

# This presentation premiered at WaterSmart Innovations

[watersmartinnovations.com](http://watersmartinnovations.com)



# MASCO



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Headquartered in Taylor, Michigan,  
Masco Corporation is one of the world's leading  
manufacturers of home improvement and building  
products,  
as well as a leading provider of services that  
include the installation of insulation and other  
building products.

# Our Plumbing Products

Plumbers install a range of Masco products every day in homes across America.



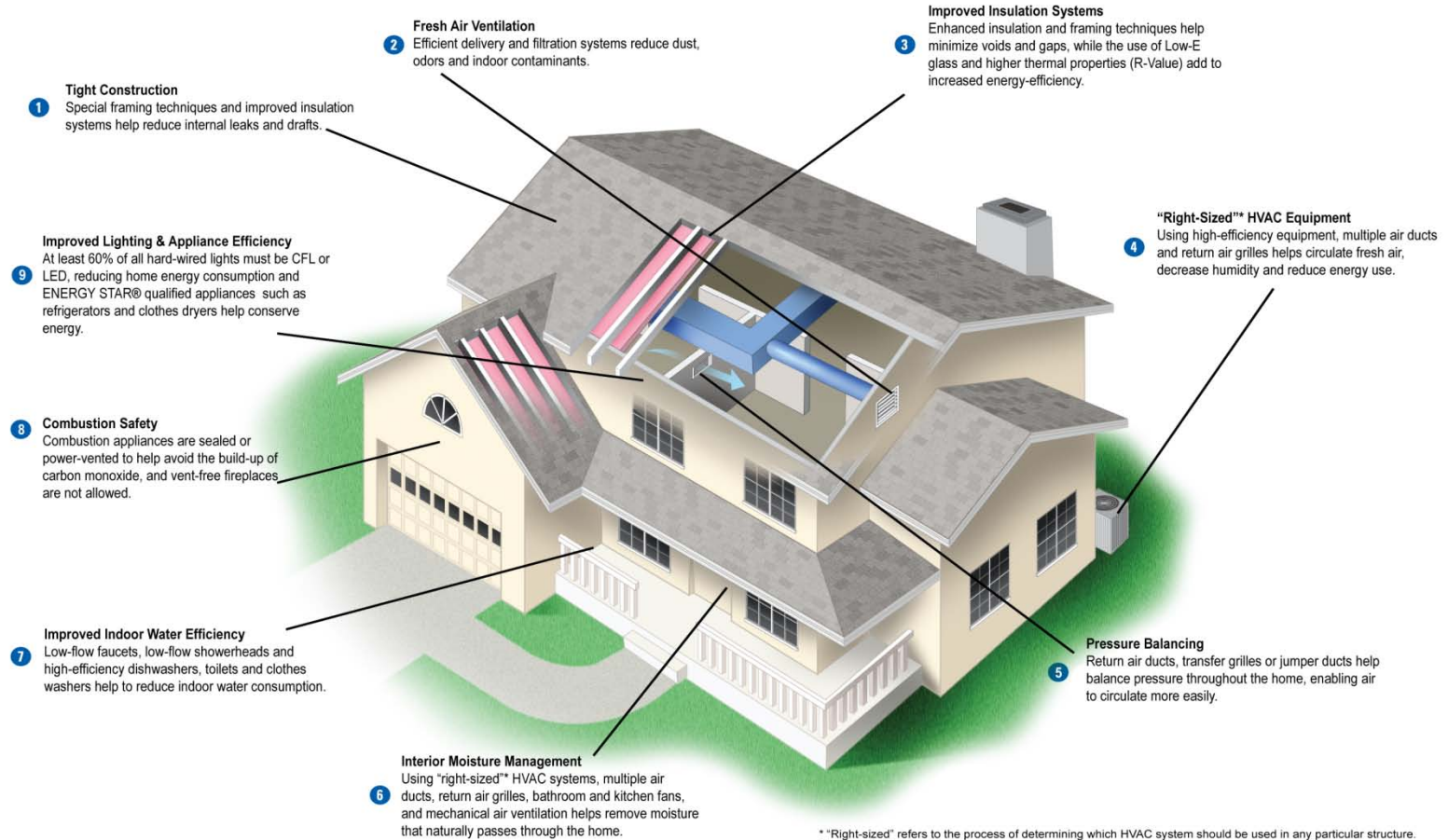
# What is the Environments For Living® – Certified Green Program?

