

DOE Zero Energy Ready Home

Tech Training Webinar Series

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



Energy – and Water –
Efficiency in the DOE
Zero Energy Ready Home Program

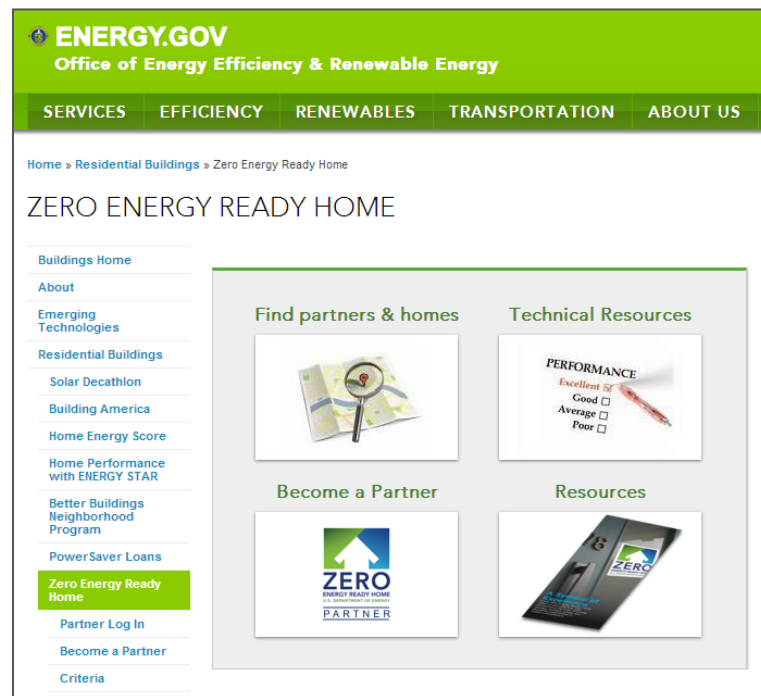


The Home of the Future....Today



Website

- www.buildings.energy.gov/zero/
- Events:
 - Upcoming in-person ZERH Trainings
 - Technical Training webinars
 - Conference Presentations
- Partner Locator
- Program Specifications
- Webinar Recordings



Building America Solution Center

- <http://basc.pnnl.gov/>

Thank You



For More Information:

www.buildings.energy.gov/zero

Email:

zero@newportpartnersllc.com

look for



WaterSense® New Homes





Agenda



- What is a WaterSense labeled home?
- Why WaterSense
- WaterSense Requirements
- Efficient Hot Water Distribution
- Outdoor Requirements
- Additional Resources and materials

WaterSense Labeled New Homes Program

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- First national new home labeling program for water efficiency
- Is an easy addition to programs such as ENERGY STAR and ZERH that adds performance, efficiency, and value
- WaterSense labeled new homes:
 - Reduce water use in new homes by **at least 20%**
 - Educate homeowners about continuing water-efficient behaviors
 - Encourage community infrastructure savings
 - Are third-party certified



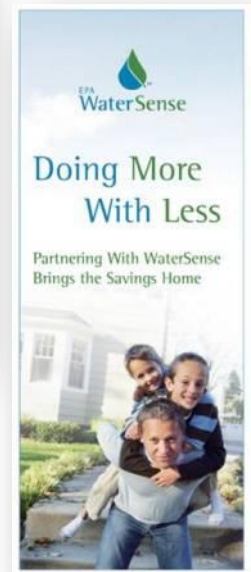
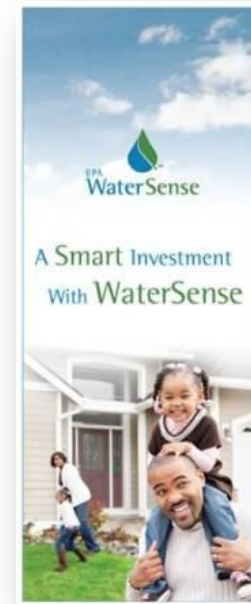
First community of all WaterSense labeled new homes in Issaquah, WA

look for



Selling a WaterSense Labeled Home

- **Inside:** compared to a typical home, a family of four could save big in a WaterSense labeled new home
 - **50,000** gallons of water - equal to 2,000 loads of laundry
 - More than \$600 per year on water, sewer, and energy bills
- **Outside:** water-efficient landscapes are adaptable to local watering restrictions
 - Easily maintained
 - Offer long term curb appeal





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Why Build WaterSense Labeled Homes?

- **Part of the “whole-house” building science approach**
 - Provides a key market differentiation
 - Allows builders to stay a step ahead of codes and utility rates
- **Ability to co-brand with WaterSense**
 - Access to WaterSense partner resources
 - Meet the growing demand for green products
 - Eligibility for awards
- **Convenience, efficiency, & confidence**
 - Hot water will be delivered to users faster and use less energy
 - Regionally appropriate landscaping
 - WaterSense labeled products provide efficiency *and* performance
 - Improved quality and reduced call backs



