This presentation premiered at WaterSmart Innovations

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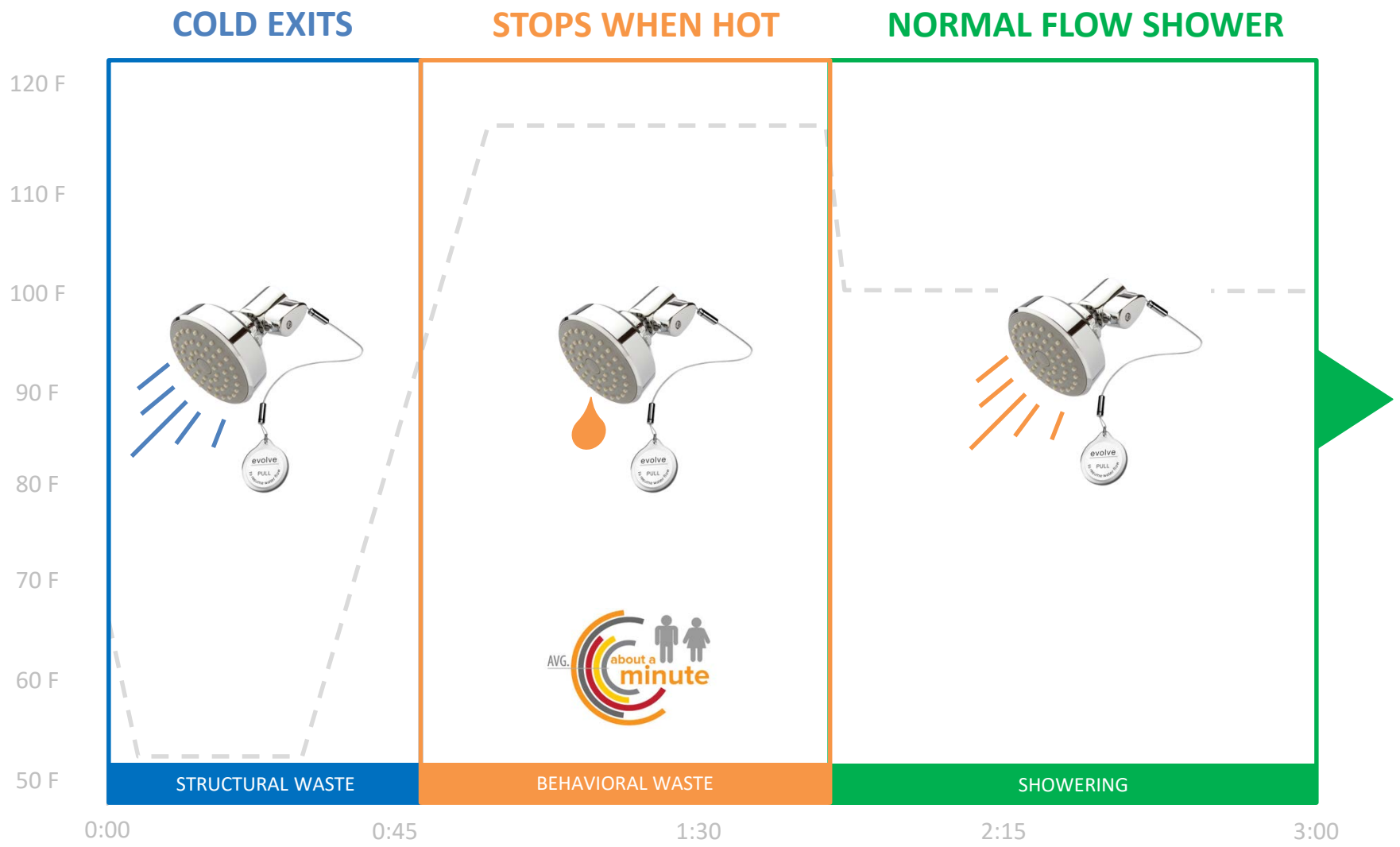
INNOVATIONS

evolve™
TECHNOLOGIES

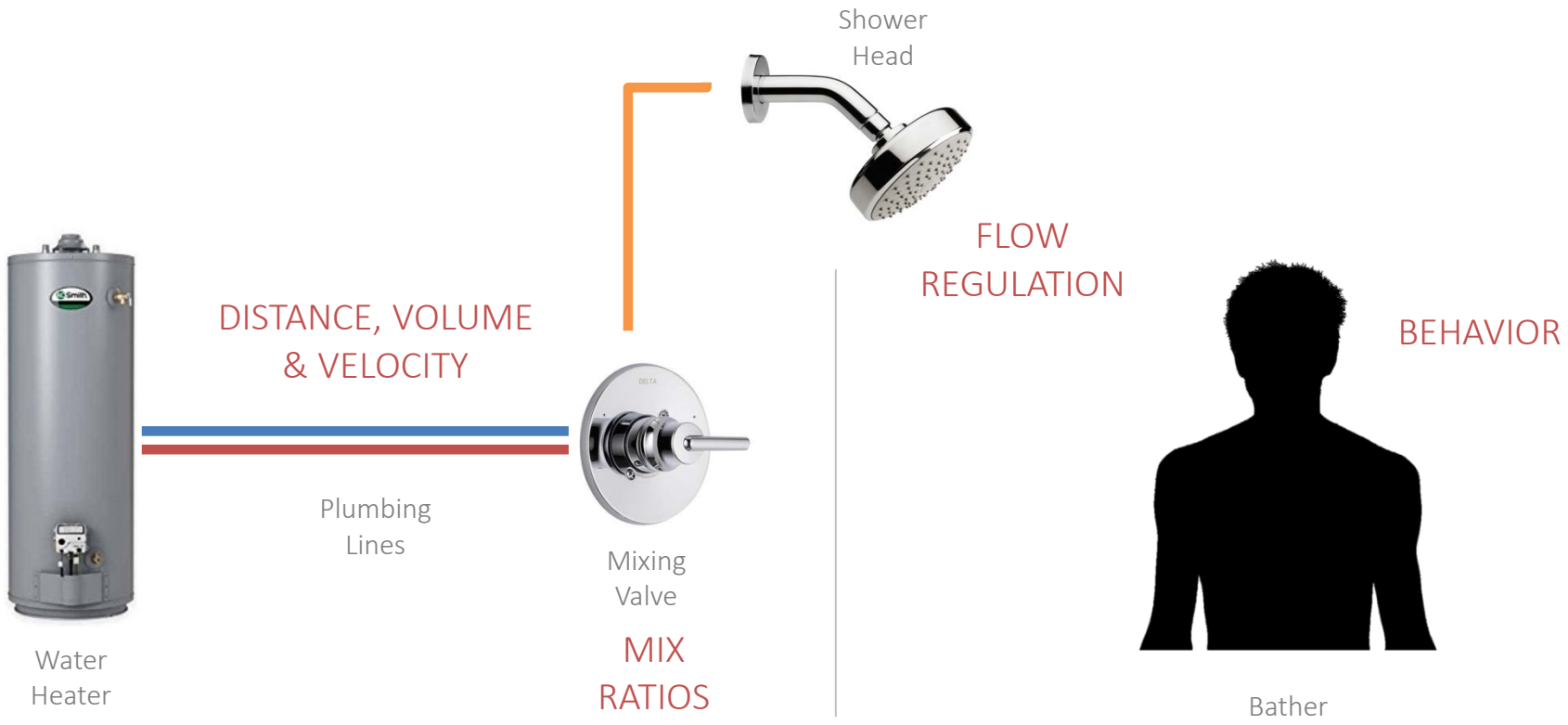
Auto-Diverting Tub Spouts & Applegate Apartments WaterSmart Innovations 2019

