



Changes in Residential Hot Water Use

...and the story with showerheads

June 6, 2018

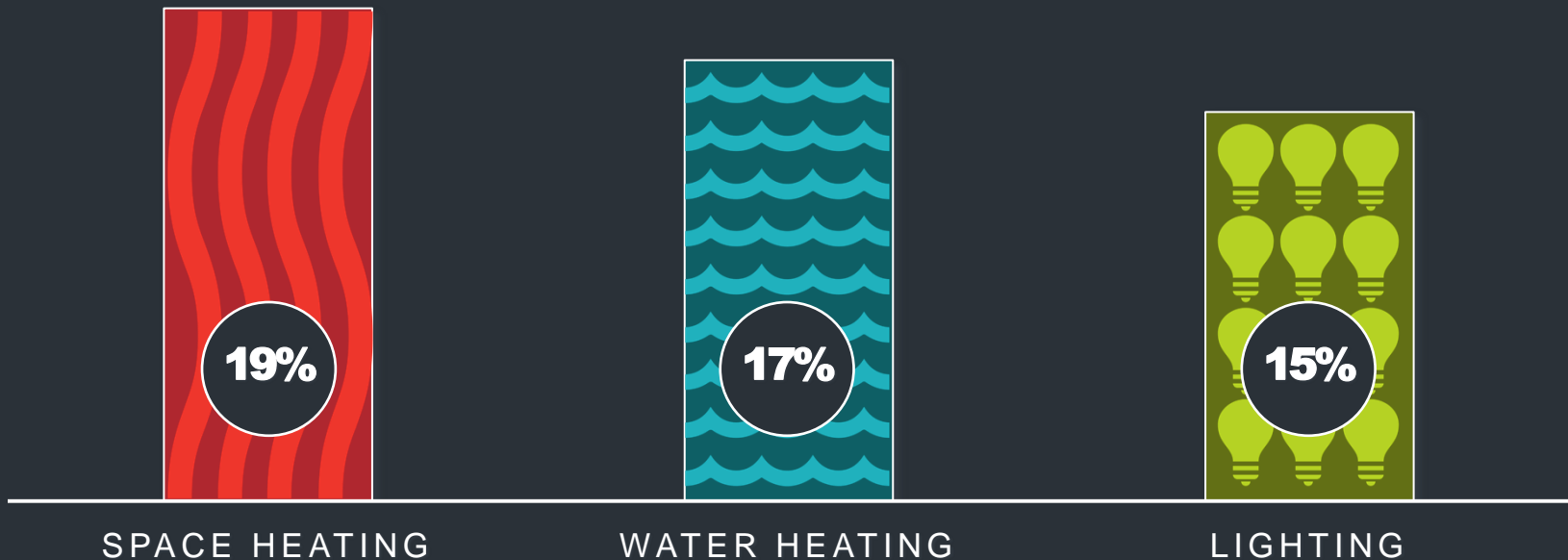
Agenda

1. Big picture framing
2. Changes in national and regional hot water energy use
3. Some interesting findings from RBSA II
4. Implications on BPA's momentum savings work

Why is hot water important?

It is the second largest residential end use in the Northwest

PERCENT OF 2015 NORTHWEST RESIDENTIAL LOAD (aMW)

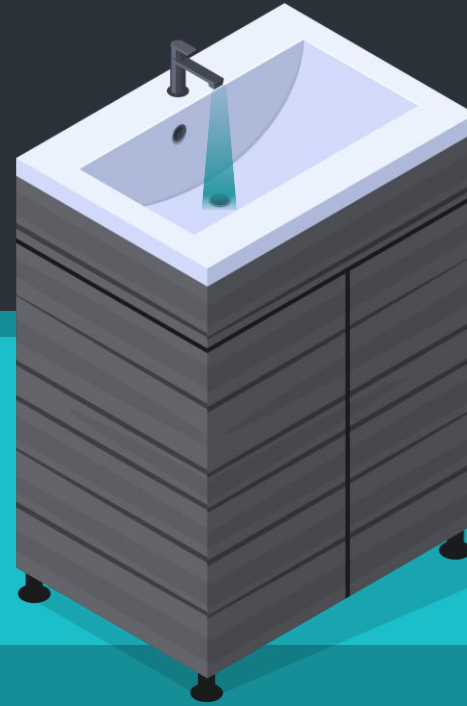


We can think about the hot water market in two ways:



1

or



2

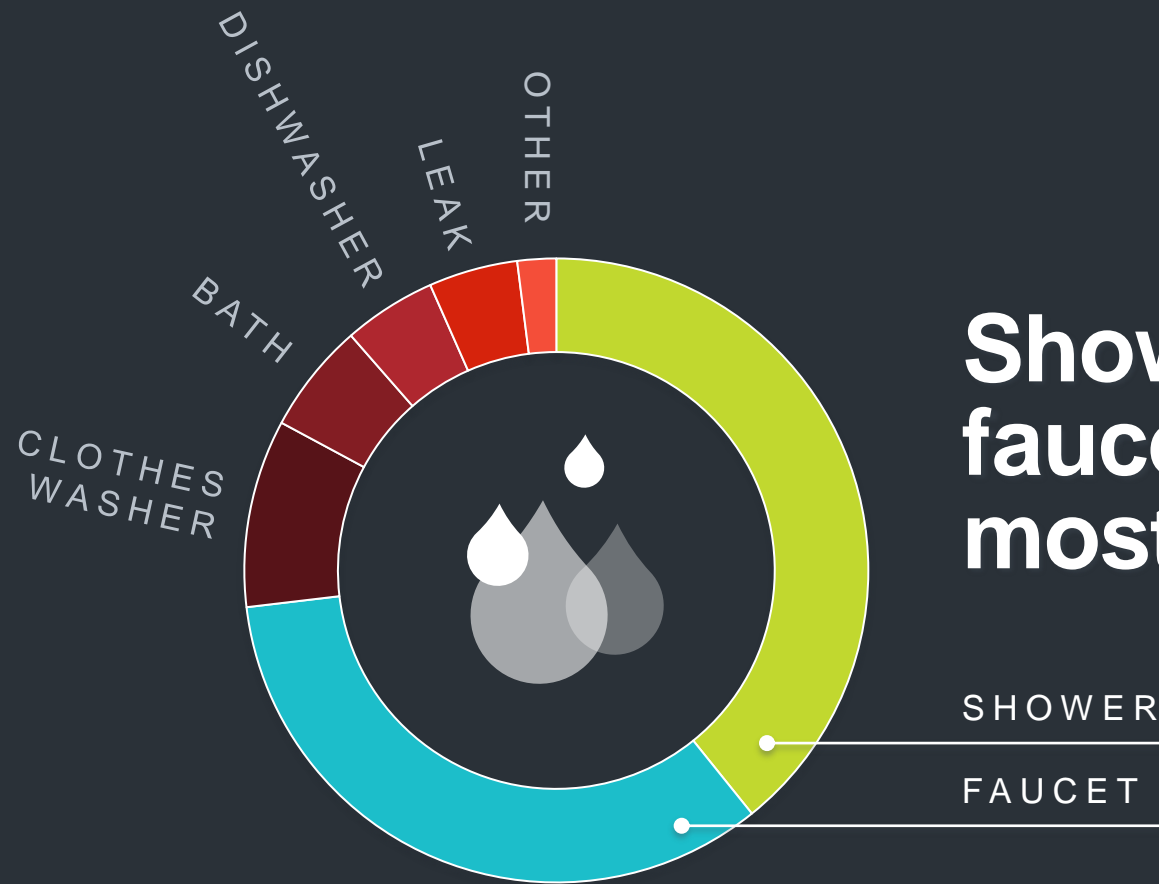
Water
heating
efficiency

Hot
water
use

**The discussion today is focused
on hot water use**

**How do
people use
hot water?**





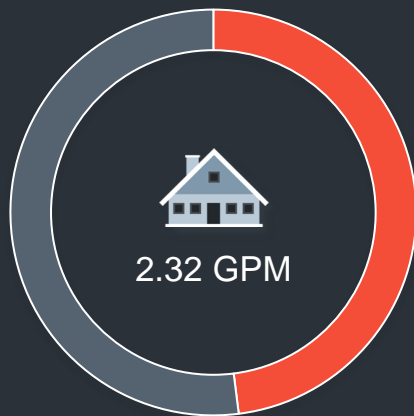
Showers and faucets use the most hot water

SHOWER

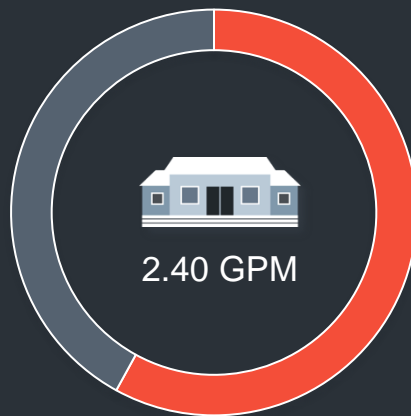
FAUCET

Source: 2016 Residential End Uses of Water, Version 2: Executive Report, Table 1

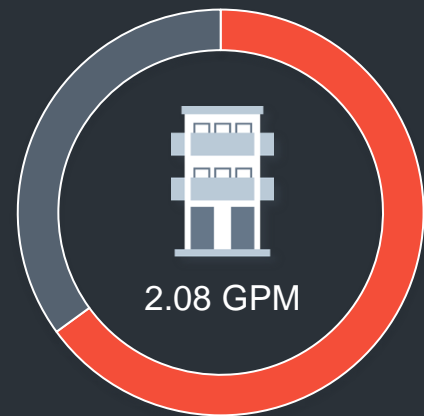
Lots of inefficient showerheads (2011)



SINGLE FAMILY



MANUFACTURED
HOMES



MULTIFAMILY

■ At or Below WaterSense (≤ 2.0 GPM)

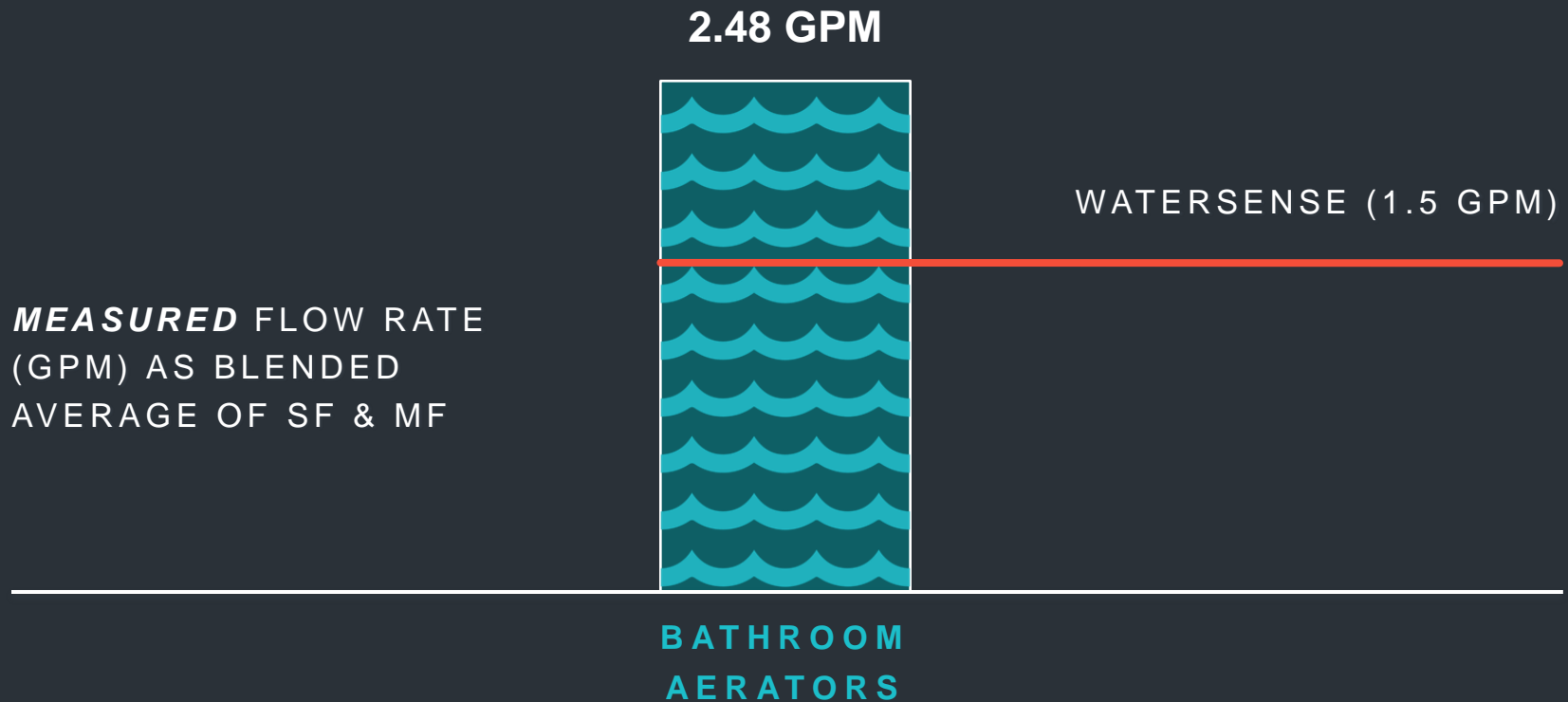
■ Above WaterSense (≥ 2.1 GPM)