**WaterSense labeled new home by
HiPointe Homes
Colorado Springs, CO**

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Why WaterSense



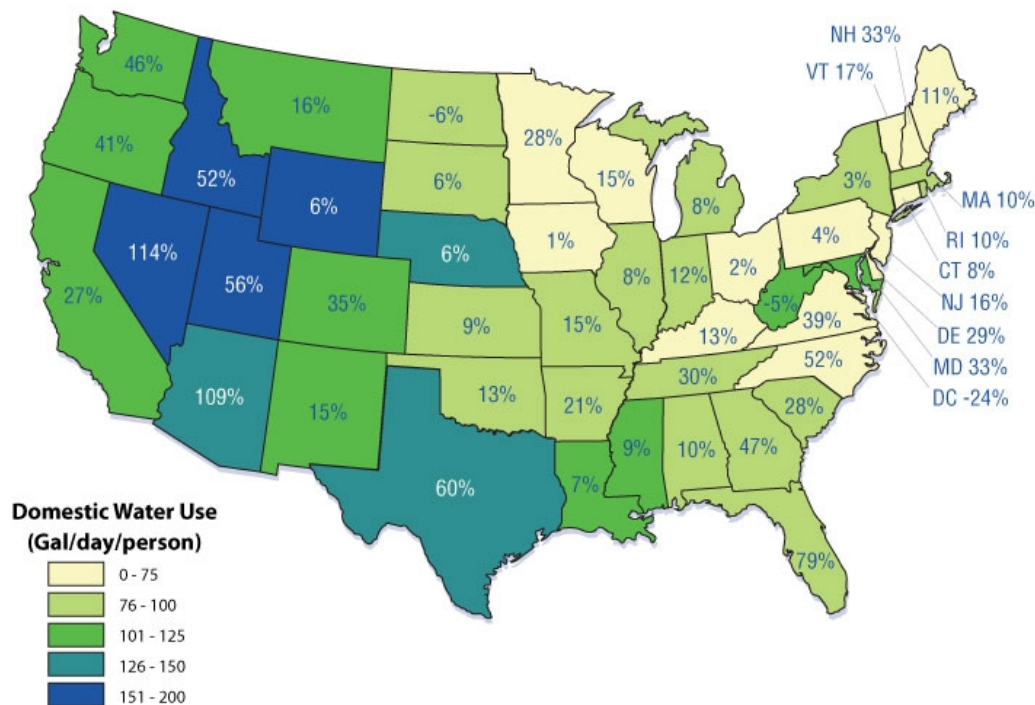


The Need for Water Efficiency



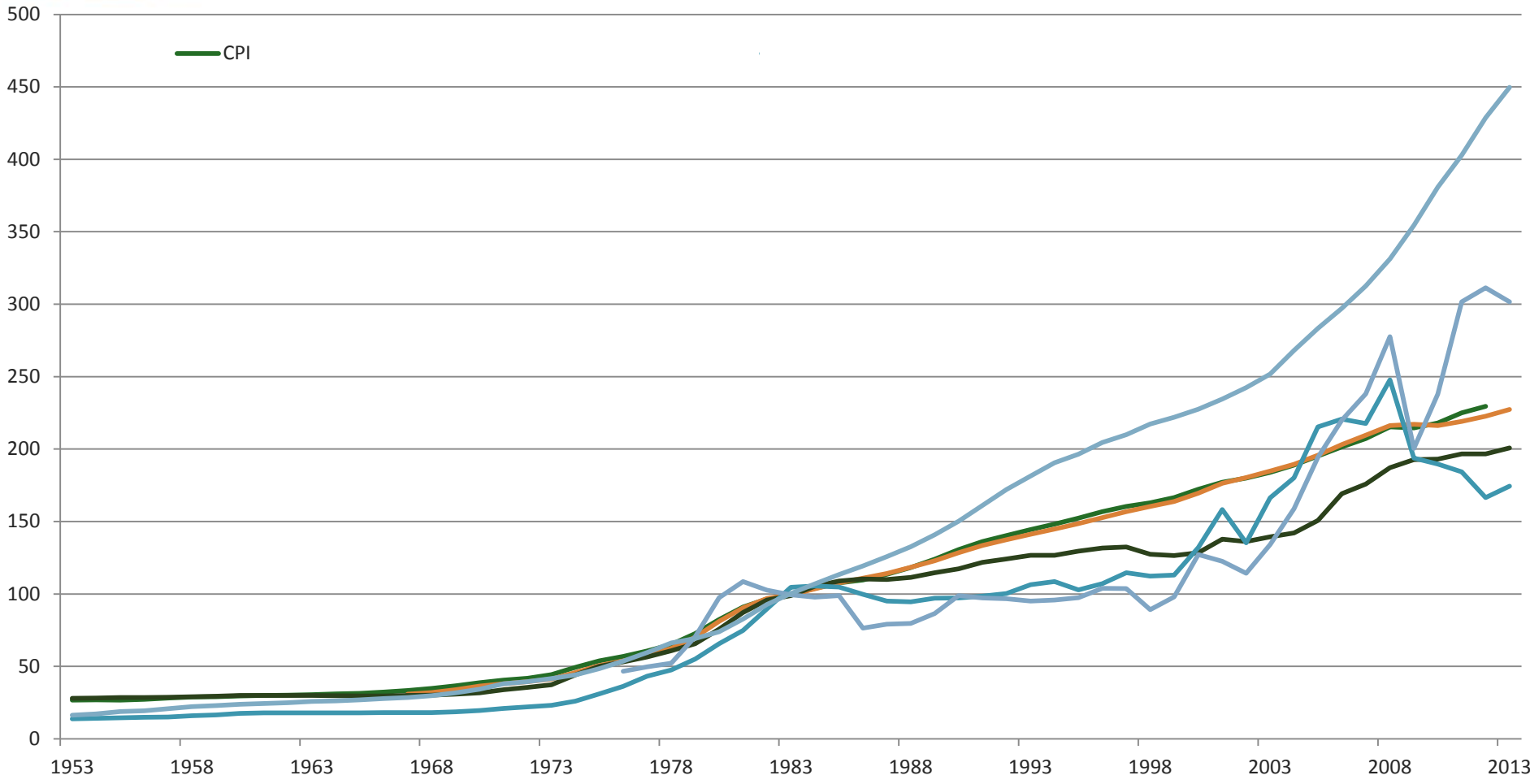
- Our national thirst for water is increasing
- Demand coupled with climate change will increase stresses on water supplies
- Non-drought water shortages are expected in 40 states
- Water utilities may need to invest more than \$700 billion to update aging infrastructure in the next 20 years

Domestic Water Use in Gallons per Day per Person and Projected Percent population Change by 2030





What Will Water Cost in 20 Years?

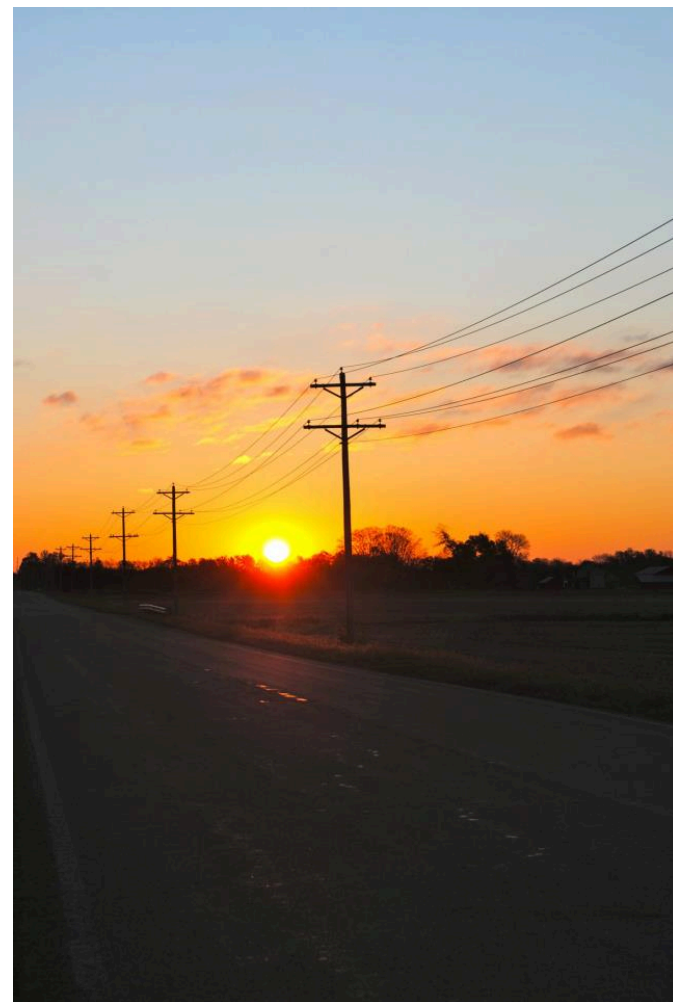




Not Just About Water



- Moving, treating, and heating water uses energy
 - Every gallon of water has an energy “footprint” from treatment, delivery, and heating
- Energy used by the Water sector
 - Nationally - ~3-4%
 - California - ~20%
 - Municipal level - can be > 40%
 - System level - energy is one of the highest utility costs





WaterSense Label Assures Confidence



- WaterSense labeled products are third party certified for both efficiency and performance
- Promote water-efficient behavior and action
- Help consumers save money
- Reduce the need to expand infrastructure capacity
- Save water critical needs

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WaterSense for New Homes Requirements





Version 1.2

- WaterSense released a revision (version 1.2) in July 2014
- Revision updates the specification to reflect changes made in WaterSense's outdoor program
- WaterSense reorganized the way we work with irrigation professionals to
 - Provide consistency across all certification providers
 - Remove administrative burdens
 - Grow the number of professionals we recognized
 - Be able to add additional types of professionals in the future
- Will not impact the ability of projects currently underway to earn the label



Eligibility



- Single-family homes and townhomes.
- Homes in multi-family buildings including:
 - Residential units in multi-family buildings, three stories or less in size.
 - Residential units in multi-family buildings of any height, including mixed-use buildings, provided the units have independent heating, cooling, and hot water systems separate from other units.
 - Units in buildings that utilize central domestic hot water systems powered by alternative energies (e.g., solar or geothermal) if the alternative energy source provides at least 50 percent of the hot water needs for the residential units.