EPA WaterSense PARTNER

Brief Technology Explanation - How A TSV Works



Shower Structure – Key Considerations For Water & Energy Use



STRUCTURAL

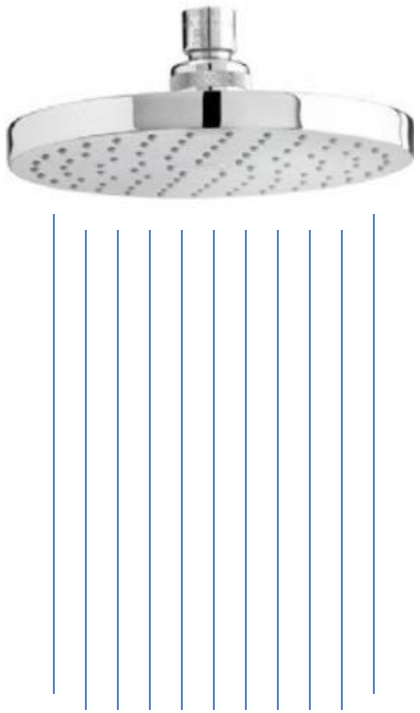
CAN'T REALLY CHANGE

BEHAVIORAL

OPPORTUNITY FOR CHANGE

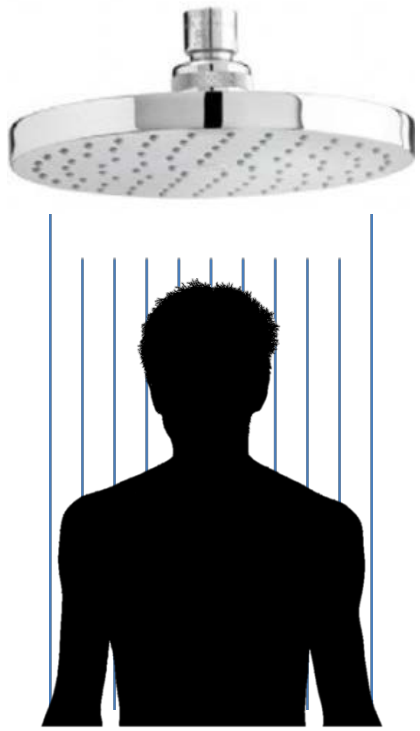
20% - 30% Of Shower Is Wasted Before Bathing Begins

In 2004 and 2011 papers Jim Lutz at Lawrence Berkeley National Lab indicate that shower warm-up waste falls in the 20% - 30% range.



~ 2 Minutes
Of This
WARM-UP WASTE

BEFORE



~ 6 Minutes
Of This
BATHING USE

Behavioral Waste Estimates From Field Research

Based on primary and secondary research from LBNL as well as 3rd party pilot studies Behavioral Waste is approximately 1 minute per shower taken.

BERKELEY LAB
Lawrence Berkeley National Laboratory

2004
Secondary Research via REUWS

2011
Small Pilot Study

2013
Evolve Analysis of Field Data
n = 18 bathrooms / 283events

39-59 Seconds

GREYSTAR
Redefining Excellence in Apartment Living.

2014
Multifamily Pilot Study
n = 240 apartments (120 control)

~ 60 Seconds

CADMUS ppl

2015
Pilot Study
n = 22 bathrooms / 581 events

59 Seconds

Core Product Lines

ShowerStart® TSV

- Eliminates behavioral waste
- Universal compatibility
- Solid brass construction
- Easy installation

Auto-Diverting Tub Spout

+ ShowerStart TSV

- Reduces warm-up waits by 2x or more
- Auto diverts hot water to the showerhead once it arrives
- Anti-leak tub spout design
- Includes WaterSense showerhead or handshower

Showerhead

+ ShowerStart TSV

- Eliminates behavioral waste
- Pressure compensating performance
- Multiple spray patters and flow rates
- Exceeds WaterSense standard

Handshower

+ ShowerStart TSV

- Eliminates behavioral waste
- Pressure compensating performance
- Multiple spray patters and flow rates
- Exceeds WaterSense standard
- Stainless steel hose
- Brass fitting

Standard Showerheads Also Available

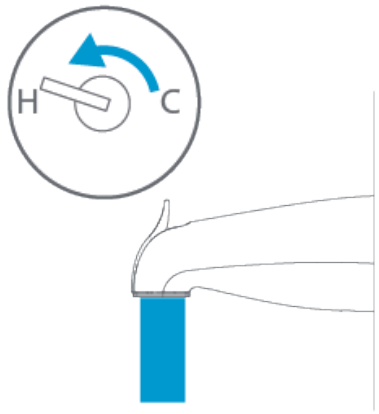
Single & Multifunction Showerheads

- Multiple spray patterns and flow rates
- Rub clean spray nozzles
- Pressure compensating flow regulation

Single & Multifunction Handshowers

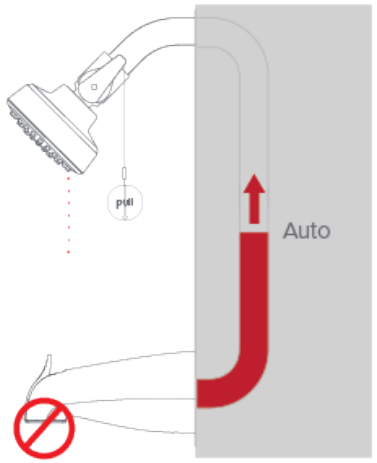
- Multiple spray patterns and flow rates
- Rub clean spray nozzles
- Pressure compensating flow regulation
- 59’’ stainless steel hose and shower arm mount

How it works



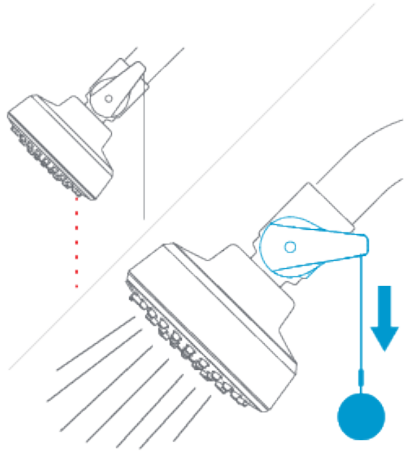
1 Turn on hot water
Cold water exits spout

Continue with your typical routine - the things you do while waiting for the shower to become warm.



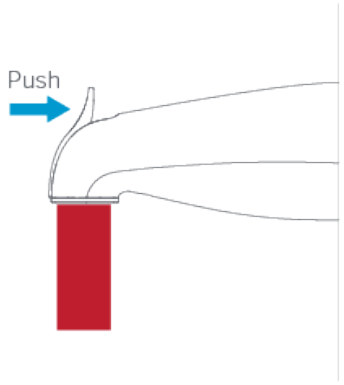
2 Auto diverts when hot water arrives

Upon reaching 95°F, ShowerStart Technology automatically diverts flow. Showerhead trickles - saving hot water until you get in.