Source: 2011 NEEA RBSA

Note: GPMs shown are weighted average measured flow rates for each building type.

Lots of inefficient bathroom aerators

Most not meeting WaterSense

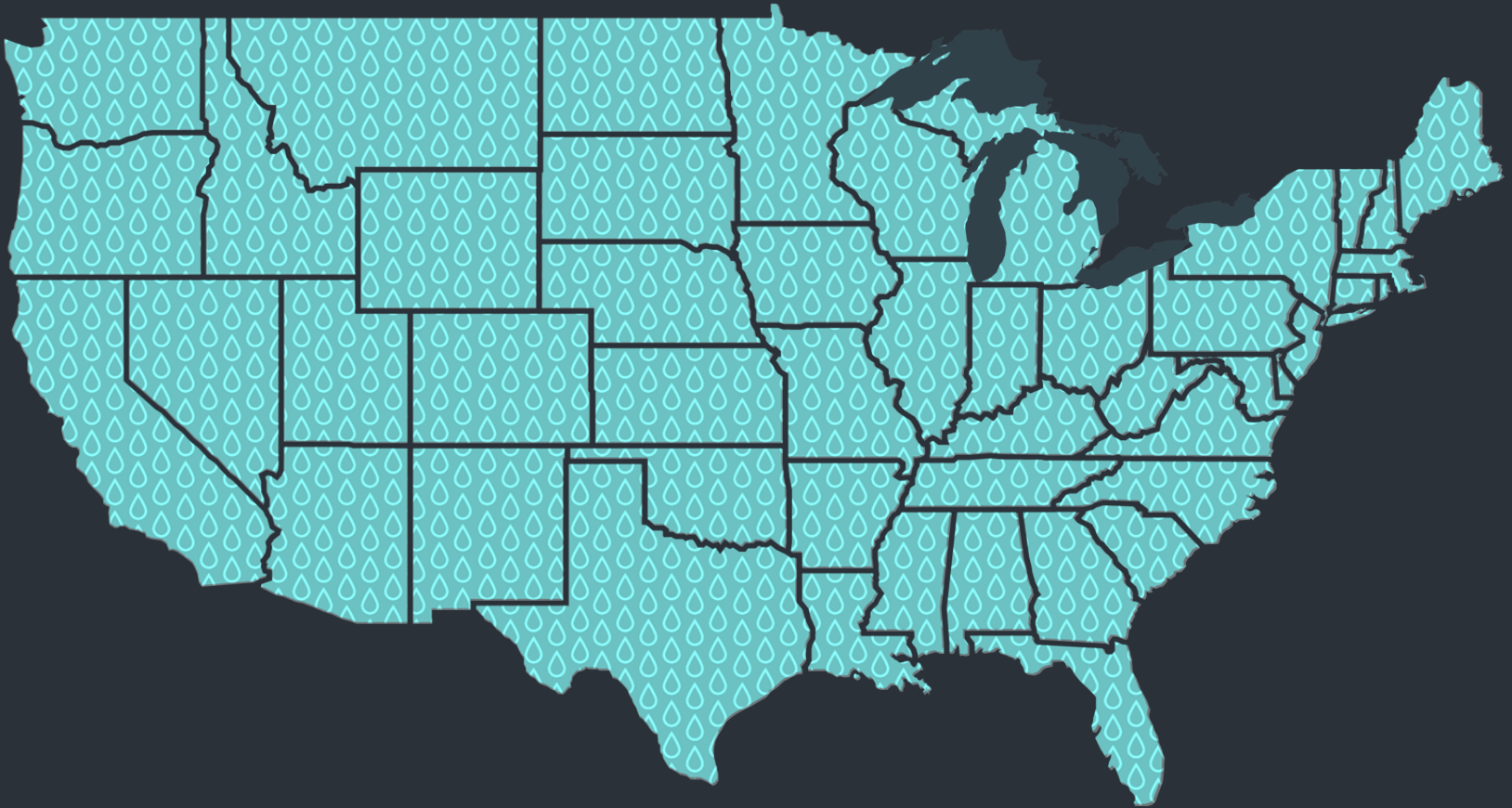


Source: Energy Trust of Oregon Blessing Memo for Faucet Aerators, "ETO CEC 2015 Customizable Energy Saver Kits-140822 REVISED", as presented in 7th Plan Aerator Conservation Supply Curve Workbook (Res-Aerator-7P_v5.xlsx)