Certification & Labeling Structure

Program Administrator (RESNET)

- Oversees training and quality assurance process

Providers

- Trains inspectors, issues WaterSense label, audits homes in accordance with QA protocols

Water Efficiency Inspectors

- Conducts physical inspection of homes seeking the WaterSense label
- Often a HERS rater

What Makes a WaterSense Labeled Home?

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Indoor Requirements & Inspection: Leak Prevention



- Inspection:

- Pressure loss test:

- Attach a pressure gauge to the cold water faucet for the washing machine and take a pressure reading before and after turning the water to the home or unit off.
 - The pressure should remain constant.
 - If the pressure drops, this indicates that the home has a leak.
 - If the home or multi-family building has a separate water supply for irrigation, check both the indoor and outdoor water supply for leaks.



detail.en.china.cn/provide/detail,1080202890.html



Indoor Requirements & Inspection: Service Pressure

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- *Static pressure for each home or residential unit shall be 60 pounds per square inch (psi) or less.*

- **Inspection:**

- For homes supplied by groundwater wells verify that a pressure tank is installed and set to 60 psi.
- For homes with publicly supplied water:
 - Document whether the home has a pressure-regulating valve downstream of the point of connection.

OR

- Check the static pressure using a pressure gauge
AND
- Gather written documentation from builder that the pressure supplied by the jurisdiction is 60 psi or less.



www.ci.austin.tx.us/watercon/prvfaq.htm

Home Owner/Occupant Education

- WaterSense provides a template for creating a home owner education manual that includes:
 - *WaterSense materials on efficient water use.*
 - *If clothes washers or dishwashers are not provided, general information about water-efficient appliances.*
 - *If an irrigation system is installed:*
 - *A record drawing (schematic) of the system.*
 - *Itemized list of irrigation components.*
 - *Copies of the irrigation schedules.*
 - *Information about adjusting the schedule after establishing the landscaping.*

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Hot Water Distribution





Hot Water Distribution Systems Performance Requirement

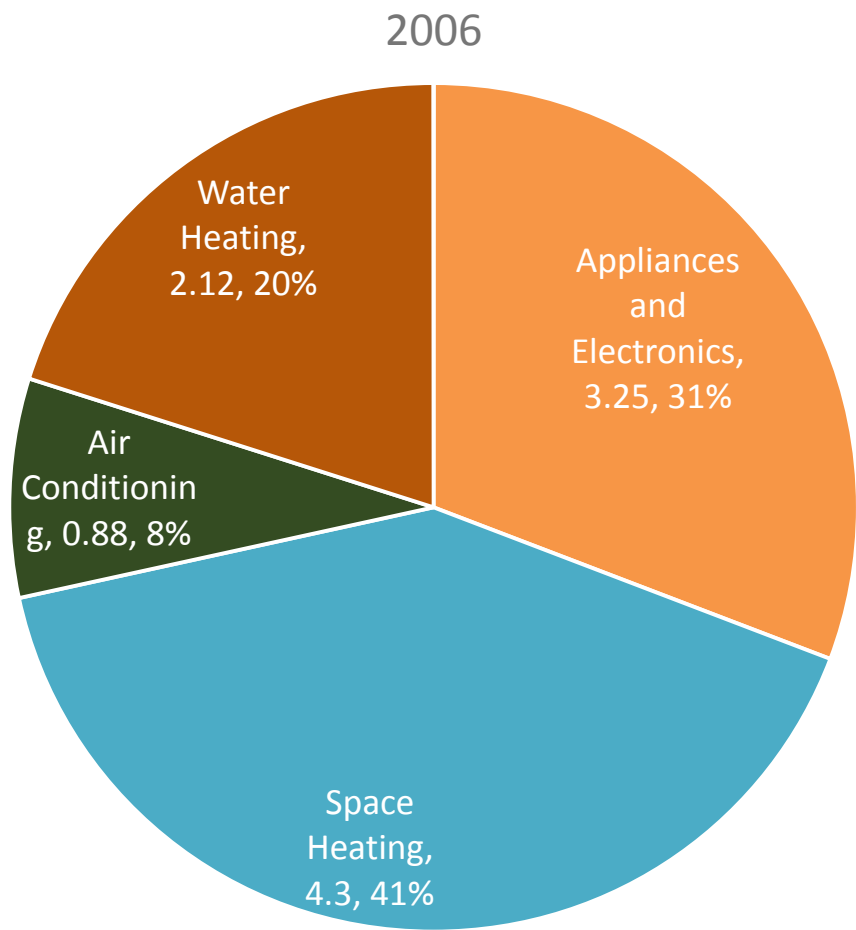
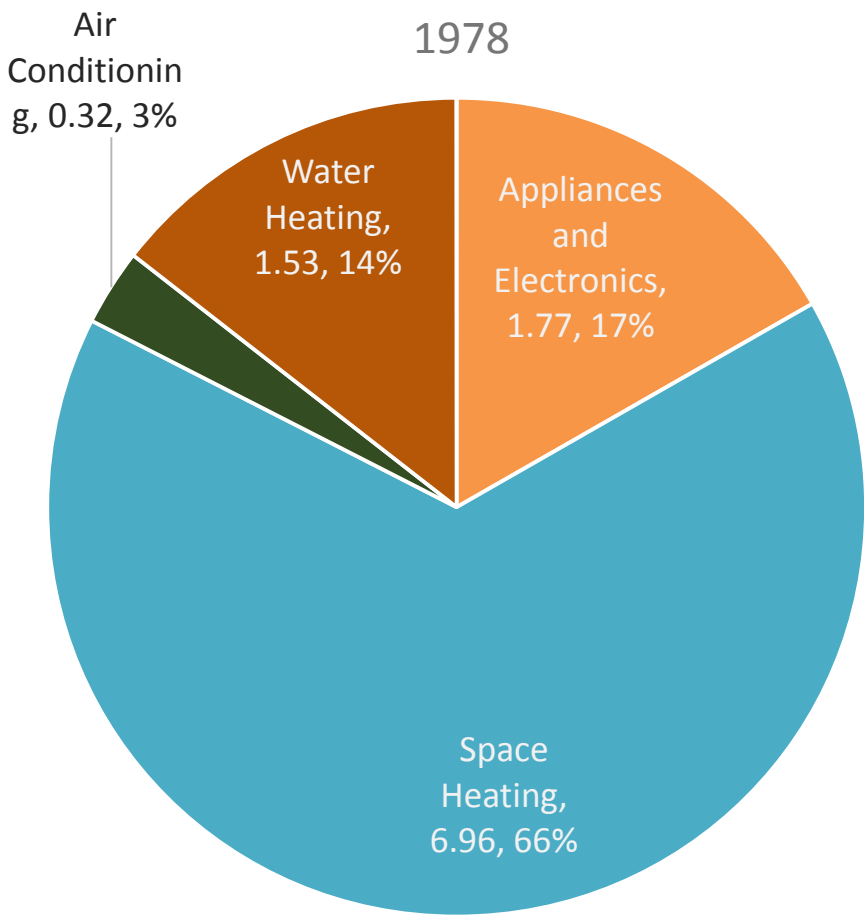


