



Market Research & Momentum Savings Team

QUARTERLY CALL | FEBRUARY 5, 2020

Bonneville
POWER ADMINISTRATION



Agenda

- Team staffing update
- Major learnings from 2019 (all new!)
 - Residential HVAC
 - Non-residential lighting
 - Residential hot water
- High-level look at 2020 focus areas

Team Staffing Updates



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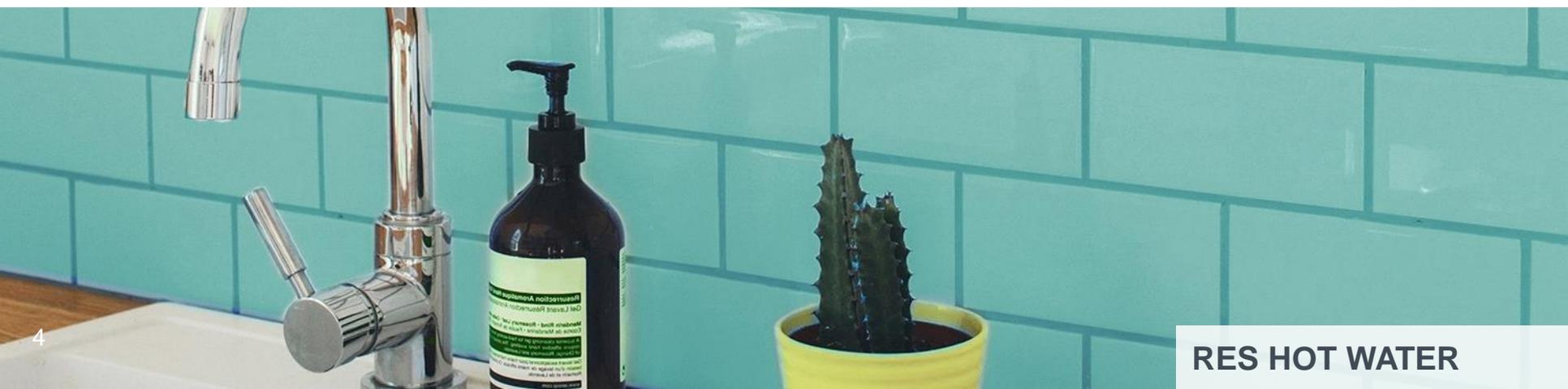
NON-RES LIGHTING