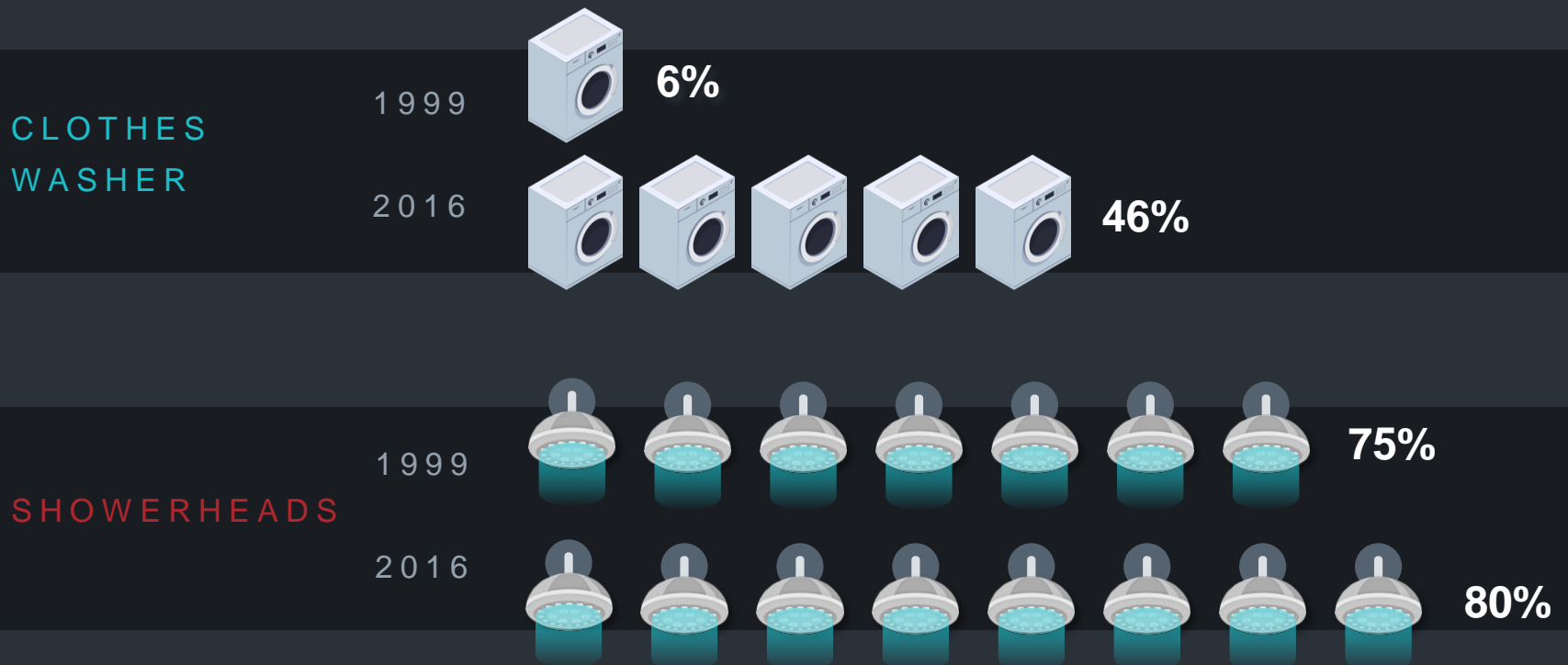
How is hot water use changing over time?

Nationally, how is hot water use changing?



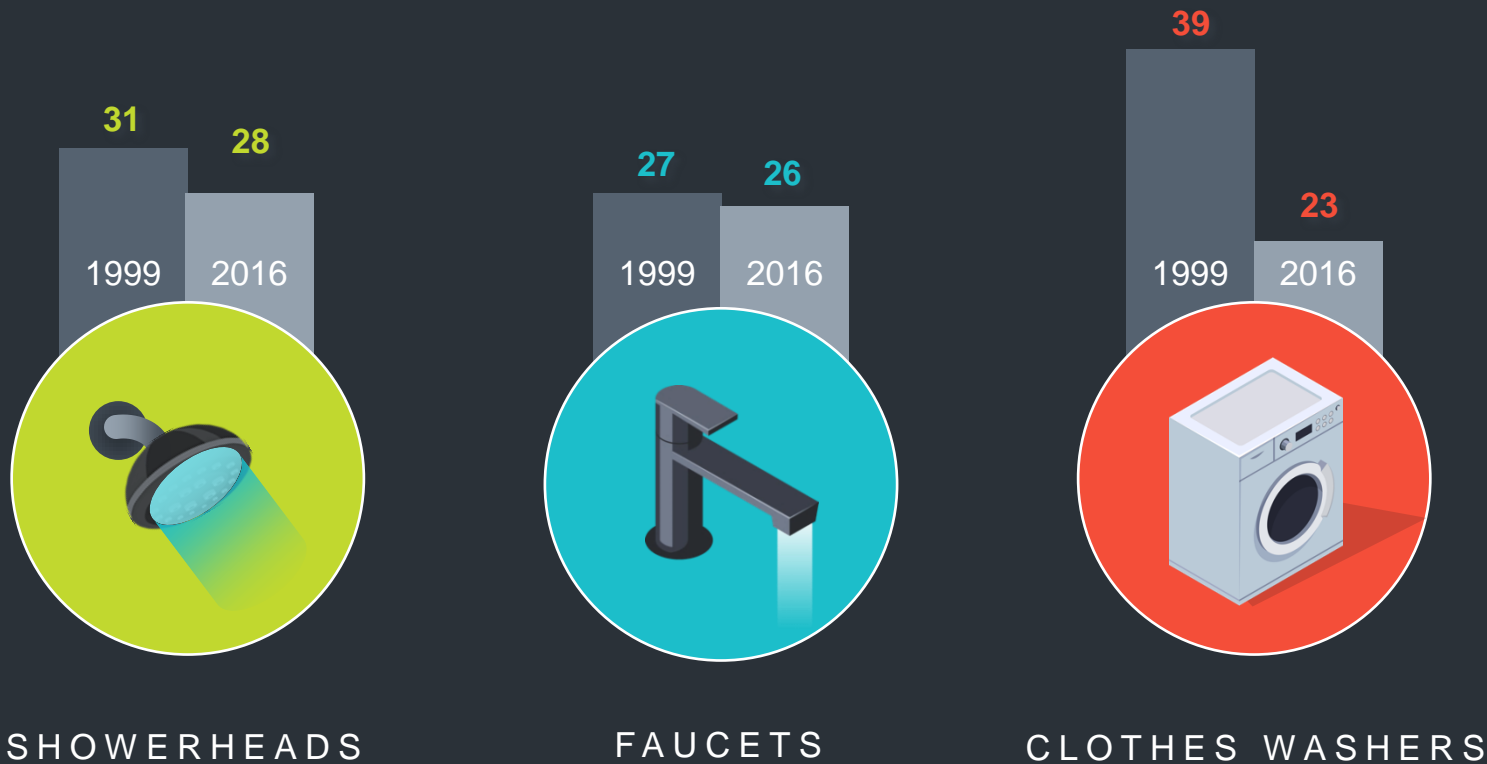
We're getting more efficient, nationally