- *The system shall store no more than 0.5 gallons in any piping/manifold between the hot water source and any hot water fixture.*
- *No more than 0.6 gallons of water shall be collected from the fixture before hot water is delivered (accounts for water that must be removed from the system before hot water can be delivered).*
- *Recirculation systems must be demand initiated (push button or motion sensor).*
 - *Timer and temperature activated recirculation systems do not meet this requirement.*





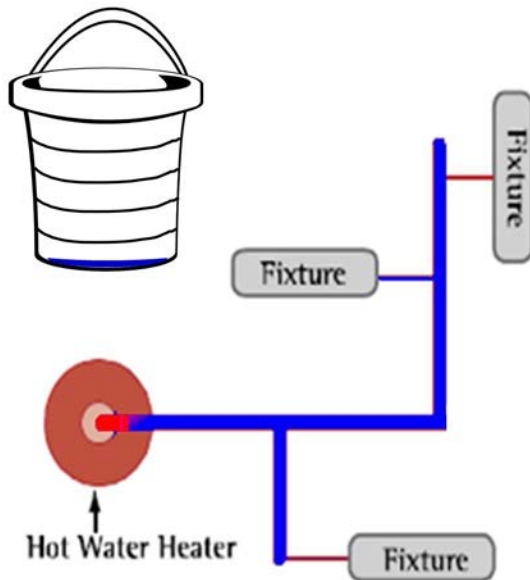
Hot Water Distribution Systems Energy by End Use



*Based on EIA data in quadrillion BTU

Hot Water Distribution Systems

The Problem



Resources:

- [Hot Water Distribution Volume Calculator](http://epa.gov/watersense/excel/hw_volume_tool_v1.xlsm)
(http://epa.gov/watersense/excel/hw_volume_tool_v1.xlsm)
- [Guide for Efficient Hot Water Delivery Systems](http://epa.gov/watersense/docs/hw_distribution_guide.pdf)
(http://epa.gov/watersense/docs/hw_distribution_guide.pdf)



Hot Water Volume Calculator



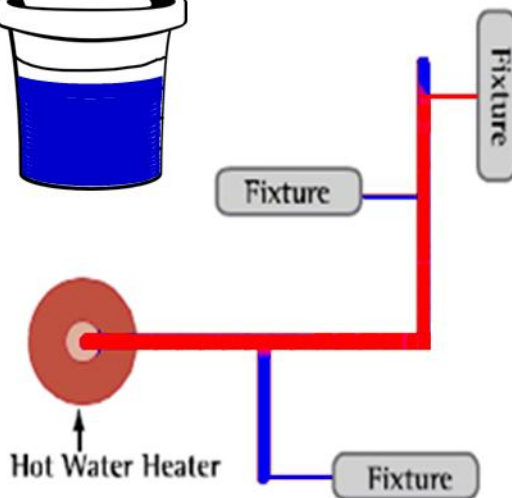
Trunk:		
piping:	<input type="text" value="Copper L"/>	diameter <input type="text" value="1"/>
length (feet)	<input type="text" value="10"/>	ounces/ft: 5.43 volume (oz): 54.3
Branch:		
piping:	<input type="text" value="Copper L"/>	diameter <input type="text" value="3/4"/>
length (feet)	<input type="text" value="5"/>	ounces/ft: 3.22 volume (oz): 16.1
Twig:		
piping:	<input type="text" value="Copper L"/>	diameter <input type="text" value="1/2"/>
length (feet)	<input type="text" value="2"/>	ounces/ft: 1.55 volume (oz): 3.1
total		
length (feet)	17	volume (oz): 73.5

Hot Water Distribution Systems

The Problem



- 1 & 2/3rds gallons wasted.
- 20 seconds wait time



Resources:

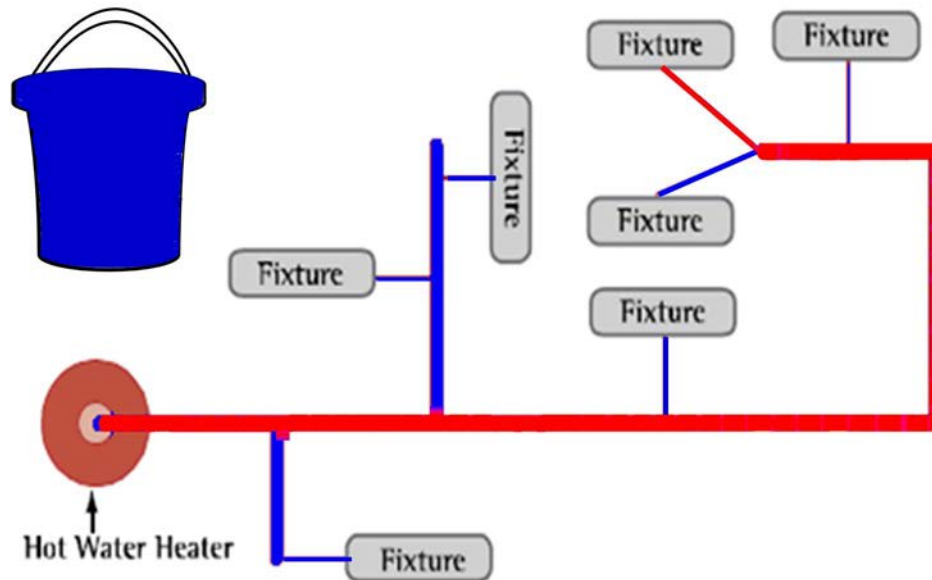
- [Hot Water Distribution Volume Calculator](http://epa.gov/watersense/excel/hw_volume_tool_v1.xlsm)
(http://epa.gov/watersense/excel/hw_volume_tool_v1.xlsm)
- [Guide for Efficient Hot Water Delivery Systems](http://epa.gov/watersense/docs/hw_distribution_guide.pdf)
(http://epa.gov/watersense/docs/hw_distribution_guide.pdf)