The *Environments For Living -Certified Green* program is designed to have homes built in accordance with the program achieve an energy-efficiency level equal to a reduction of carbon dioxide (CO<sub>2</sub>) emissions and a reduction in internal water usage of 20%, and a home must achieve a Home Energy Rating System Index of 80 or less (20% more energy efficient than the 2006 International Energy Conservation Code).

- Durability
- Energy Efficiency - Guaranteed Performance\*
- Indoor Environmental Quality
- Water Efficiency

\* Written Guarantees are issued to homeowners on the amount of energy used for heating, cooling and comfort. See actual guarantee for details and imitations [www.environmentsforliving.com](http://www.environmentsforliving.com)

# Environments For Living® – Certified Green Program Elements





# Program Success

To date, more than 140,000 homes around the U.S. have been built to the Environments For Living<sup>®</sup> program specifications.



# ENVIRONMENTS FOR

CERTIFIED GREEN



- Will require builders to use EFL trained and certified contractors
- Most trades will use Green Builder Media Training Program
- Plumbing contractors will use GreenPlumbersUSA Training



# Water Efficiency Specifications

- Kitchen - 2.2 gpm
- Lavatory - 1.5 gpm
- Showerhead – 2.0 gpm (H<sub>2</sub>O Kinetic)
- Energy Star Appliances –
  - Horizontal Axis Washing Machine - WF = 6
  - Water Heater Efficiency Standards
- Engineered Plumbing (minimize water wasted waiting for Hot Water) – Recommended Practice

# Green Building Standards - The Water Efficient Home

Application	1999	Environments For Living® Certified Green	% Savings
Toilet Flush	18.5	6.5	64.8
Clothes Washer	15	6.8	54.6
Shower	11.6	9.2	20.6
Faucets	10.9	9	17.4
Other	3.8	3.9	0
Total	59.8	35.4	41%

Units – Gallons/Capita/day

1999 – Residential End Uses of Water Study – (excludes leakage

Annual usage (350 occupancy days )= 58,604 gallons/year.

Environments for Living – Kitchen Faucet – 2.2 gpm, Lav Faucet 1.5 gpm,  
Showerhead 2.0 gpm, Toilet – 1.28 gpf, Clothes Washer – Water Factor 6.0

Annual usage = 34,700 gallons/year

# Next Steps

- Where do we take Water Efficiency Improvements from here?
- Beyond just point-of-exit restrictions?
  1. Minimize Water Wasted Waiting for Hot
  2. Develop Engineered or Structured Plumbing Strategies and Builder/Plumber Education
  3. Develop New Construction and Retrofit Strategies
  4. Behavior – Feedback, Education and other methods to influence behavior

# Home Faucet Usage

- Faucet Use – Northwestern US, 2008\*
- 343 Homes
- 280,000 faucet uses over 2 week period (20,000 uses/day)

Average Uses/Day/Home	58
Average Peak Flow Rate	0.96 gpm
Average Use Duration	3.5 Seconds
Average Total Flow/Use	0.5 gallons

Source : Bill DeOreo Aquacraft Engineering

## Water Use-Time of Day Scenario (Family of 4)

Outlet	Total Uses			Hot Water Draw – Cold Start			Grand Total
	Early	Day	Night	Early	Day	Night	
Kitchen	6	6	7	2	2	2	19
Master Lav	4	2	5	1	1	1	11
Master Shower	2			1			2
Bath 2 Lav	4	4	5	1	1	1	13
Bath 2 Shower	2			1			2
Powder Room	3	5	7		1	1	15
Total	21	17	24	6	5	5	62