3 Pull cord when ready to get in

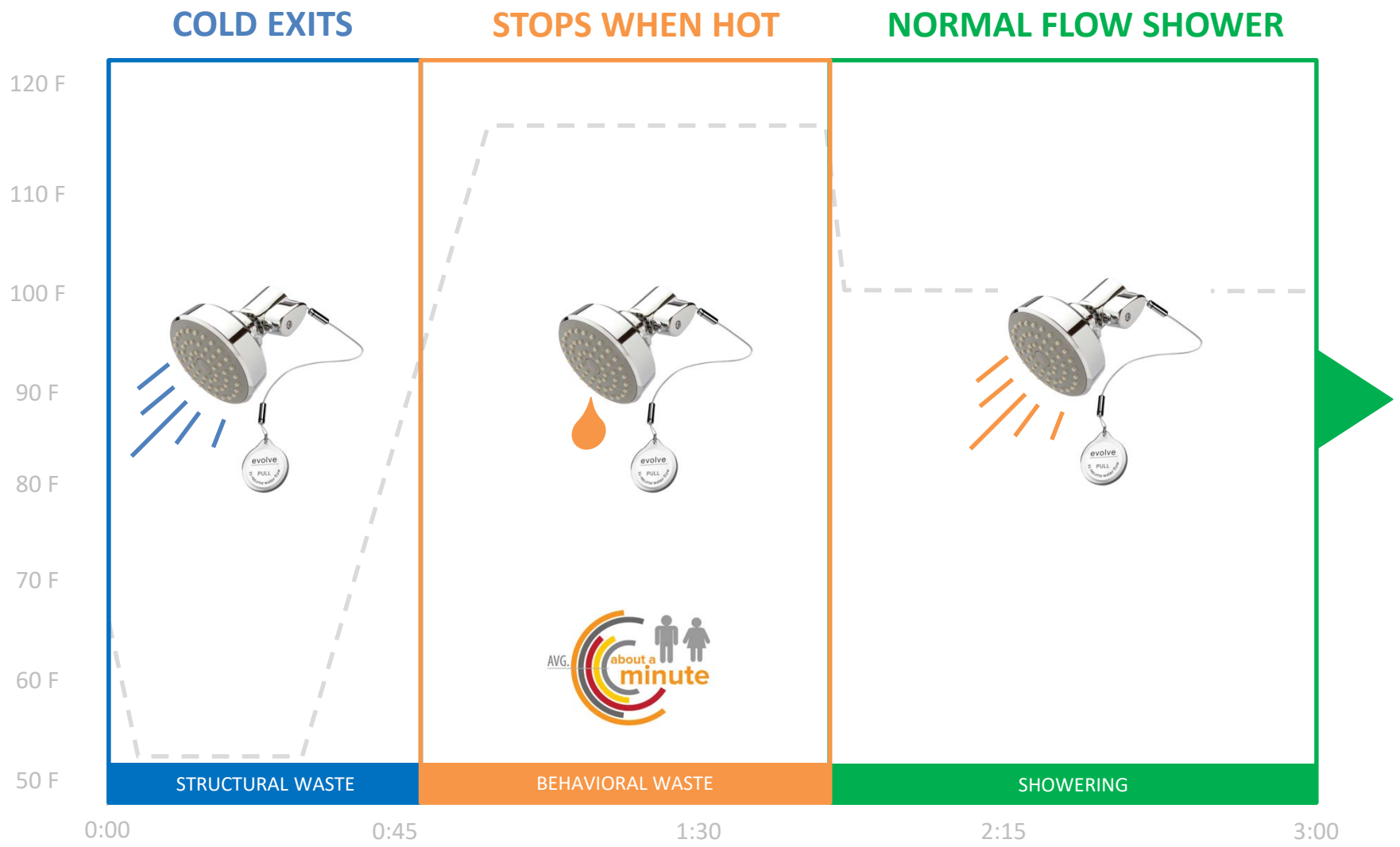
Pull the cord to activate normal flow and begin showering.



4 Option: Taking a bath

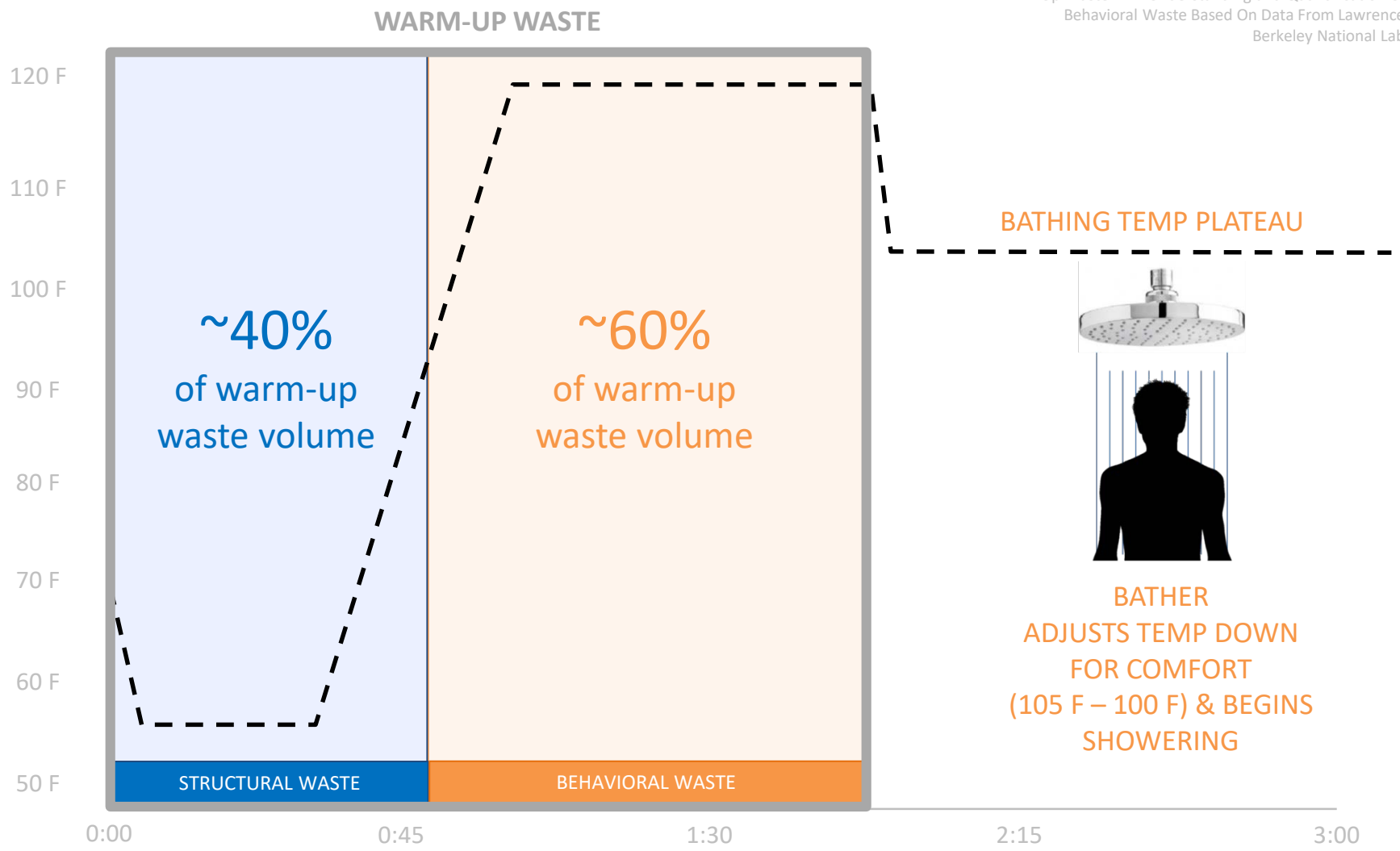
If a bath is preferred, simply push tub spout lever back to its original position.