PERCENT OF HOMES MEETING EFFICIENCY CRITERIA
REU 1999 AND REU 2016

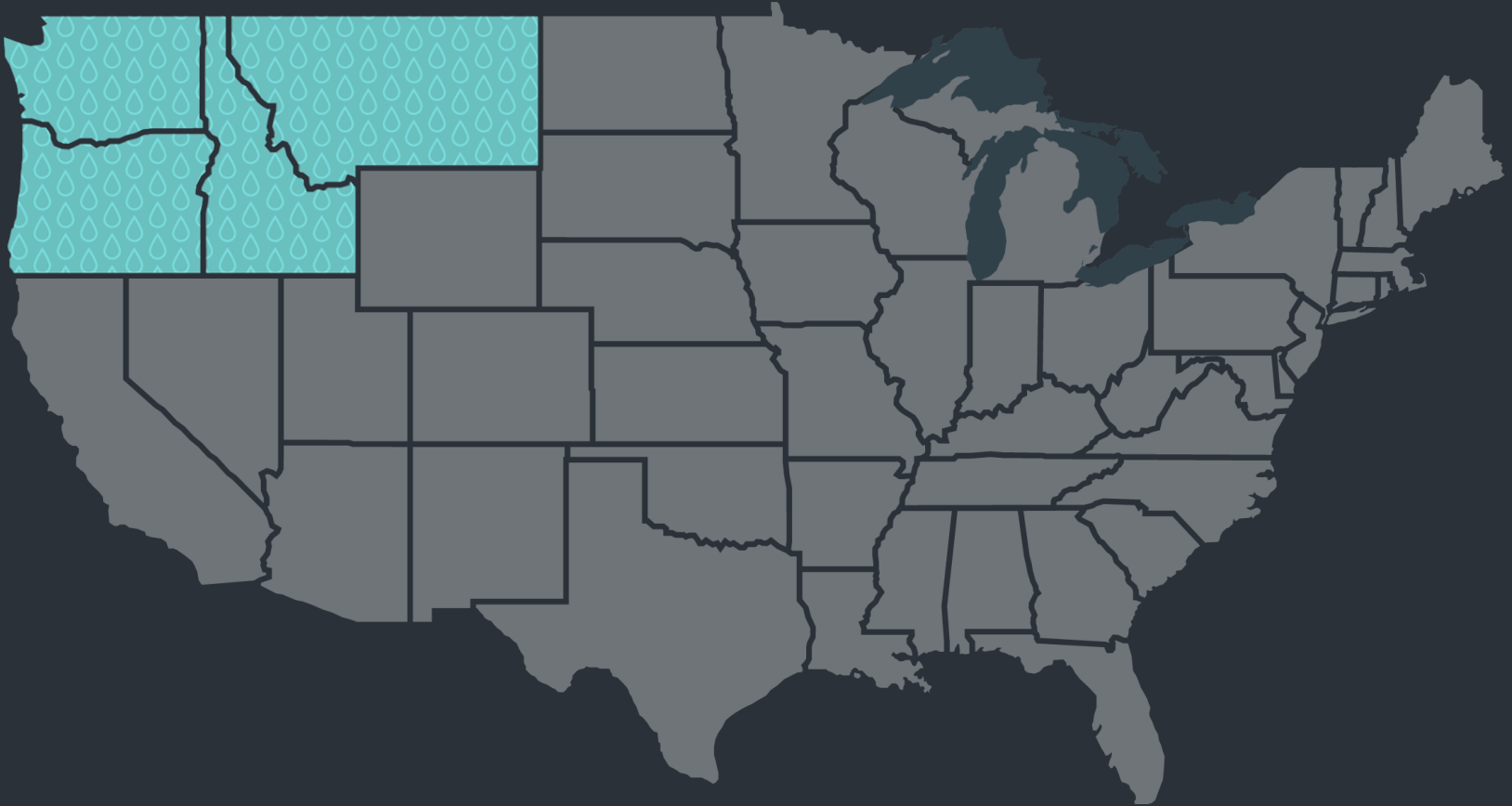


People are *probably* using less hot water

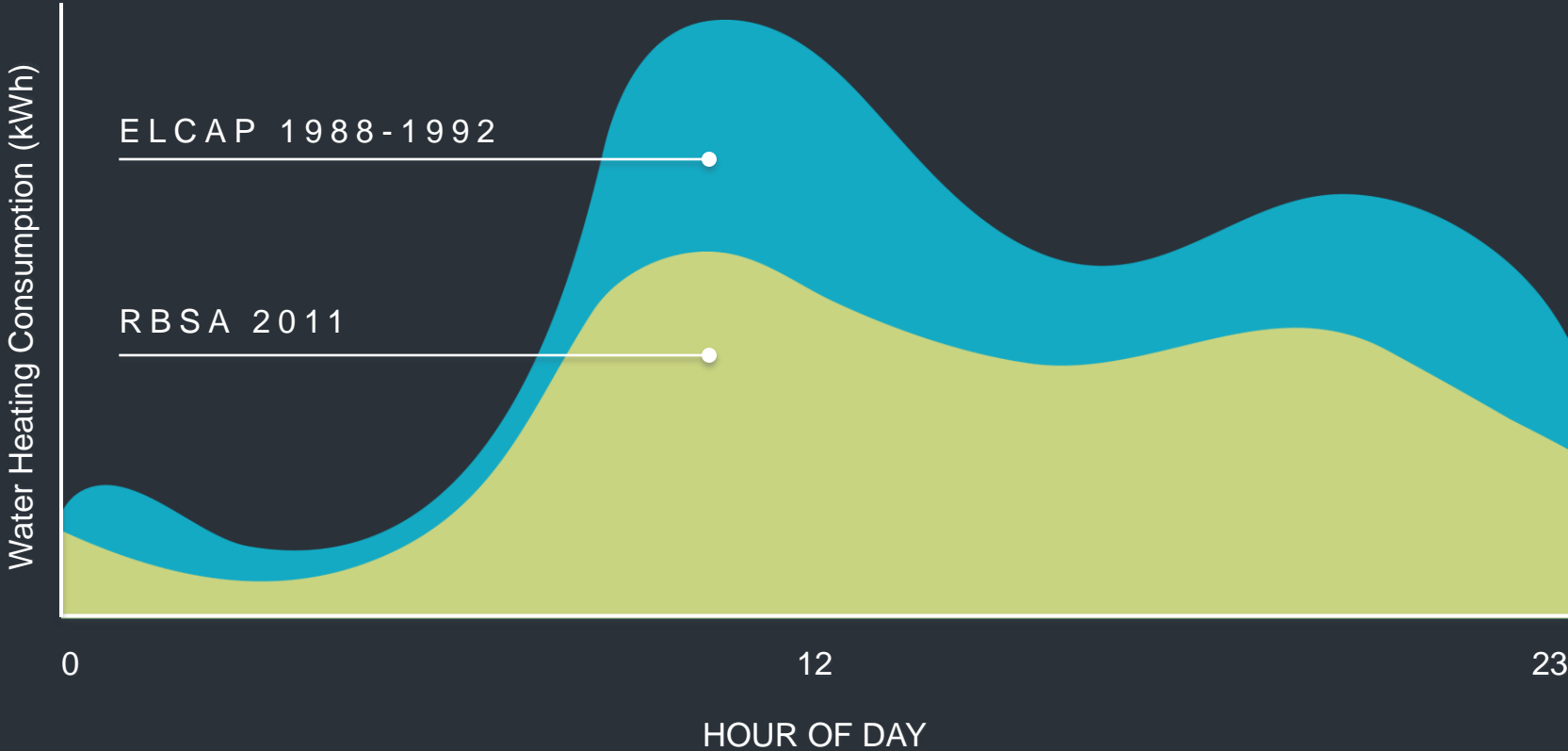