## Typical Plumbing



Pipe Length = 152 feet  
Water wasted waiting for Hot  
**25 g/d, 8750 gallons/year**

Approximate Hot Water Wait Times

Kitchen	1 minute
Master Bath Lav	1.5 minutes
Master Bath Shower	1.25 minutes
Bath 2 Lav	1 minute
Bath 2 Shower	45 Seconds

## Add Hot Water Recirculation



Length HW Pipe = 162 feet  
Water Wasted Waiting for Hot  
**4 g/d, 1400 Gallons/year**

### Hot Water Wait Times

Kitchen	8 Seconds
Master Bath Lav	4 Seconds
Master Bath Shower	5 Seconds
Bath 2 Lav	8 Seconds
Bath 2 Shower	5 Scdonds



## Centrally Located Water Heater

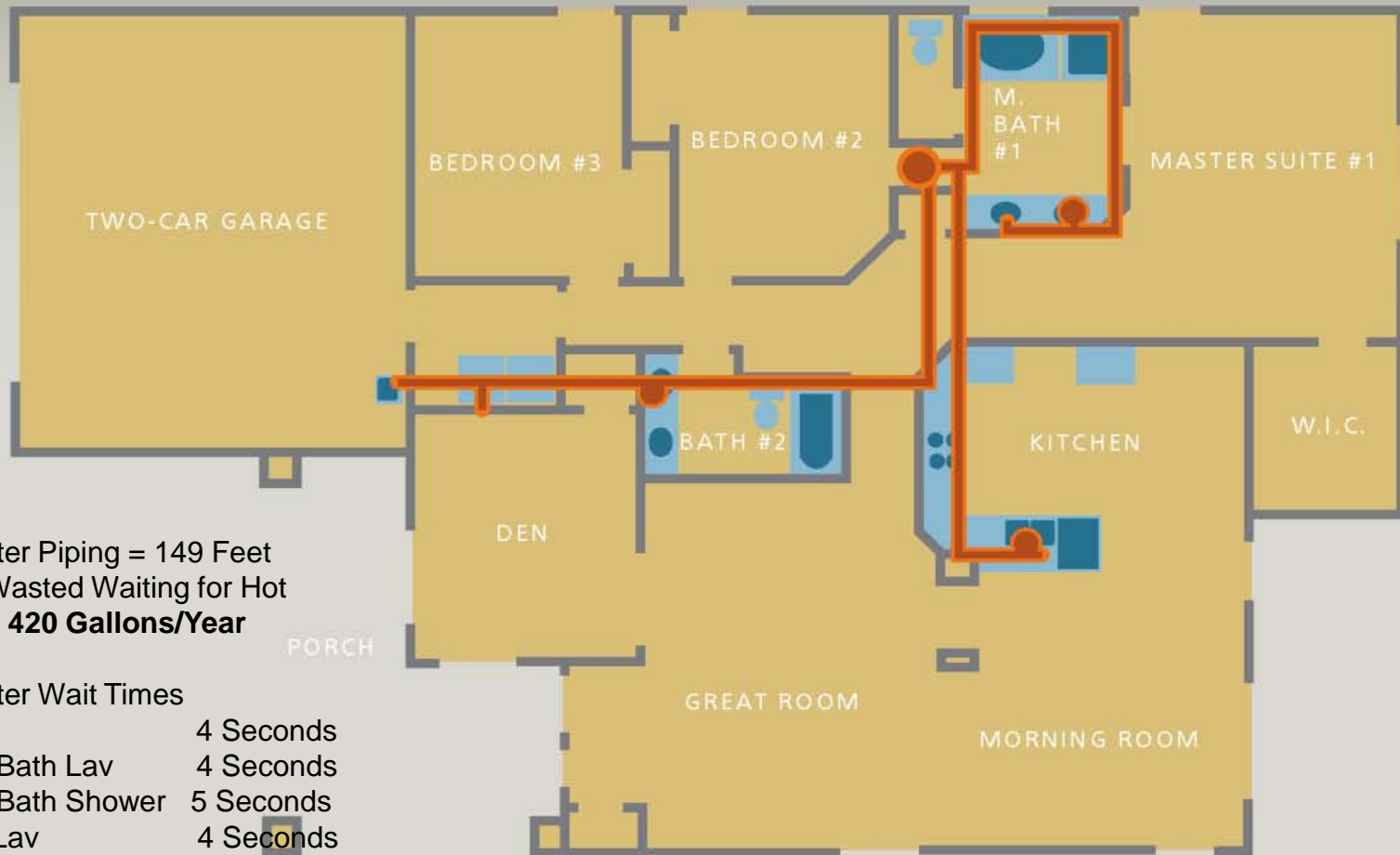


Hot Water Piping = 165 Feet  
Water Wasted Waiting for Hot  
**10.5 g/d, 3675 Gallons/Year**

### Hot Water Wait Times

Kitchen	25 Seconds
Master Bath Lav	20 Seconds
Master Bath Shower	25 Seconds
Bath 2 Lav	50 Seconds
Bath 2 Shower	25 Seconds

## Centrally Located Water Heater with Recirculation



Hot Water Piping = 149 Feet  
Water Wasted Waiting for Hot  
**1.2 g/d, 420 Gallons/Year**

### Hot Water Wait Times

Kitchen	4 Seconds
Master Bath Lav	4 Seconds
Master Bath Shower	5 Seconds
Bath 2 Lav	4 Seconds
Bath 2 Shower	5 Seconds

# How Water Wasted Comparison

Design	Hot Water Wasted/yr
Typical	8750 Gallons
Recirculation	1400 Gallons
Centrally Located HW Heater	3675
Centrally Located HW Heater with Recirculation	420

# Plumbing Plan Review Process

Qualify Home Specifications for Environments For Living<sup>®</sup> Certified Green

Improvement benefits are four-fold:

1. Lower Material Costs from streamlined, designed plumbing system layout
2. Lower Homeowner Energy Costs (Hot Water)
3. Increased Homeowner convenience via quick hot water delivery times
4. Lower Water Usage in eliminating 90% of water wasted waiting for hot water

Educate Builders/Plumbers in techniques to minimize water wasted waiting for hot water

# Plumbing Plan Review Process

## Designing a Well-Plumbed Home

A design principles guide for new homes to minimize water wasted waiting for hot and deliver hot water where needed in less than 5 seconds.