Brief Technology Explanation - How A TSV Works

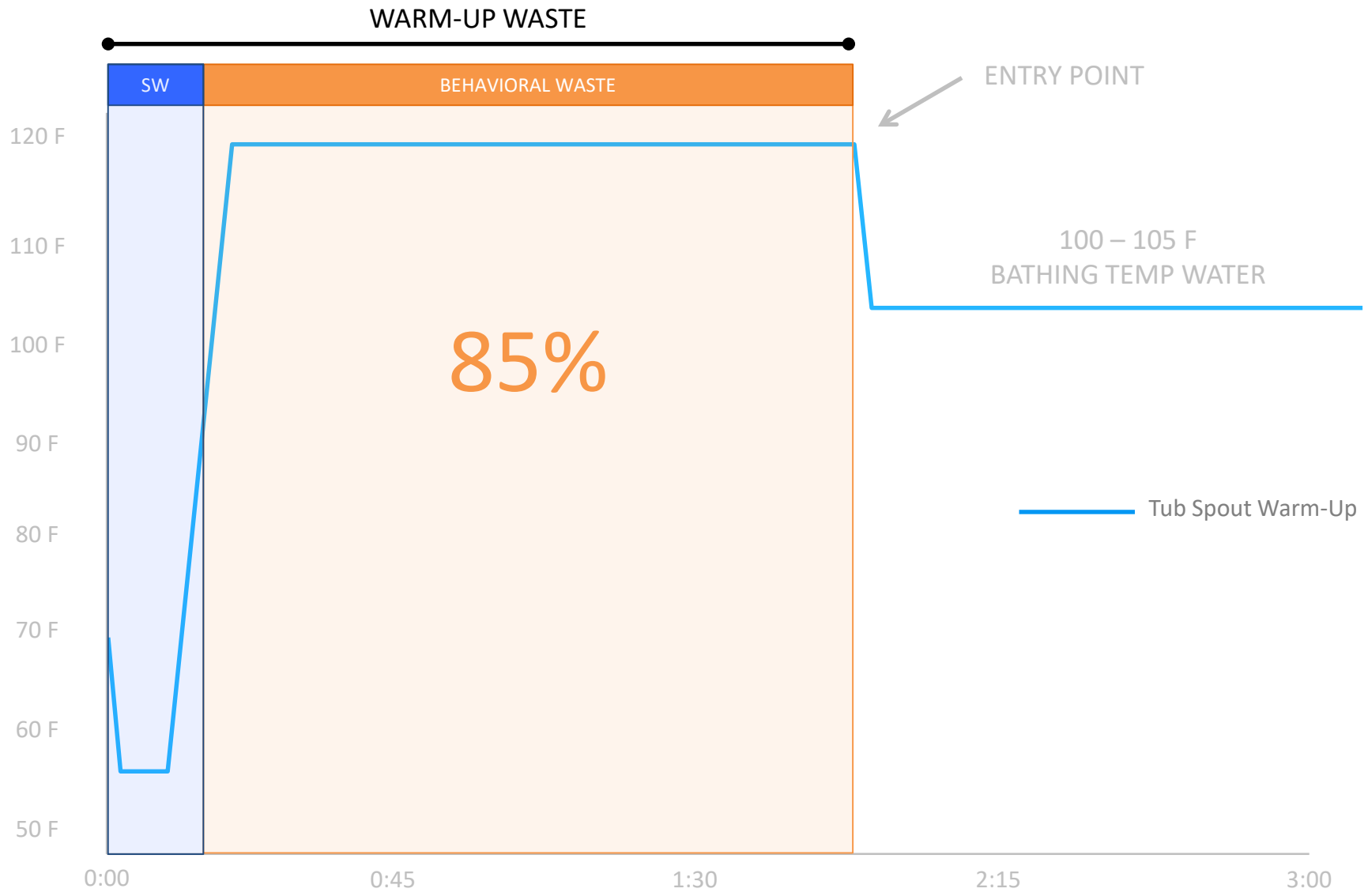


Anatomy Of A Shower Warm-Up – Lawrence Berkley National Lab Data Analysis

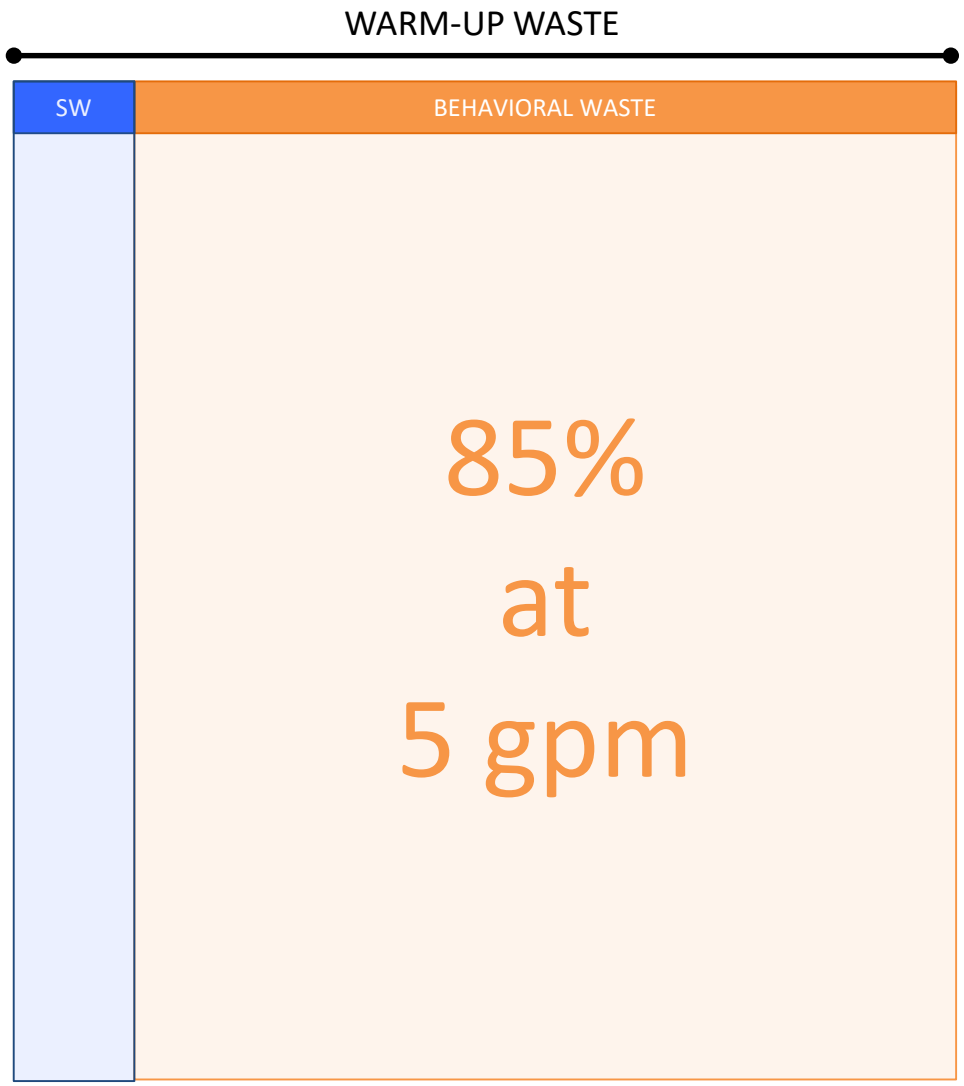
SOURCE: 2014 Disaggregating Residential Shower Warm-Up Waste – An Understanding and Quantification of Behavioral Waste Based On Data From Lawrence Berkeley National Lab