New Insights from Market Research

MODEL RESULTS AND MORE

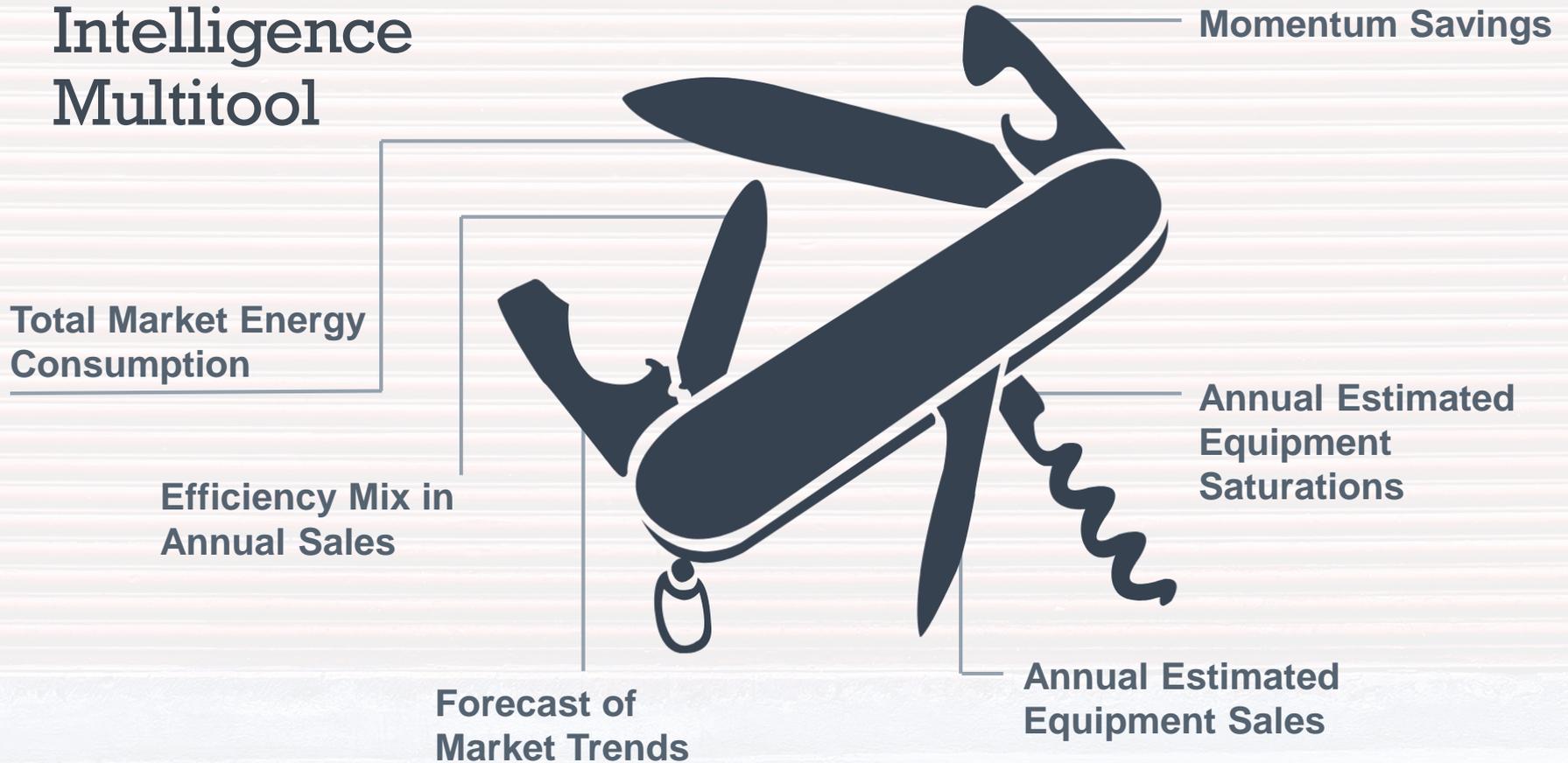


RES HVAC

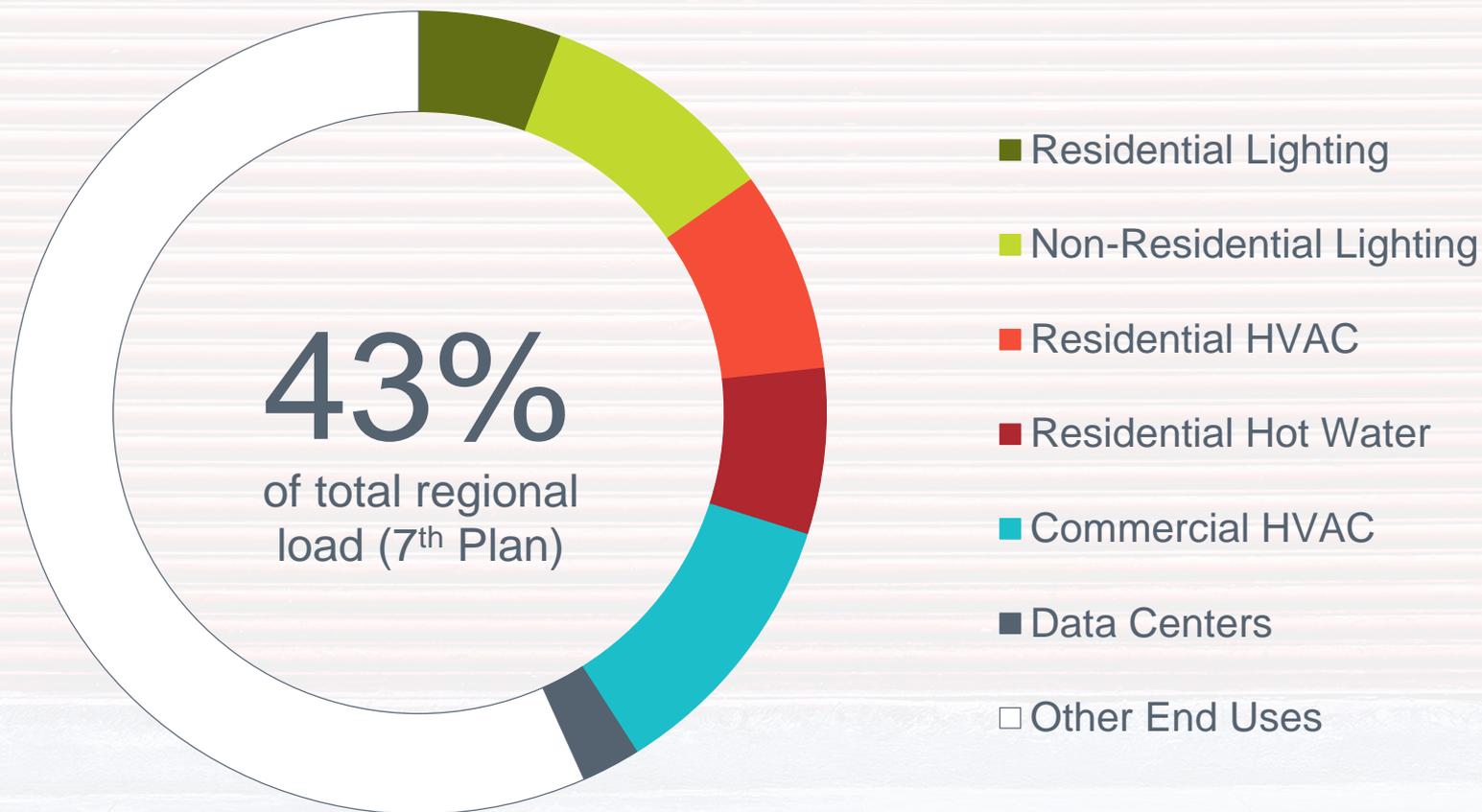


RES HOT WATER

Market Intelligence Multitool



Markets BPA has Studied and/or Modeled