TOTAL (MIXED) HOUSEHOLD WATER USE
GALLONS PER DAY (GPD)



In the Northwest

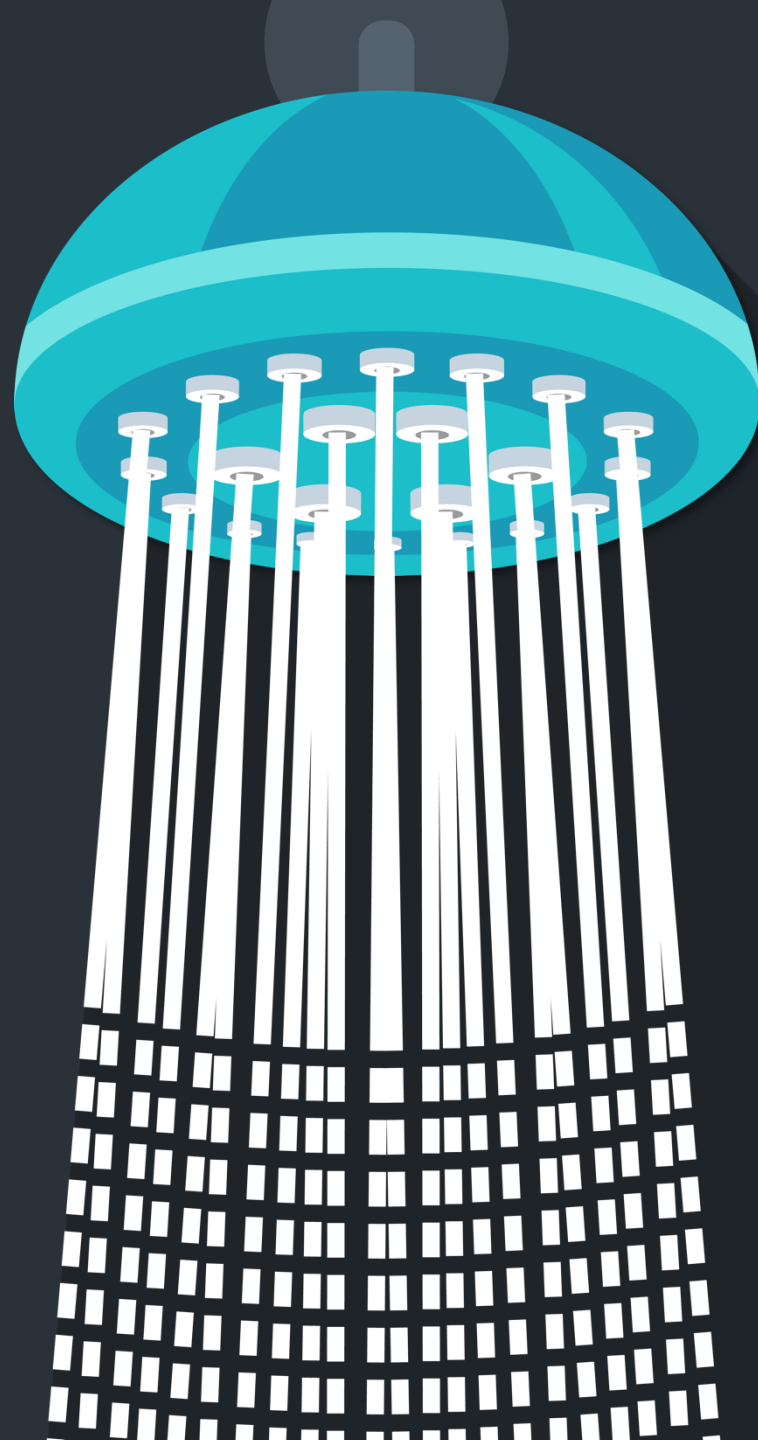


Northwest water heating consumption is less than 20 years ago



Why is consumption dropping?