Hot Water Distribution Systems

The Problem

- 3 gallons wasted
- 1 minute 30 seconds wait time

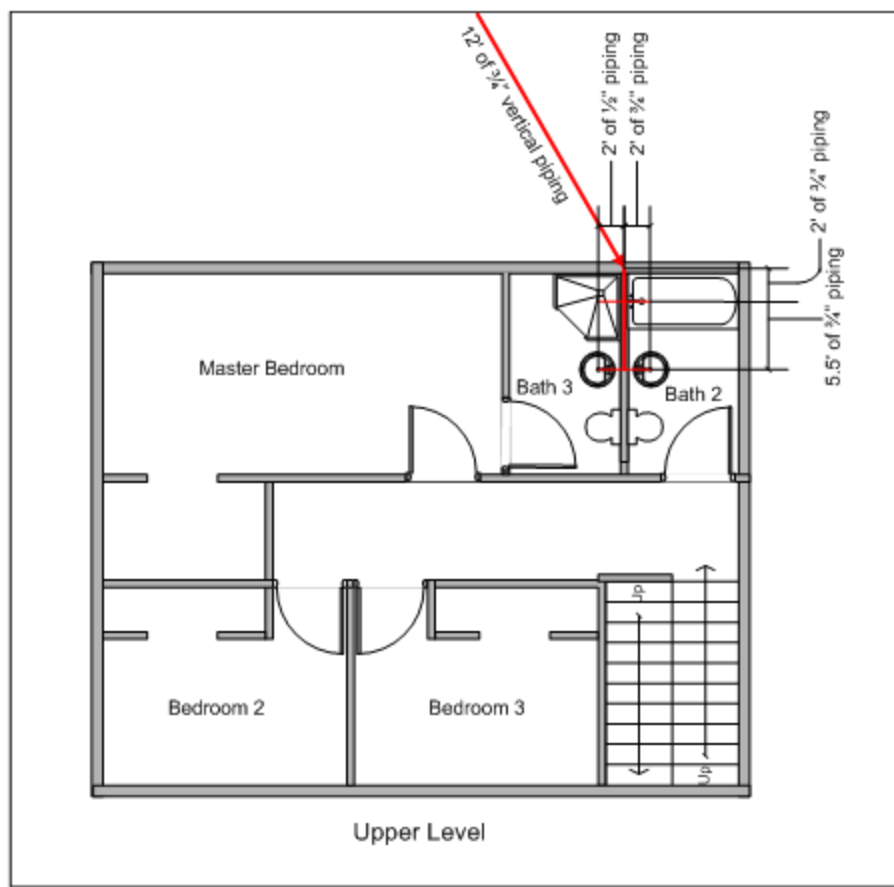
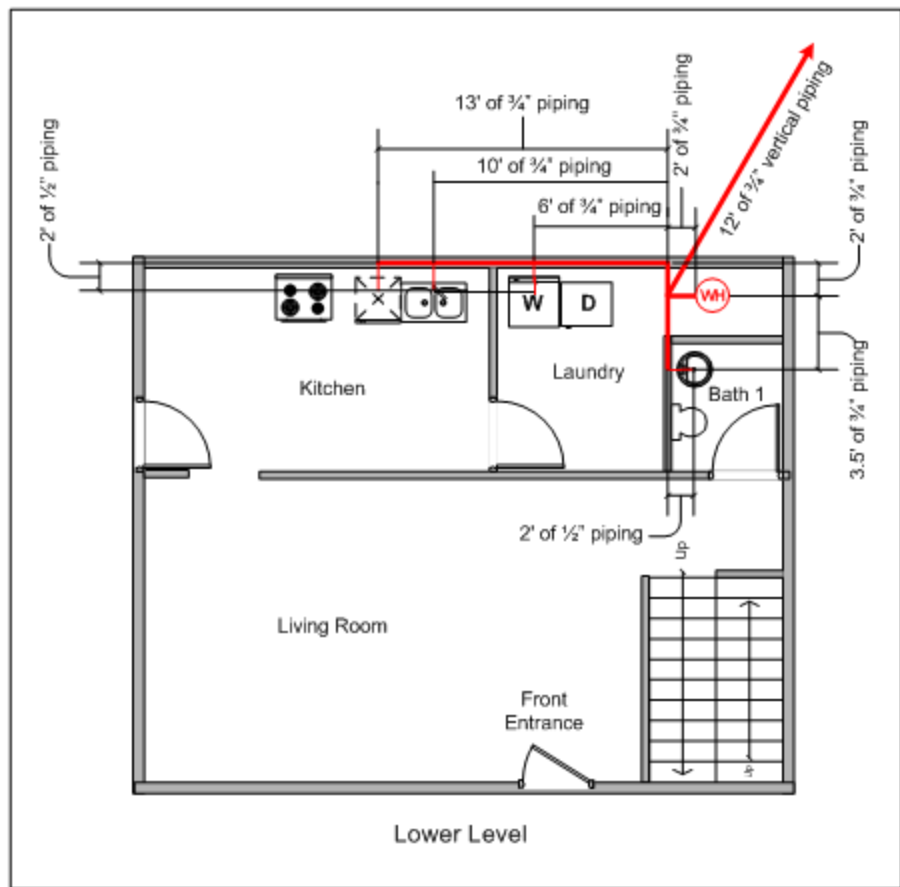
Currently, HERS will not reflect this system poor energy performance.
That is changing.





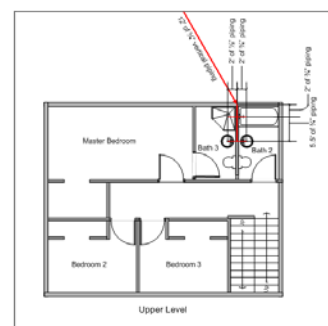
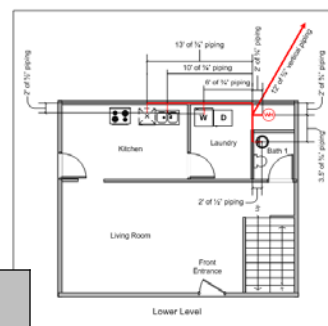
Hot Water Distribution Systems

Design #1





Hot Water Distribution Systems Design #1

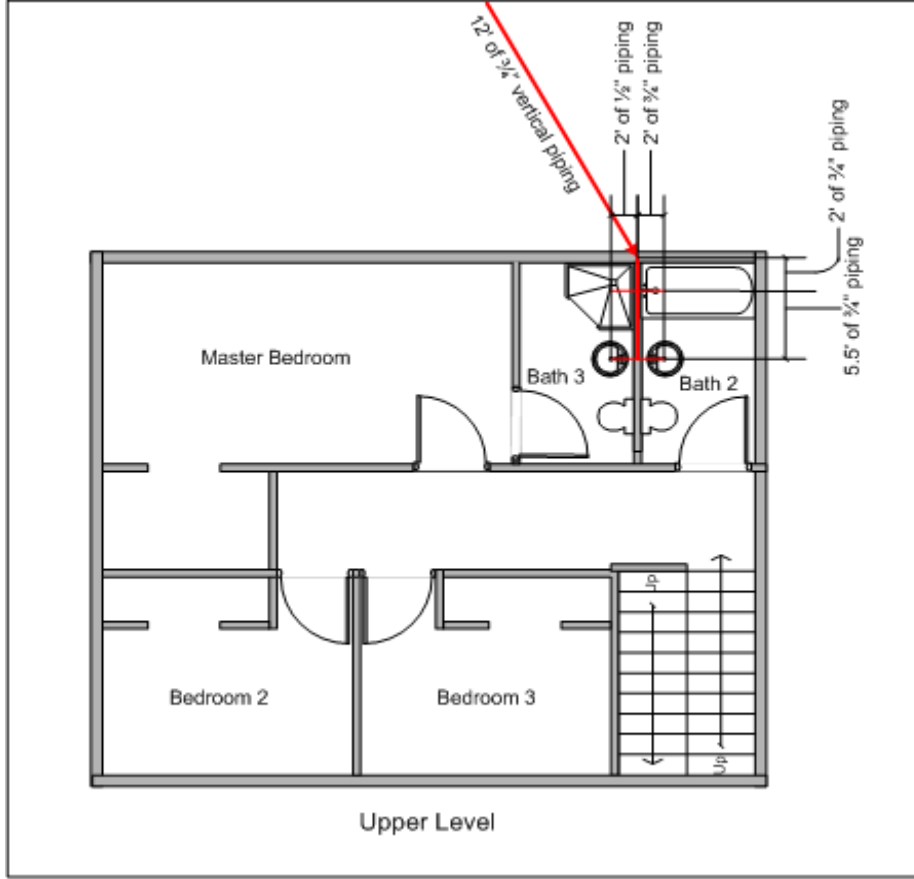
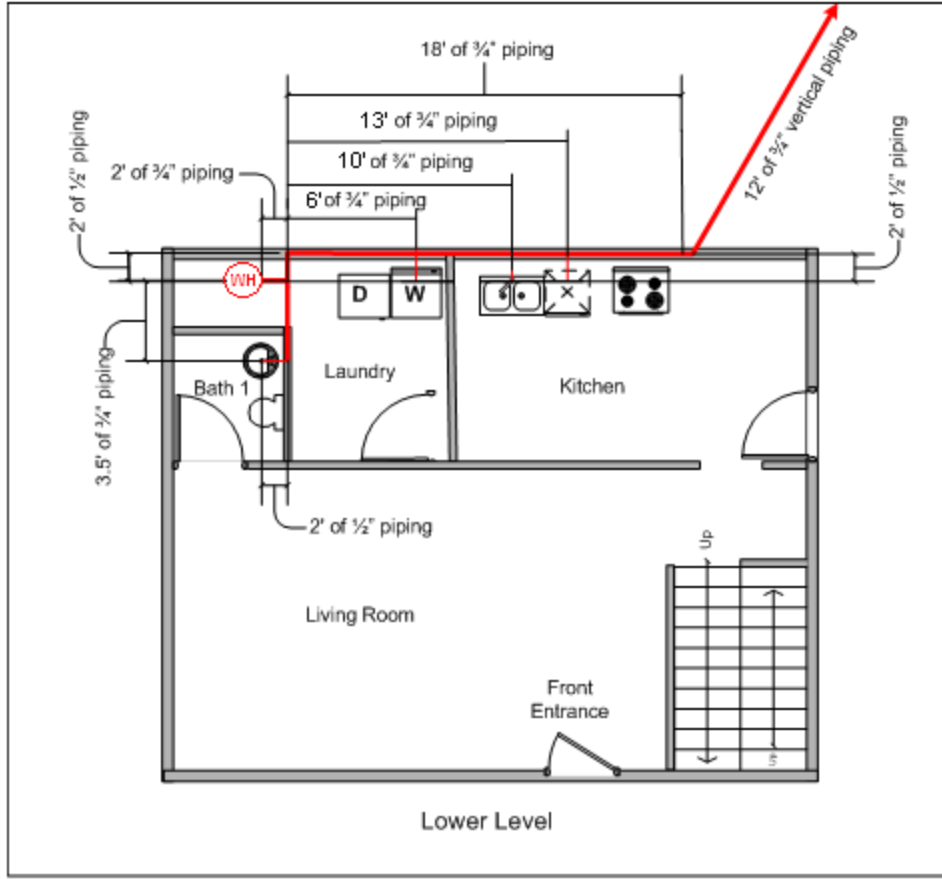