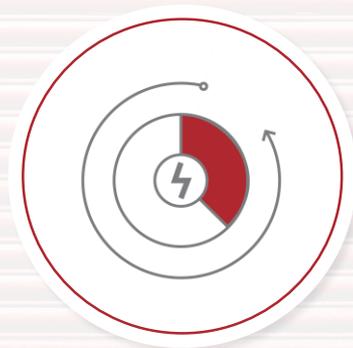


Market Research Results

THREE OF THE MOST IMPORTANT, LARGEST END USES IN THE REGION



State of the
market



Changes over
time in energy
consumption



Total market
savings



Planned next
steps

Residential HVAC



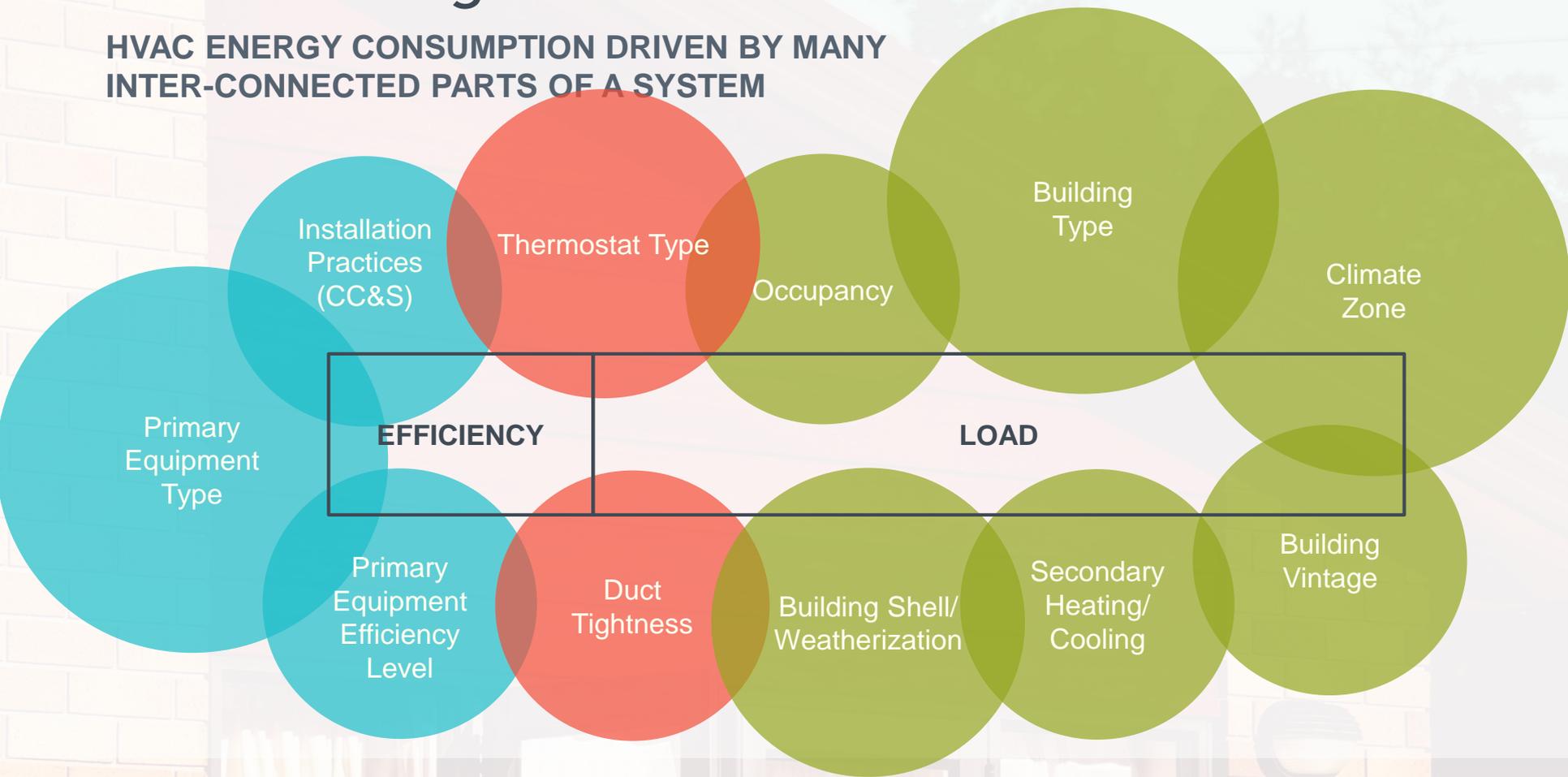
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The Challenge We Faced

HVAC ENERGY CONSUMPTION DRIVEN BY MANY INTER-CONNECTED PARTS OF A SYSTEM





What Information Do We Use in Our Model?