...We don't know,
but we do have
some clues from
existing data



Bathroom aerators are getting more efficient

Flow rates are decreasing in single-family homes



MID-2000'S
MEASURED FLOW RATE

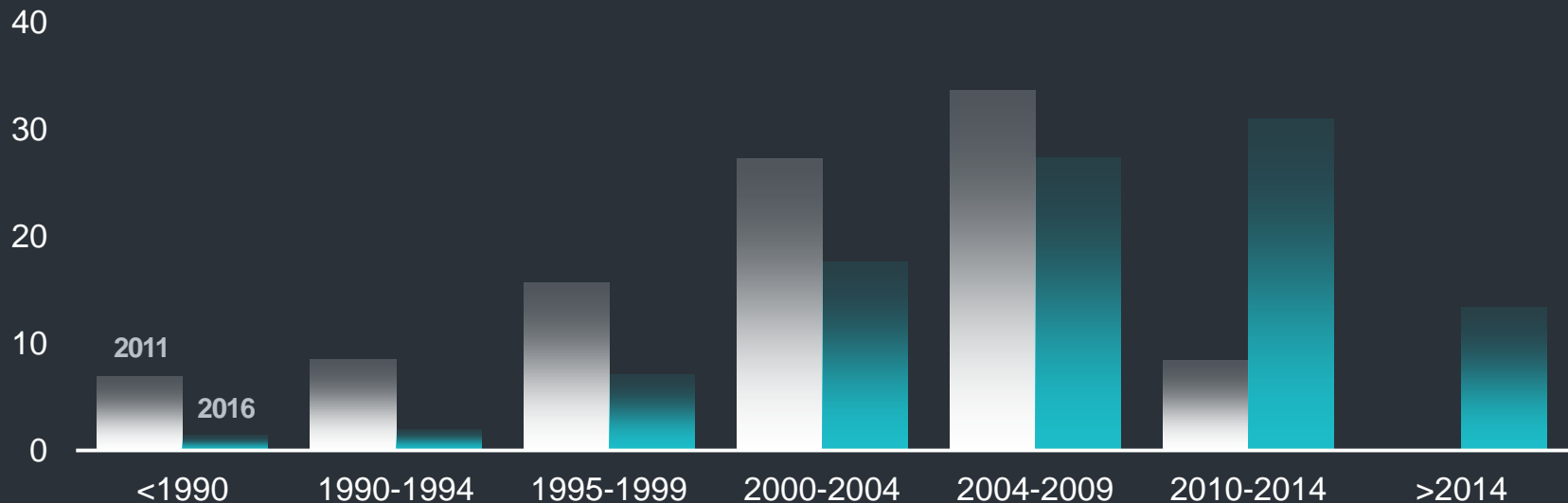


2016 SINGLE-FAMILY
MEASURED FLOW RATES

Source: Energy Trust of Oregon Blessing Memo for Faucet Aerators, "ETO CEC 2015 Customizable Energy Saver Kits-140822 REVISED", as presented in 7th Plan Aerator Conservation Supply Curve Workbook (Res-Aerator-7P_v5.xlsx)

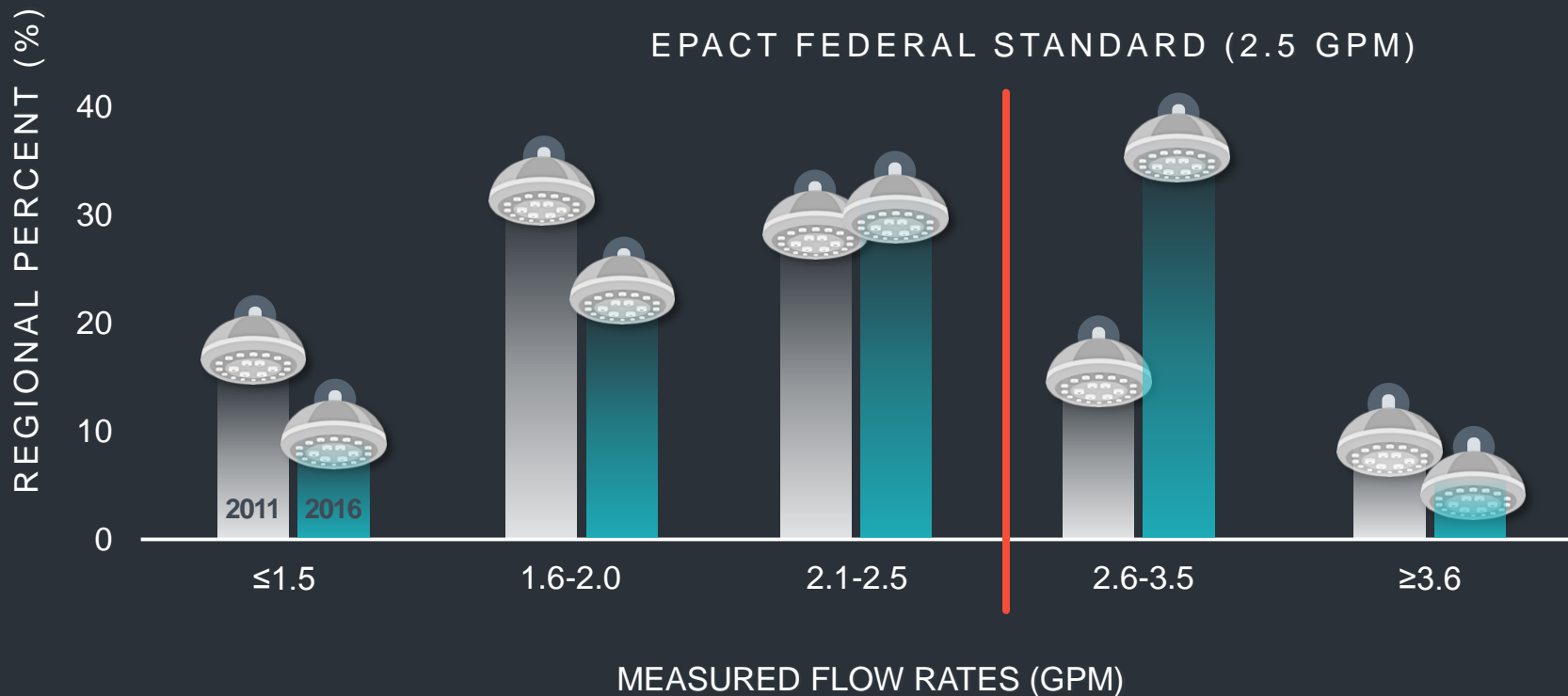
Old and inefficient *clothes washers* are becoming less common

DISTRIBUTION OF CLOTHES WASHERS BY VINTAGE
REGIONAL PERCENT (%)



However, *showerheads* are getting less efficient

Decrease in saturation of efficient showerheads 2011-2016 (single family)



Wait a second....