	¾" Piping Length (ft)	½" Piping Length (ft)	Hot Water Capacity (oz)	Hot Water Capacity (gal)	Approximate Wait Time (sec)
Lower Level					
Dishwasher	17	2	61.7	0.48	NA
Kitchen Sink	14	2	51.4	0.40	16
Washer	10	2	37.7	0.29	NA
Bath 1 sink	5.5	2	22.2	0.17	10
Upper Level					
Bath 2 tub	16	0	54.9	0.43	26
Bath 2 sink	17.5	2	63.4	0.50	45
Bath 3 shower	14	2	51.4	0.40	24
Bath 3 sink	17.5	2	63.4	0.50	45



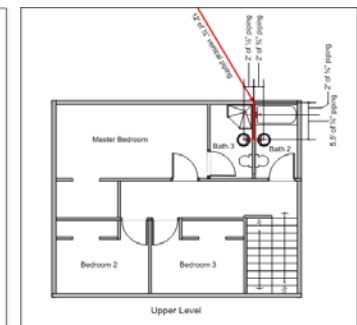
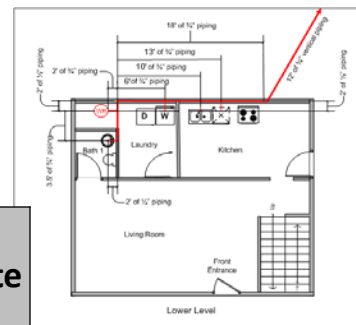
Hot Water Distribution Systems

Design #2





Hot Water Distribution Systems Design #2

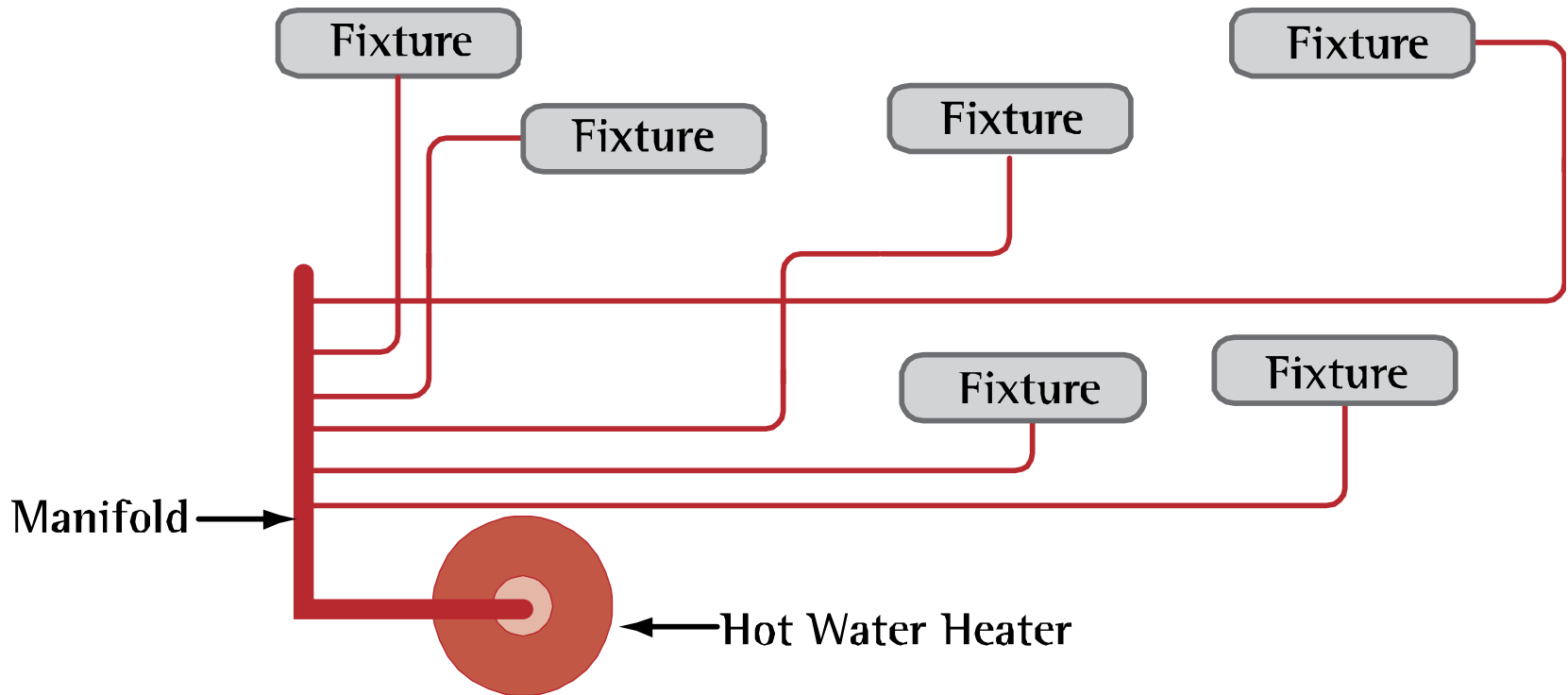


	3/4" Piping Length (ft)	1/2" Piping Length (ft)	Hot Water Capacity (oz)	Hot Water Capacity (gal)	Approximate wait time (sec)
Lower Level					
Dishwasher	17	2	61.7	0.48	NA
Kitchen Sink	14	2	51.4	0.40	16
Washer	10	2	37.7	0.29	NA
Bath 1 sink	5.5	2	22.2	0.17	10
Upper Level					
Bath 2 tub/shower	38	0	130.3	1.02	61
Bath 2 sink	39.5	2	138.9	1.09	65.4
Bath 3 shower	36	2	126.9	0.99	59
Bath 3 sink	39.5	2	138.9	1.09	65.4