Existing Data Sources

- RBSA I and RBSA II
- RTF SEEM models and calibration
- Prior market research



BPA Primary Research (2017-present)

- In-depth market characterization studies
- Annual sales data
- Advanced smart thermostats – market, savings, adoption
- CC&S current practice
- Installer surveys



Model Scope: Full Market



Geography:

Oregon
Washington
Idaho
Western Montana



Unit of Account:

Dwelling Unit
(i.e., Household)



Sector/Building Type:

Single family
Manufactured homes
Multifamily units



Technology:

In-unit technologies
that affect electric
heating
and cooling

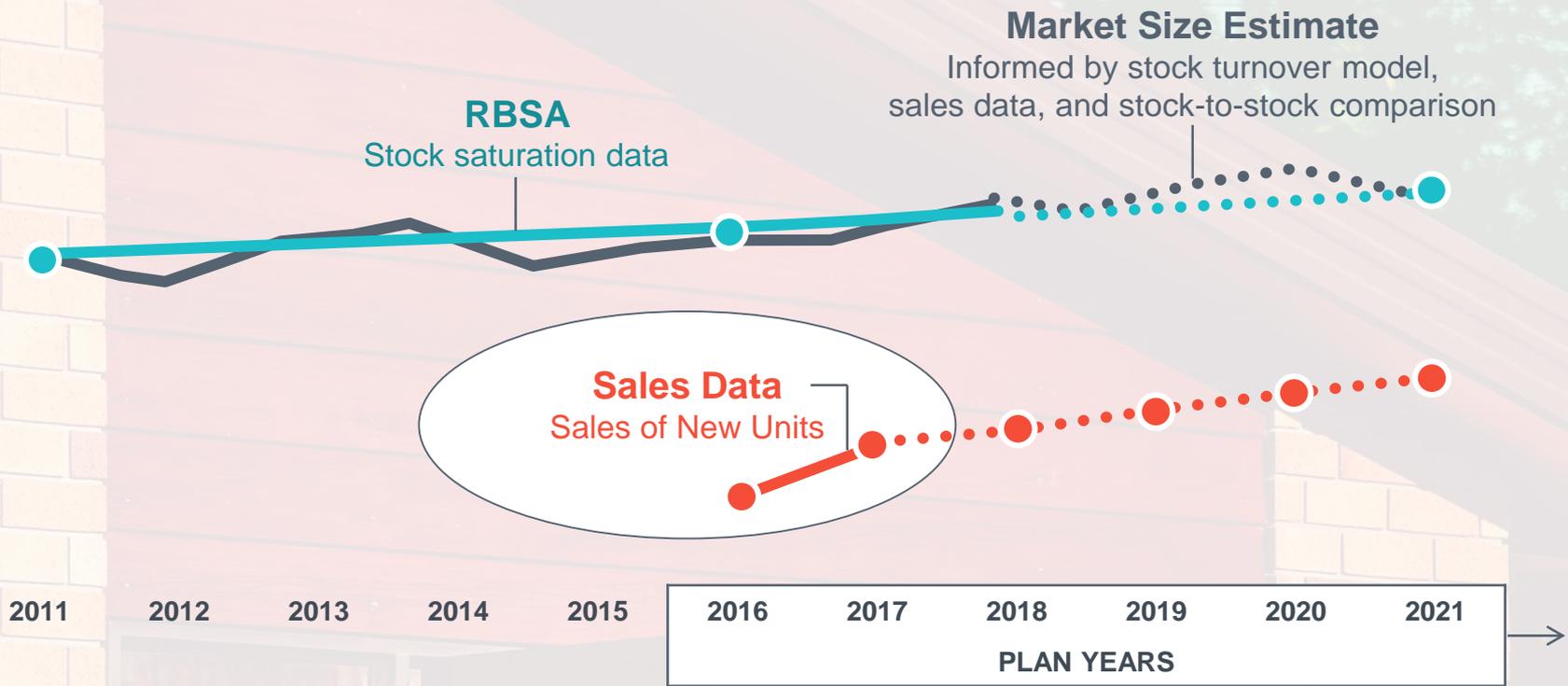


Fuel Type:

Electric
(Includes electric
consumption from
non-electric heating)