Anatomy Of A Tub Spout Warm-Up - Example



A Dramatic Impact On Eliminating Warm-Up Waste



Eliminates A Much Larger Percentage of Warm-Up Waste At A Much Higher Flow Rate

5 gpm or more vs. 2.5 gpm or less

ADTS Is Efficient In Four Unique Ways

The product reduces structural waste, eliminates behavioral waste, provides an efficient shower and stops tub spout leaks while showering.

REDUCES STRUCTURAL WASTE

Higher warm-up velocity reduces thermal loss – less to purge before hot arrives.

ELIMINATES BEHAVIORAL WASTE

ShowerStart TSV integrated into TubSpout eliminates behavioral waste.

PROVIDES EFFICIENT SHOWERING

WaterSense certified showerhead saves water while bather is showering.

STOPS LEAKING TUB SPOUT

Positive, pressure sealed shut-off prevents TubSpout from leaking during shower.

Impact of Lower Flow Rates On Existing Structures

At lower flow rates, 50% - 100% more water must clear the pipe than is actually sitting in the pipe before hot water reaches the shower.

PLUG FLOW (+ 5 gpm) distance < 1 foot

0% - 10%
more than
volume of pipe

LONG BULLET (1-3 gpm) distance 5 – 10 feet

10% - 50%
more than
volume of pipe

EPA
EPAct of 1992
water flow limits on toilets and fixtures

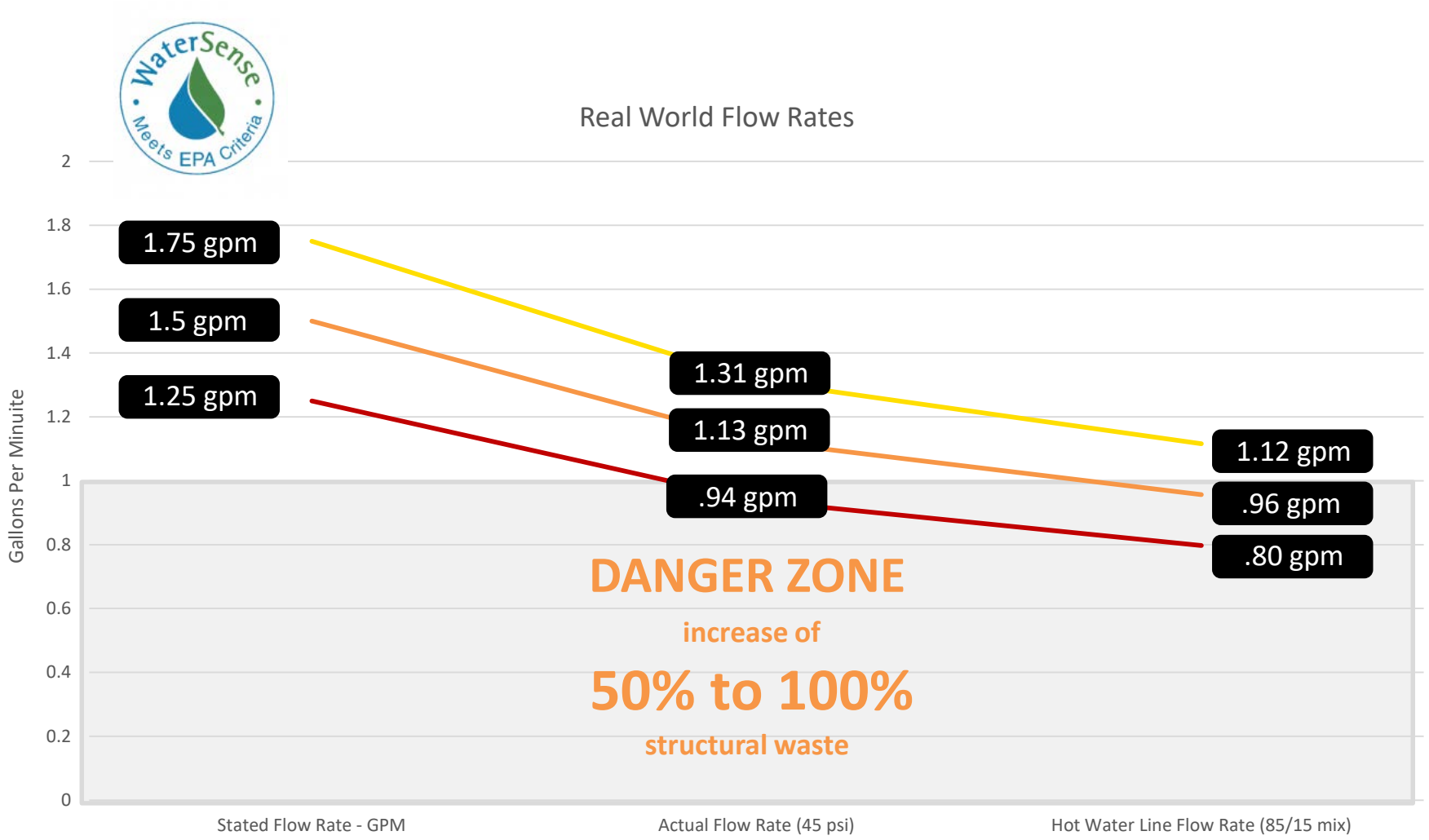
HOT SLIDES UP OVER COLD (<1 gpm) distance + 20 feet