## Adapting Good Plumbing Design to Your Floor Plans

A guide/process for optimizing hot water delivery speed and lowest water wasted based upon water heater placement, piping configuration and Demand Controlled Recirculation options for new homes using existing floor plan layouts with minimum layout modifications.

## Retrofitting Existing Homes to Improve Hot Water System Performance

A guide/process of optimizing hot water delivery speed and lowest water wasted in retrofitting existing homes. Utilizes the same spreadsheet and calculation features from process 2.

# Questions/Discussion

- Many of the new home floor plans we've seen would be best optimized in eliminating water wasted waiting for hot water with a Demand Controlled Water Recirculating system. What can we do to:
  1. Educate Builders and Plumbing Contractors regarding system layout and design to address this issue?
  2. Incentivize Builders and Plumbers to use recirculation where floor plan layouts make that the best option?
- In reviewing Builder plans, we see design layouts for the DWV and gas piping, but no design for the water supply system. How do we change this?

# Questions/Discussion

- Current Plumbing Codes establish minimum pipe sizes based primarily on Roy Hunter's work in the 1930's/40's

Probability of simultaneous fixture use – water demand in  
Multi-family buildings

Single family residence simultaneous uses are likely more  
infrequent

Lower demand from faucets and high efficiency toilets  
could justify lowering pipe sizes and their contained  
volumes (hot water wait)



# Questions/Discussion

- What incentives might Utilities offer to Builders to encourage less wasteful plumbing design in new construction? Would a discount on connection/access fees be possible?
- What incentives might be helpful in getting Demand Controlled Recirculation systems installed in existing homes?