td>708</td>
<td>702</td>
<td>696</td>
<td>690</td>
</tr>
</tbody>
</table>
Typical Installation Scheme

The Accutronic pump runs on electricity and has a control panel.

How Accutronic Works

When used to run a water heater, the following parts are required:

1. The pump
2. The sensor
3. The controller
4. The installation kit

When the sensor detects that the water temperature is too low, it sends a signal to the controller, which then activates the pump to circulate water through the system. This helps to maintain a consistent water temperature and prevent the tank from becoming too cold.

The pump is designed to be quiet and efficient, and it can be installed in a variety of locations, such as in a basement or utility room. It is also relatively easy to install, with most models coming with a step-by-step installation guide.

Some key features of Accutronic pumps include:

- Energy-efficient operation
- Quiet operation
- Easy installation
- Wide range of applications

Overall, Accutronic pumps are a great choice for anyone looking to maintain a consistent water temperature in their home.
Design

The circulator is the most efficient system bringing on only when the system needs to be replenished with hot water.

Saves money and pays for itself

- saves the average family of four up to 17,000 gallons of water annually.
- replaces only 3% of water used.
- does not require a return line.
- does not require the circulating pump.
- requires only one pump and one installation for all areas of the house.
- heat a single high temperature on optional статусы of the Pump.
- uses a built-in 7-day timer which allows the selection of operating time and periods to suit your schedule.
- saves energy, water and money and pays for itself in a short period of time.