Establishing Market Size

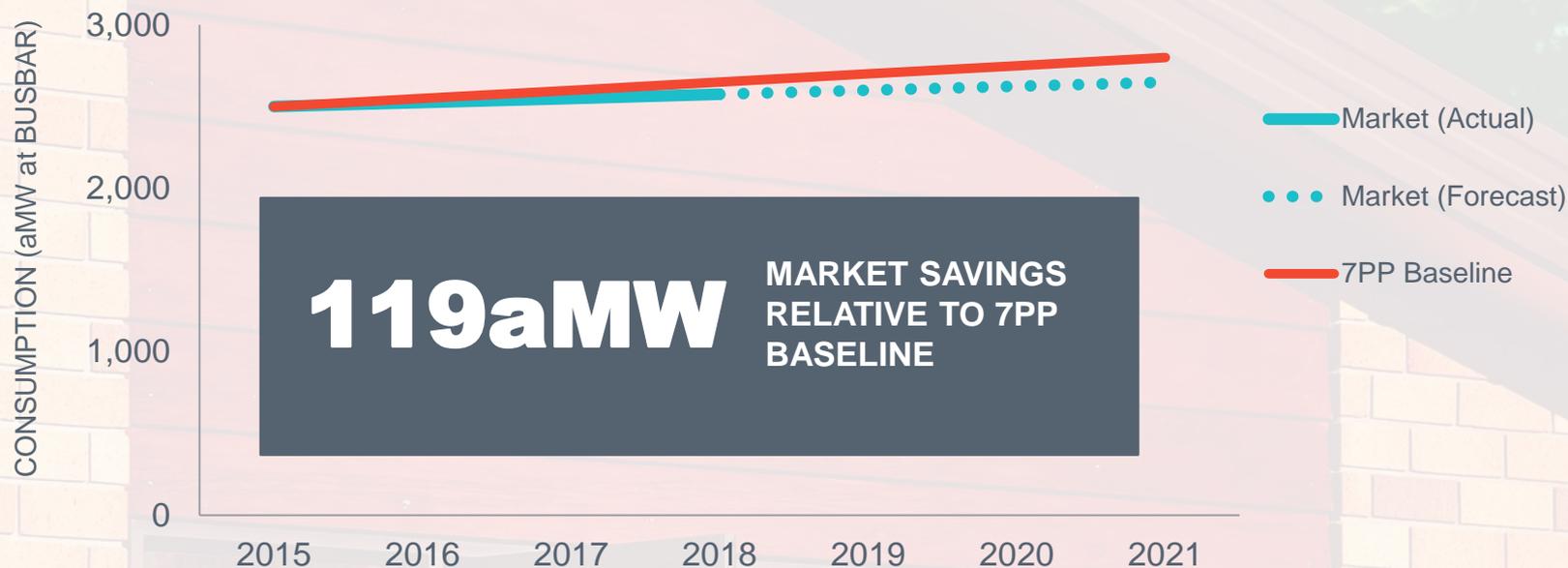


Graph is illustrative only.