Hot Water Distribution Systems

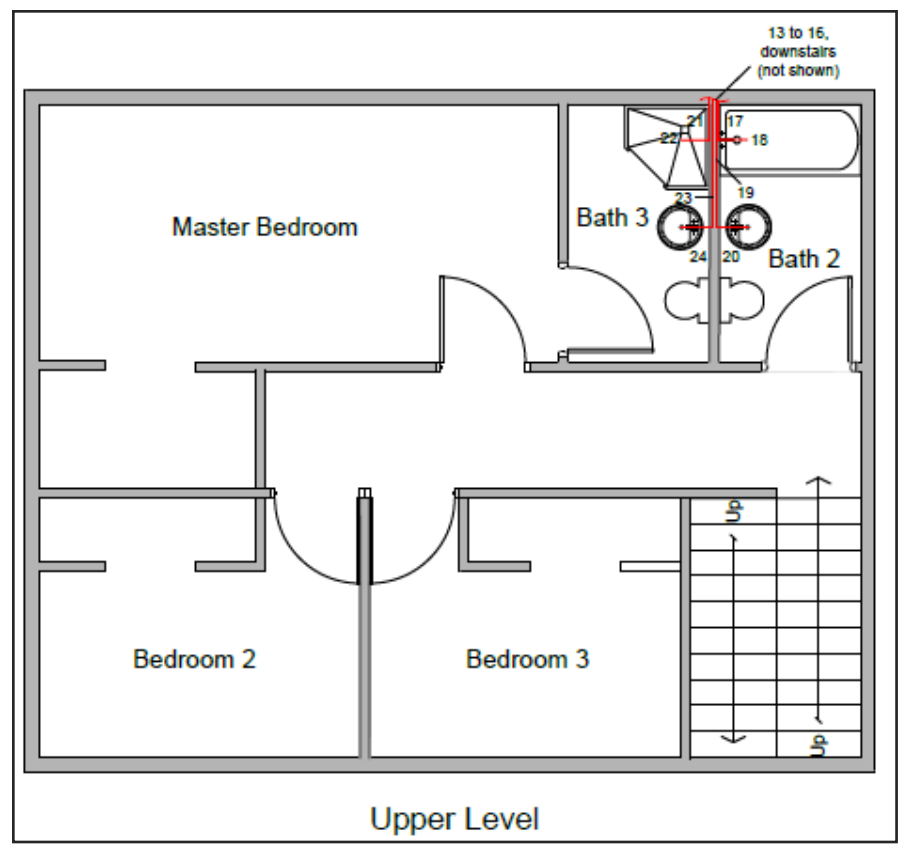
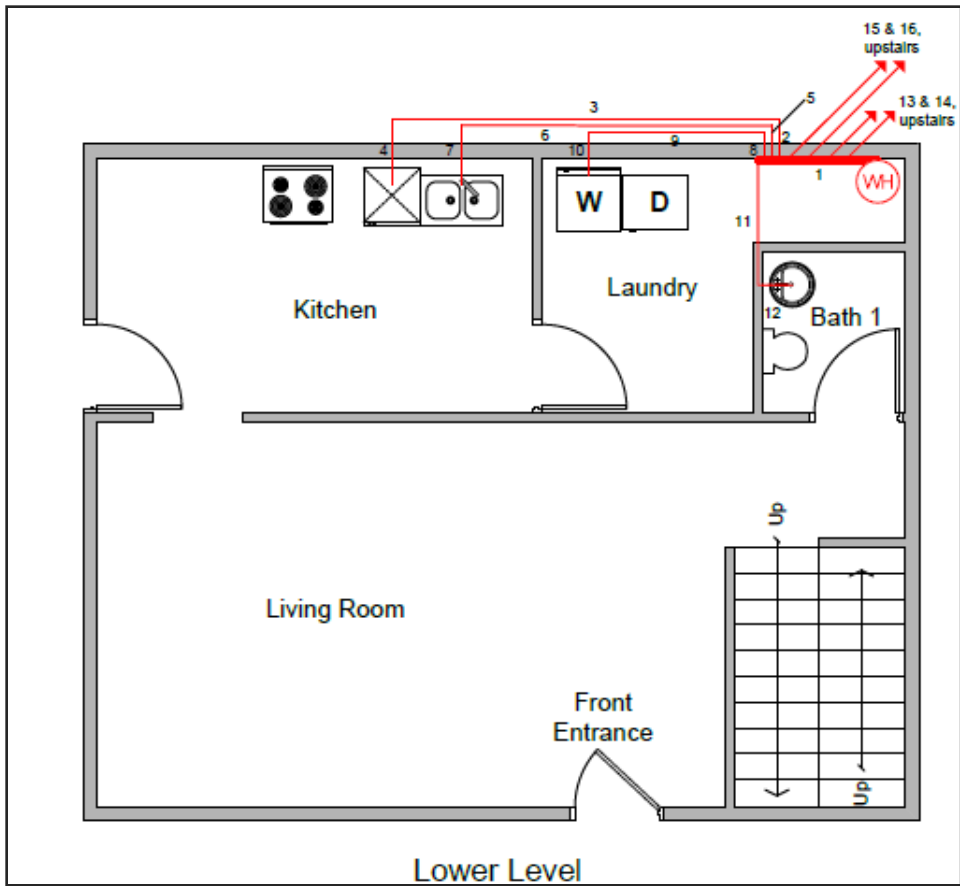
Whole House Manifold System





Hot Water Distribution Systems

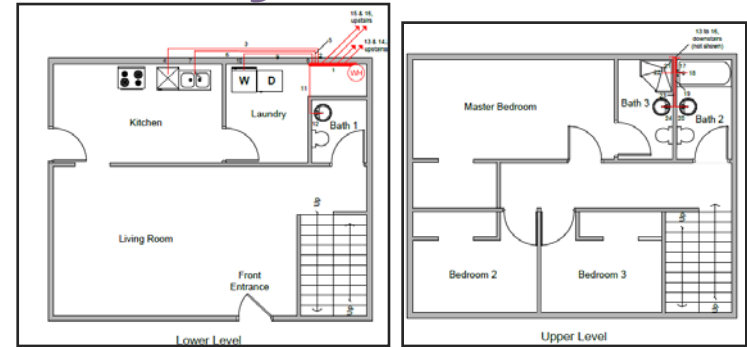
Whole House Manifold System





Hot Water Distribution Systems

Whole House Manifold System



	1" Piping Length (ft)	3/8" Piping Length (ft)	Hot Water Capacity (oz)	Hot Water Capacity (gal)	Approximate Wait Time (sec)
Lower Level					
Dishwasher	4	17	32	0.25	NA
Kitchen Sink	4	14	50.7	0.24	10
Washer	4	10	28.2	0.22	NA
Bath 1 sink	4	7.5	26.8	0.21	12
Upper Level					
Bath 2 tub	4	16	32	0.25	11
Bath 2 sink	4	19	34.6	0.27	16
Bath 3 shower	4	16	32	0.25	11
Bath 3 sink	4	19	34.6	.27	16