50% - 100%
more than
volume of pipe

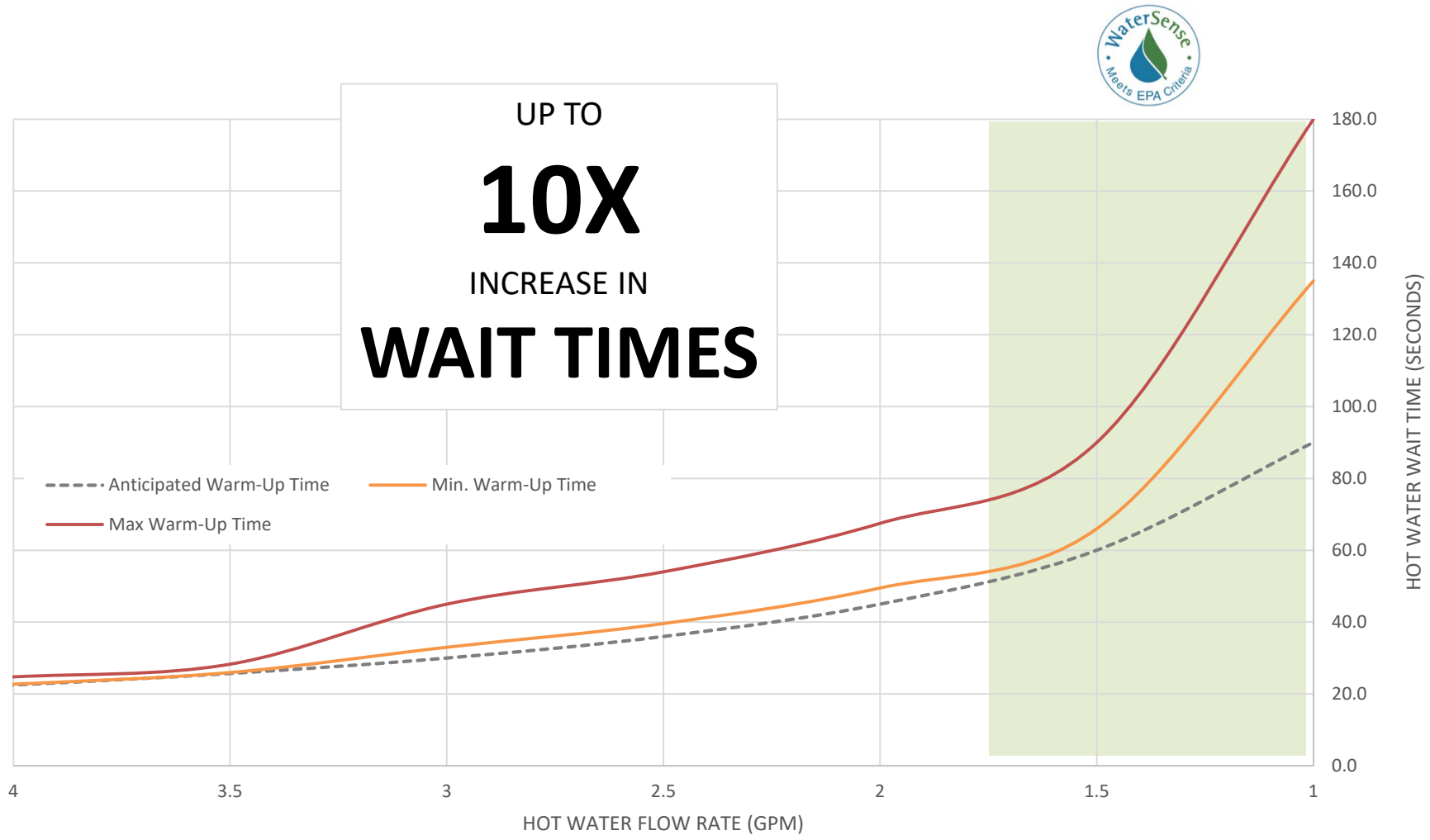
DANGER ZONE

SOURCE: Koeller, J (2007) Residential Hot Water Distribution Potential Best Management Practices.pdf

WaterSense Shower Heads Are Frequently In The Danger Zone



20 Second Waits Are Now Becoming 3 Minutes!



SOURCE: Gary Klein, Estimates for hot water volume to purge 1-2 gallons (1.5gal avg.).
Koeller, J (2007) Residential Hot Water Distribution Potential Best Management Practices.pdf

Shower Warm-Up Research - Survey Results

The majority of bathrooms have tub/shower combos, the tub spouts leak and multitasking while water is running out of the tub spout is common place.

62%

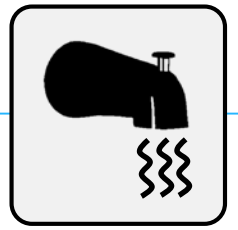
TUB/SHOWER COMBOS

648 of the people surveyed reported that they typically shower in a tub/shower combination unit

34%

LEAKY TUB SPOUT

220 showering in a tub/shower combo unit report that their tub spout leaks during their showers



40%

TUB SPOUT WARM UP

258 people with tub/shower combo units warm their shower by letting the water run through the tub spout and activating the diverter AFTER the water becomes warm

58%

MULTITASK

149 people doing tub spout warm ups regularly or occasionally leave to do something else while waiting for the water to become warm

BEHAVIORAL WASTE

multitasking during tub spout warm up causes significant waste

Tub Spouts Flow At 4 to 7 Gallons Per Minute

ADTS Savings Potential – California Centric Calculations

Savings should be adjusted based on regional behavioral waste times.
Savings should be adjusted based on factors for installation qualification.

ADDED TO BEHAVIORAL

Structural Waste

5.5 GALLONS SAVED

Behavioral Waste

5.0 GALLONS SAVED

Efficient Showering

1.5 - 4.5 GALLONS SAVED

Anti-Leak Tub Spout

12 TO 15 GALLONS SAVED PER SHOWER

Auto-Diverting Tub Spout System (ADTS) Product Family

ADTS
+
Single Function
Showerhead

ADTS
+
Multifunction
Handshower

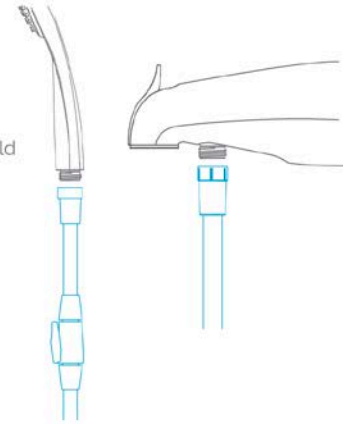
ADTS For In Wall Diverters
+
Multifunction
Handshower

Special Considerations for In-Wall Diverter Systems

1. ATTACH HOSE TO TUB SPOUT

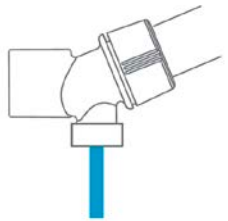
Hose Attaches To Tub Spout

Attach hose ends to **Tub Spout** and **Hand Shower**. The ShowerStart TSV Trigger should be attached closest to the **Hand Shower**.



2. ALWAYS SET TO DIVERTER TO “TUB”

note: failure to set to **TUB** will result in a stream of water flowing from the hand shower mount.