Total HVAC Energy Consumption: 2,500 aMW/Year, and Slowly Climbing

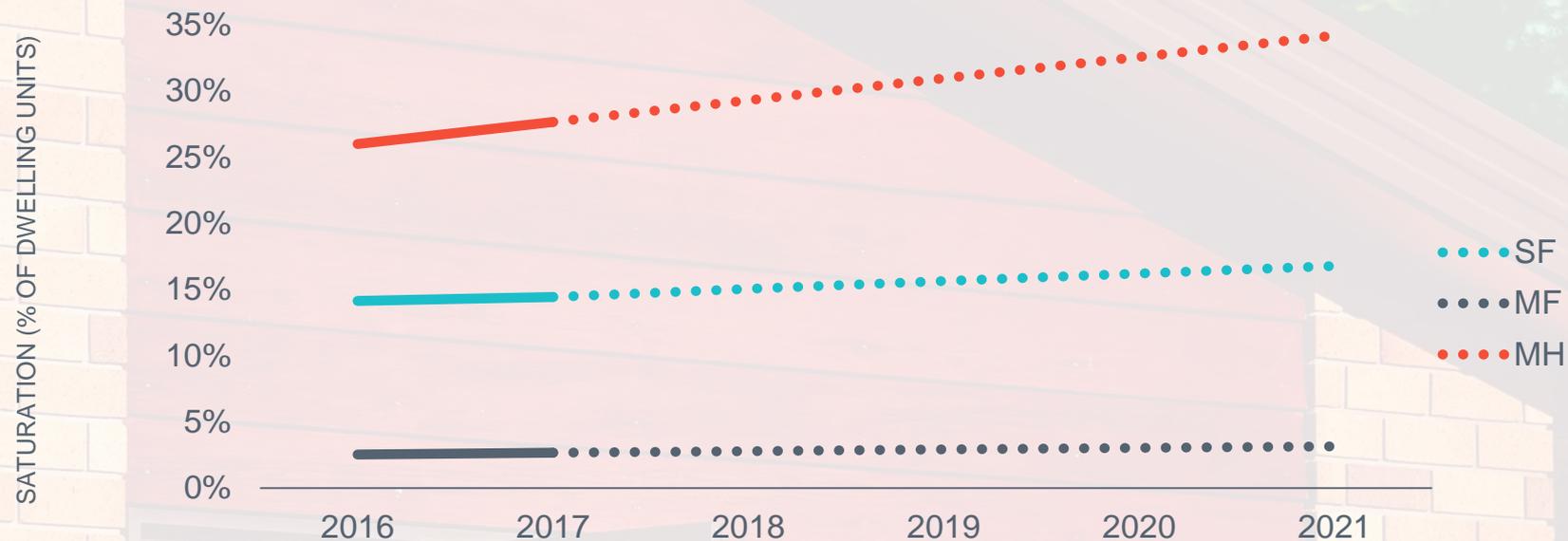
REGIONAL, RESIDENTIAL HVAC ENERGY CONSUMPTION





More ASHPs Are Being Installed...

REGIONAL, RESIDENTIAL ASHP HEATING SATURATION BY BUILDING TYPE (2016-2021)