Hot Water Distribution Systems Design & Layout Choices



	Structured Design		Un-structured Design		Structured Design W/Parallel Pipe		On Demand Recirculation	
Lower Level								
Dishwasher	0.48 gal	NA	0.48 gal	NA	0.25 gal	NA	0.13 gal	NA
Kitchen Sink	0.40 gal	16 sec	0.40 gal	16 sec	0.24 gal	10 sec	0.13 gal	5 sec
Washer	0.29 gal	NA	0.29 gal	NA	0.22 gal	NA	0.13 gal	NA
Bath 1 sink	0.17 gal	10 sec	0.17 gal	10 sec	0.21 gal	12 sec	0.13 gal	7 sec
Upper Level								
Bath 2 tub	0.43 gal	26 sec	1.02 gal	61 sec	0.25 gal	11 sec	0.13 gal	6 sec
Bath 2 sink	0.50 gal	45 sec	1.09 gal	65 sec	0.27 gal	16 sec	0.13 gal	7 sec
Bath 3 shower	0.40 gal	24 sec	0.99 gal	59 sec	0.25 gal	11 sec	0.13 gal	6 sec
Bath 3 sink	0.50 gal	45 sec	1.09 gal	65 sec	.27 gal	16 sec	0.13 gal	7 sec



Hot Water Distribution Systems

Things to Remember

1. Do the math
2. Make sure you have the numbers
3. Let the plumber know why you need the numbers
4. Let the homeowner know why what they have is better

Resources:

- [Hot Water Distribution Volume Calculator](http://epa.gov/watersense/excel/hw_volume_tool_v1.xlsm)
(http://epa.gov/watersense/excel/hw_volume_tool_v1.xlsm)
- [Guide for Efficient Hot Water Delivery Systems](http://epa.gov/watersense/docs/hw_distribution_guide.pdf)
(http://epa.gov/watersense/docs/hw_distribution_guide.pdf)

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Outdoor & Irrigation Requirements





Outdoor & Irrigation Requirements Overview



- Where irrigation is installed (**not required**)
 - Offer efficient irrigation technology with weather based control
 - Designed or installed & audited by a certified professional
- Allow for beautiful and functional landscapes
- Provide for regionally appropriate landscapes that are easy to maintain
 - Can cut down on maintenance (time and expense)
 - May survive periods of drought or watering restrictions more readily than conventional landscapes





Outdoor & Irrigation Requirements WaterSense Water Budget Tool



STEP 1 Location and Area

STEP 2 Plants and Irrigation

STEP 3 The Results

Congratulations on choosing to design a locally appropriate water-efficient landscape! The WaterSense water budget tool will help you determine if your landscape meets EPA's criteria for efficient outdoor water use in your area.

In order to use the water budget tool, you will need to know some basic information about your landscape:

- The location and zip code
- The total area of applicable landscape
- Types of plants and the total coverage
- Methods of irrigation (if any)

Your landscape will receive a pass/fail based on local climate, plant selection, irrigation methods, and size of the landscape. Follow the instructions on screen to find out if your landscape meets the WaterSense criteria.

For what purpose is the tool being used?
What are you landscaping?

WaterSense Labeled Home(s) ▼

How many sites?

Development of Multiple Landscapes Single Site

Is there an irrigation system?

Yes No

Enter Zip Code

75751

Enter Landscaped Area for a Single Home or Siteⁱ

5000

Sq. Ft.

Enter Multi-Home/Development Landscaped Area Rangeⁱ

to

Sq. Ft.

[NEXT STEP >](#)

look for



Additional Resources





WaterSense Labeled New Homes More Information

WaterSense® An EPA Partnership Program

Product Search | Meet Our Partners

WaterSense / New Homes

New Homes

Bringing Savings Home: WaterSense Labeled New Homes

Building Certifying Promoting Buying

- Easy to find on the WaterSense homepage
 - Look for the “New Homes” tab
 - www.epa.gov/watersense/new_homes
- Inspection video
- Resources for real estate agents
- Help us build our gallery of homes.

Who's Building in Your State?

WaterSense labeled new homes are popping up all across the country. Saving water, energy, and money makes sense wherever you might live—whether your region has recently experienced a drought or is flush with lakes and streams. [Find a WaterSense builder partner in your state.](#) And check out a few of the homes below that have been built to date!



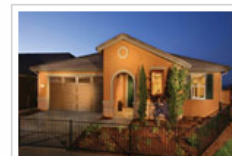
Chapel Hill, NC
(Vanguard)



Hendersonville, NC
(Nappier Homes)



Colorado Springs, CO
(GJ Gardner)



Roseville, CA
(KB Home)



WaterSense Labeled New Homes

More Information



- **Inspection and Verification Guidance and Inspection Checklist**
 - Lists the specification requirements
 - Provides step by step inspection instructions for each element
 - Provides a template for documenting whether each requirement is met
 - Indicates which elements require documentation
- **Guidelines for Irrigation Audits and Irrigation Audit Checklist**
 - Provides guidance and documentation criteria that the WaterSense irrigation partner uses when inspecting an irrigation system
- **Sampling protocol information for single and multi-family homes**
 - Provides an inspection checklists for documenting homes covered by a sampling protocol

look for



WaterSense Labeled New Homes

More Information

ZERH Requirements:

<https://basc.pnnl.gov/checklists/doe-zero-energy-ready-home>

WaterSense New Homes (Main Page):

www.epa.gov/watersense/new_homes

WaterSense New Homes Certification System:

www.epa.gov/watersense/new_homes/cert_new_homes.html

WaterSense New Homes Technical Materials:

www.epa.gov/watersense/new_homes/homes_final.html



What Tools Does EPA Provide?

Become a WaterSense builder partner at:
www.epa.gov/watersense/partners/partnership_agreement.html

- Builder/Provider marketing tool kits
 - Press release templates
 - Web site language
 - Artwork templates
- Use of partner logo
- Use of builder promotional label
- Online materials
 - Text and ideas for builder Web sites
 - Programmed “widget” updated regularly with water-efficiency tips from WaterSense





What Tools Does EPA Provide?

Skeptical of "low-flow"?

Choose WaterSense®!

Don't sacrifice performance for water efficiency.

WaterSense labeled products are certified to PERFORM as well or BETTER than standard models

...all while SAVING at least 20% more water!

www.epa.gov/watersense



What Tools Does EPA Provide?



Save Water & Energy

Don't Waste Time!

Get Hot Water Fast!

WaterSense® labeled homes
have efficient plumbing systems that get you hot water right when you need it!

www.epa.gov/newhomes

The diagram illustrates two plumbing scenarios. On the left, a blue water droplet character looks frustrated, with a clock icon and the text 'Don't Waste Time!'. A long, winding blue pipe connects a showerhead to a water heater tank. On the right, a blue water droplet character is happy, with the text 'Get Hot Water Fast!'. A short, direct red pipe connects a showerhead to a water heater tank. A 'WaterSense' label is shown on the pipe in the efficient scenario.



What Tools Does EPA Provide?



A Healthy Yard Isn't Hard!

An illustration of a suburban house with a brown roof and orange door. The front yard is lush with various flowers, including purple and pink blooms. A large green tree stands on the left, and a hammock with a person reading is strung between two posts in the middle ground. A winding path leads from the foreground towards the house.

we build
WaterSense
Meets EPA Criteria

WaterSense® labeled homes have low-maintenance, beautiful landscapes that save water.



More Information



Jonah Schein

Email: Schein.Jonah@epa.gov

or

Web site: www.epa.gov/watersense

E-mail: watersense@epa.gov

Helpline: (866) WTR-SENS (987-7367)