Case Study: Applegate Apartments, Frederick, MD

ADTS w 1.5 gpm
Shower Head

	PROPERTY PROFILE
Owner/Manager	Maryland Mgmt.
Name	Applegate Apartments
Location	Frederick, MD
Buildings	2
Apartment Units	156
ADTS Installation	Summer 2016
Pre Install SH Flow Rate	1.5 gpm
Post Install SH Flow Rate	1.5 gpm
Additional Water Measures Installed	None

Case Study: Applegate ADTS Water Savings Potential

YES	YES	NO	YES	
				
.4 GALLONS SAVED	5.1 GALLONS SAVED	0 GALLONS SAVED	4.5 GALLONS SAVED	10 GALLONS SAVED PER* SHOWER
Structural Waste	Behavioral Waste	LIKE FOR LIKE SHOWER HEAD REPLACEMENT * Efficient Showering	Anti-Leak Tub Spout	

* *Picking up incremental shower head savings has the potential to increase total ADTS savings by up to 33%.*

Case Study: Applegate Predicted Yearly Water Savings

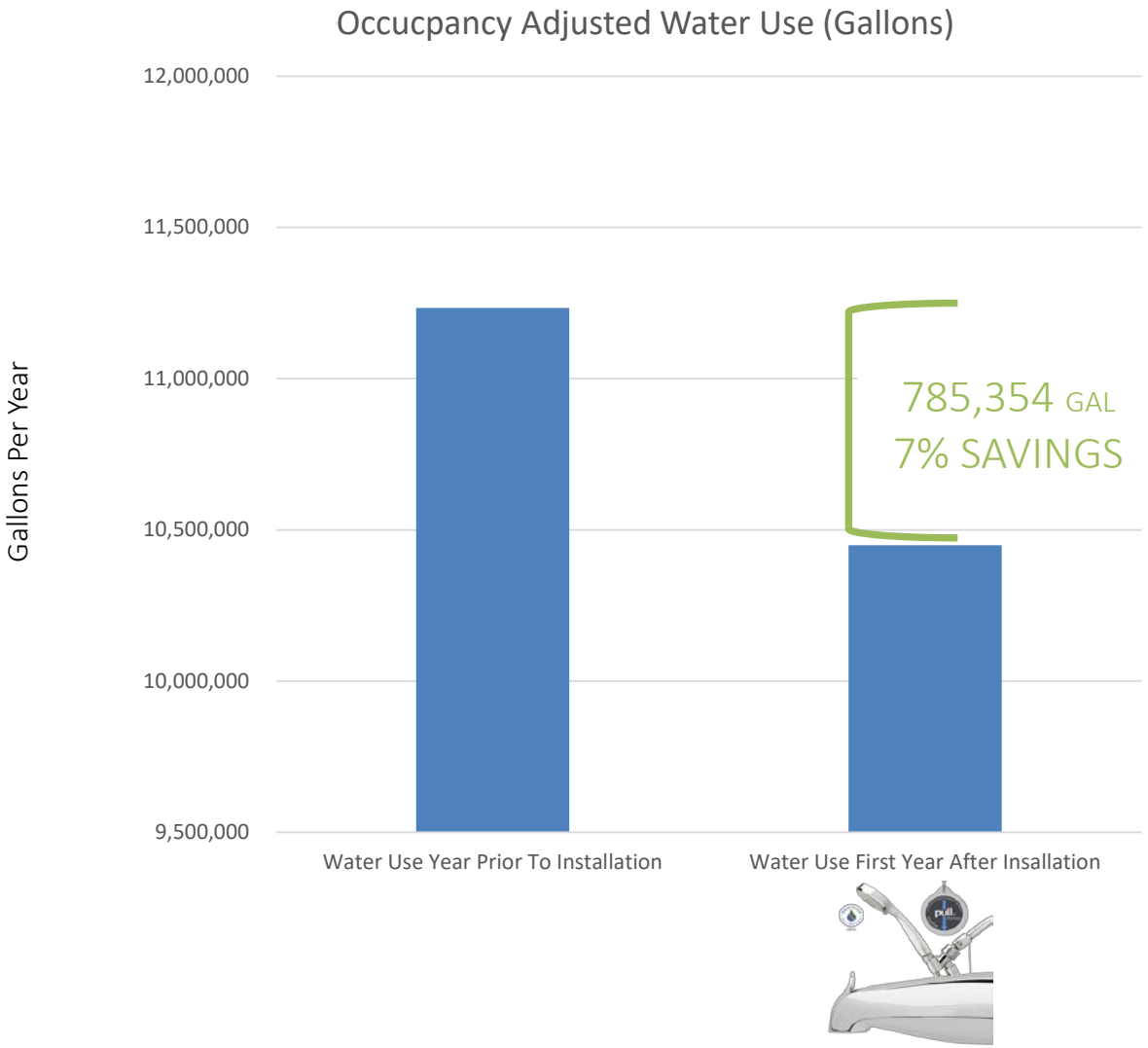
	WATER SAVINGS VARRIABLES
Apartment Units	156
Bathrooms Per Apartment	1
Persons Per Apartment	2
Shower's Per Person Per Day	0.75
Days Per Year	365.25
Occupancy Rate	0.91
ADTS Predicted Gal. Saved/Shower	10

PREDICTION

777,763

GALLONS SAVED PER YEAR

Case Study: 7% Total Water Use Reduction vs. Baseline

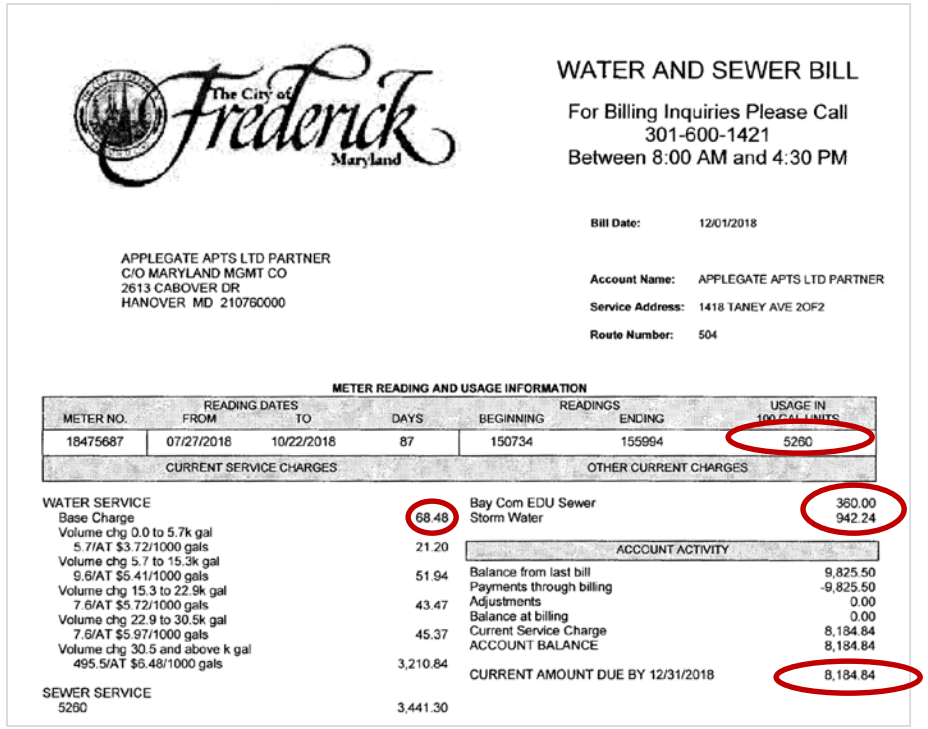


	OCCUPANCY ADJUSTED* ADTS SAVINGS
Water Use Year Prior To Installation	11,234,157
Water Use First Year After Installation	10,448,803
Year 1 Gallons Saved @ Applegate	785,354
Year 1 Percent Saved @ Applegate	7%

* OCCUPANCY ADJUSTMENT

To neutralize the impact of occupancy rate variances within the analysis water use was adjusted to assume 100% occupancy using the following formula: [actual gallons used/occupancy rate] = occupancy adjusted water use Actual monthly occupancy rates during the measurement period ranged from 88% - 96%.