**...flow rates are
*getting worse?***

Potential reasons for increase in measured flow rates compared to RBSA 2011

1. Possible error in data analysis?
2. RBSA 2016 collected data in homes with generally higher pressures, which would lead to higher flow rates?
3. Difference in data collection methods?
4. There are actually more higher flow rates in the field?

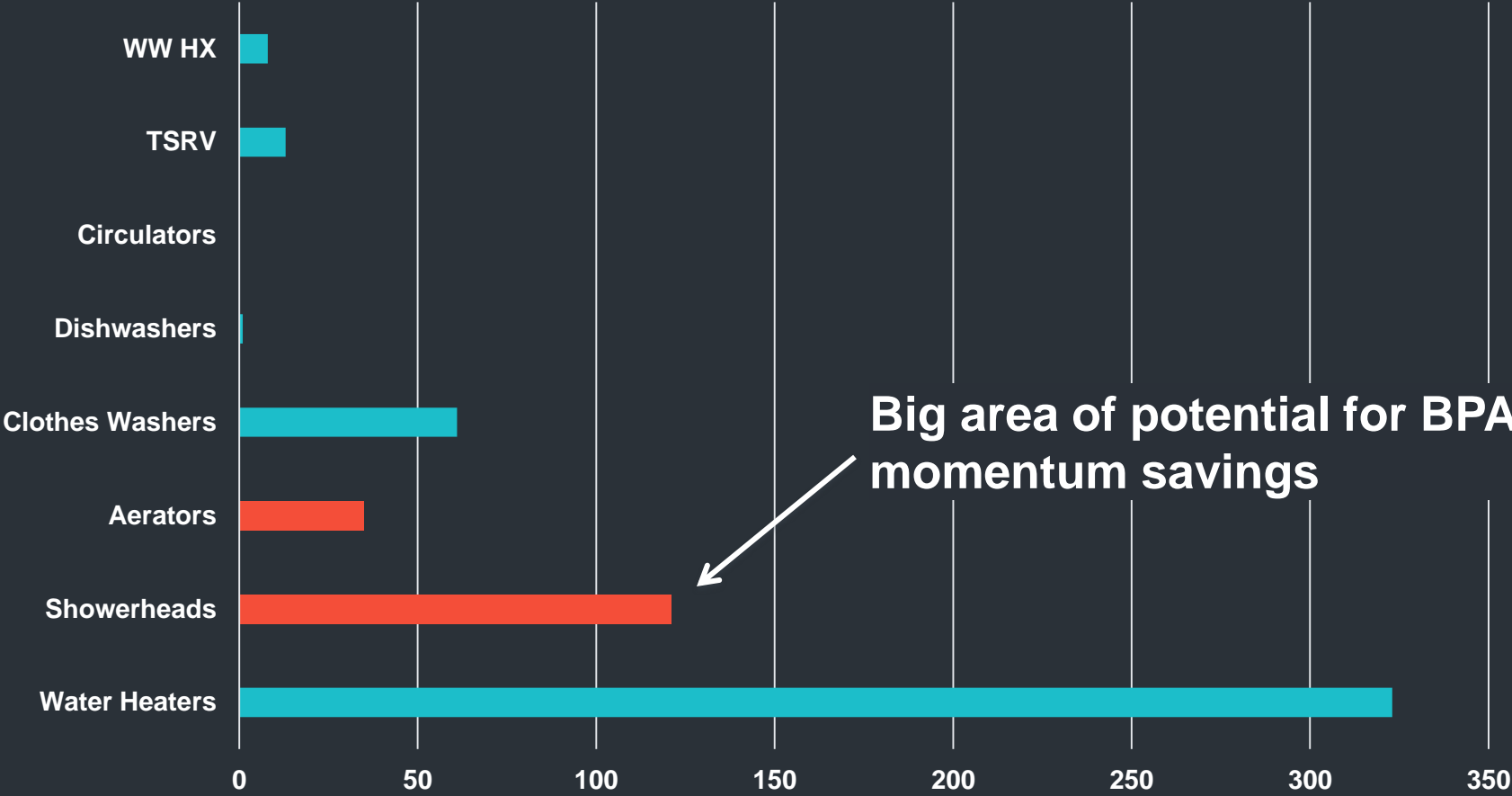
What we think is going on

1. It's not an obvious analysis error
2. It's unlikely pressure played a large role
3. The 2016 measured data are questionable, but we do not know enough right now to throw them out completely
4. The rated flow rate data and other studies suggest flow rates may in fact be *decreasing*...

**What does this mean and
why do we care?**

Why this matters for mo' savings

7th Plan Potential (aMW)



Why this matters for mo' savings

- Positive market change = possible momentum savings
- No positive market change for showerheads means maybe little or no showerhead mo' savings

Where does this leave us?

Our current thinking...

Is it even worth it to build the model with uncertainty around showerheads?

...But it's such a big end use. What if there are savings to be had, but we just don't have data to accurately capture it right now?

If we want to continue investigating this market, what are our options for reducing uncertainty?

If we proceed with the model, some analytical next steps could be...

1. Look to the RTF for technical guidance on potential measurement issues?
2. Make some kind of adjustment to the current data to correct for any issues?
3. Collect additional field data to fill data gaps?

Next Steps

- BPA to weigh the risks and uncertainty and decide if/when we continue developing hot water model
 - If we continue with model, think about what data we'd need to robustly measure market change
 - Consider potential uncertainty with UES values for water saving measures
- Communicate to this group when we've reached a decision



Contact

Bonnie Watson

BFWATSON@BPA.GOV

See you August 1st!

July monthly call is cancelled