Case Study: Applegate Water/Sewer Savings Payback



The City of Frederick Maryland

WATER AND SEWER BILL

For Billing Inquiries Please Call
301-600-1421
Between 8:00 AM and 4:30 PM

Bill Date: 12/01/2018

APPLEGATE APTS LTD PARTNER
C/O MARYLAND MGMT CO
2613 CABOVER DR
HANOVER MD 210760000

Account Name: APPLEGATE APTS LTD PARTNER
Service Address: 1418 TANEY AVE 2OF2
Route Number: 504

METER READING AND USAGE INFORMATION

METER NO.	READING DATES FROM	TO	DAYS	READINGS BEGINNING	ENDING	USAGE IN 100 GAL UNITS
18475687	07/27/2018	10/22/2018	87	150734	155994	5260

CURRENT SERVICE CHARGES

WATER SERVICE	
Base Charge	68.48
Volume chg 0.0 to 5.7k gal	
5.7/AT $3.72/1000 gals	21.20
Volume chg 5.7 to 15.3k gal	
9.6/AT $5.41/1000 gals	51.94
Volume chg 15.3 to 22.9k gal	
7.6/AT $5.72/1000 gals	43.47
Volume chg 22.9 to 30.5k gal	
7.6/AT $5.97/1000 gals	45.37
Volume chg 30.5 and above k gal	
495.5/AT $6.48/1000 gals	3,210.84
SEWER SERVICE	
5260	3,441.30

OTHER CURRENT CHARGES

Bay Com EDU Sewer	360.00
Storm Water	942.24

ACCOUNT ACTIVITY

Balance from last bill	9,825.50
Payments through billing	-9,825.50
Adjustments	0.00
Balance at billing	0.00
Current Service Charge	8,184.84
ACCOUNT BALANCE	8,184.84
CURRENT AMOUNT DUE BY 12/31/2018	8,184.84

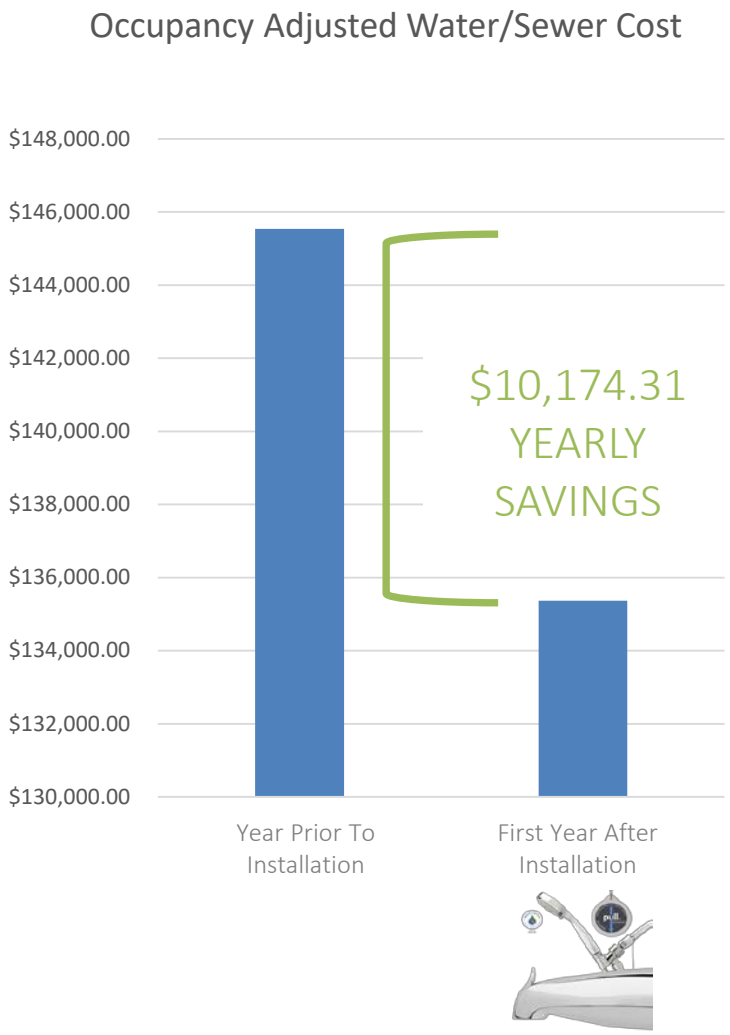
Bill Total	$	8,185.00
Fixed Cost Bay Com EDU Sewer	$	- 360.00
Fixed Cost Storm Water	$	- 942.00
Fixed Cost Base Charge	$	- 68.48
Net Cost For Water & Sewer	$	6,814.52

PAYBACK IN LESS THAN 1 YEAR ON WATER SAVINGS ALONE

- does not consider energy savings
- does not consider shower head savings

PAYBACK CALCULATIONS	
Water/Sewer Cost Per Gallon	$.013
ADTS Cost	$60.00
Gallon Cost Per ADTS	4,631
ADTS Units Installed	156
Gallon Savings Required To Break Even	722,498
Year 1 Gallon Savings – Occupancy Adjusted	785,354
Payback Months – Occupancy Adjusted	11
Year 1 Gallon Savings	996,300
Payback Months	9

Case Study: Applegate Water/Sewer Savings ROI



	ADTS ROI ANALYSIS
Annual Water/Sewer Bill Savings	$10,174.31
ADTS Cost Per Unit	$60.00
ADTS Units Installed	156
ADTS Cost Of Investment	$9,360
ADTS Est. Useful Life - Years	10
ADTS Gain From From Investment	$101,743.07
ROI (Yr 1)	**108.7%**

ROI = Gain From Investment / Cost Of Investment. First year's savings only.

Case Study: Applegate Annual Energy Savings Projections

	Structural & Behavioral	Shower Head	Anti-Leak Tub Spout	Per Unit Energy Saved	Units Installed	Occupancy Rate	Total Energy Savings	Total $ Savings
ELECTRIC	323 kWh	0 kWh	281 kWh	604 kWh	156	.91	85,744 kWh	$11,147
GAS	14.2 Therms	0 Therms	12.4 Therms	26.6 Therms	156	.91	3,776 Therms	$4,305

ASSUMPTIONS:

- 2 persons per apartment
- .75 showers per person per day
- 56.8 F avg. water mains temp
- 105F – 101F showering temp range
- $.13 per kWh (chooseenergy.com)
- $1.14 per Therm (energy-models.com)

Additional Installation Benefits – Green Loans & CPACE

- Preferential Loan Pricing
- Free energy and water audit paid by Fannie Mae
- Additional loan proceeds

Property owner must commit to property improvements that are projected to reduce the whole property's annual energy and/or water consumption by at least 30%, inclusive of at least a 15% energy consumption reduction.

Additional Installation Benefits – LEED Points

ShowerStart TSV
Contributes To Earning Up To

12 POINTS

WE c Total Water Use
Homes/Midrise

6 POINTS

WE c Indoor Water Use Reduction
BD+C: New Construction

Thank You

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480.215.3061

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