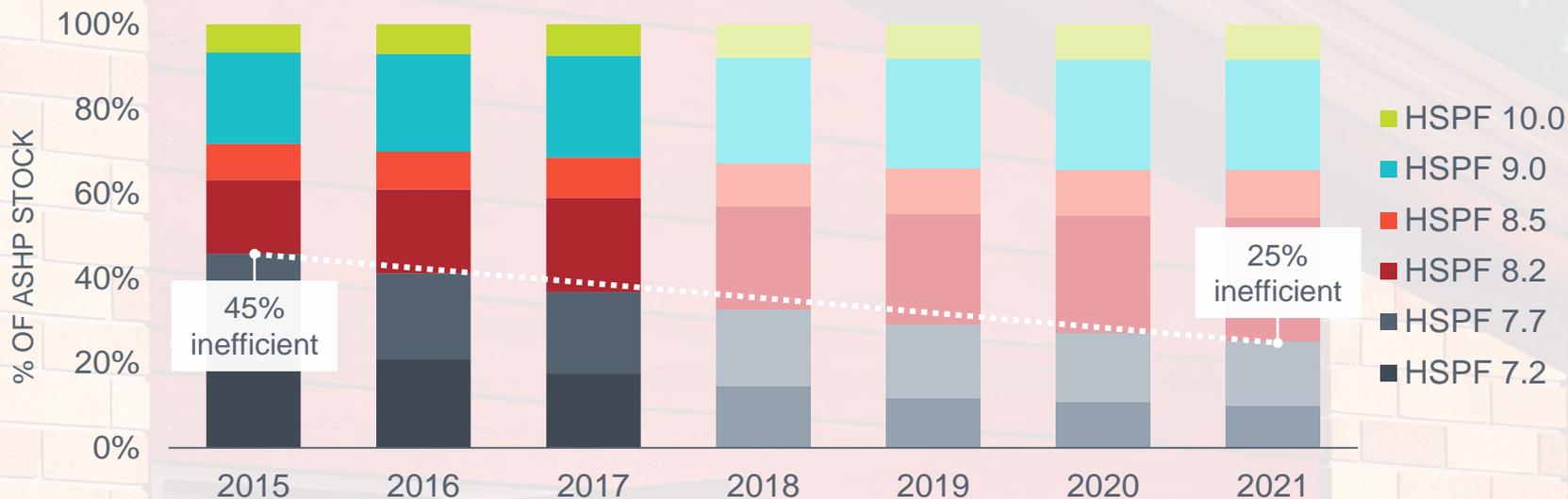


Source: Cadeo analysis of RBSA 2011, RBSA 2016, and Cadeo Residential HVAC Momentum Savings Model



And They're Getting More Efficient, Slowly but Steadily

EFFICIENCY MIX IN REGIONAL, RESIDENTIAL ASHP STOCK (2016-2021)

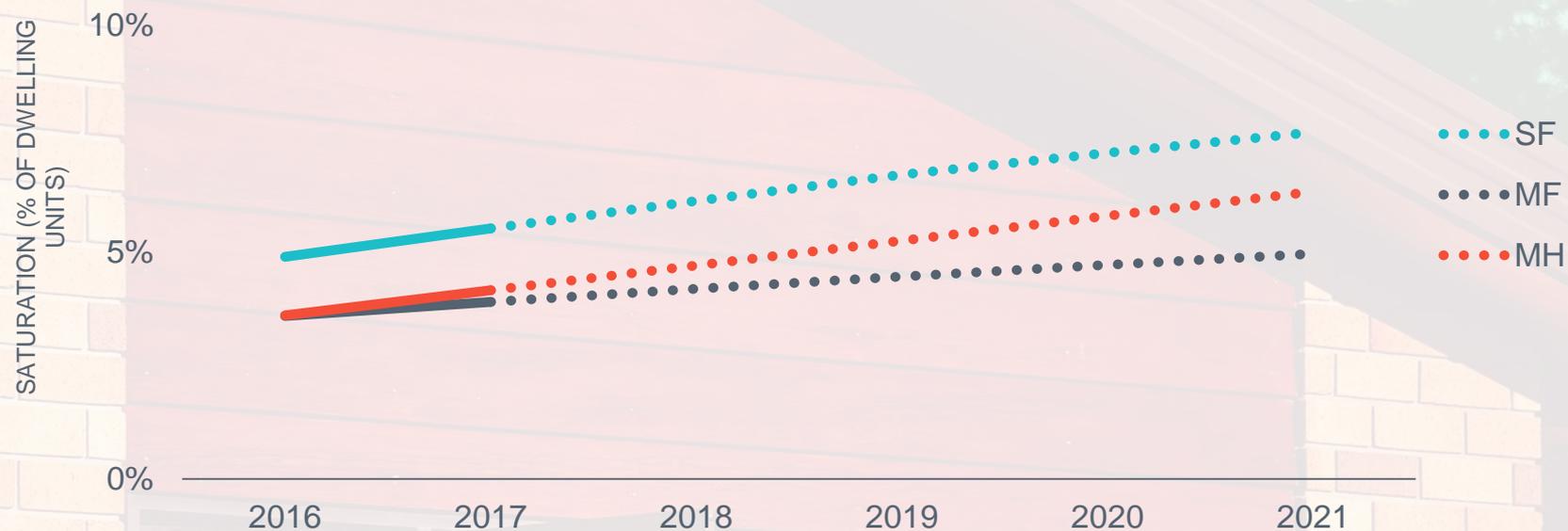


Forecasted years = lighter shading



Increasing DHP Saturation Also Drives Heating Savings

REGIONAL, RESIDENTIAL DHP HEATING SATURATION BY BUILDING TYPE (2016-2021)

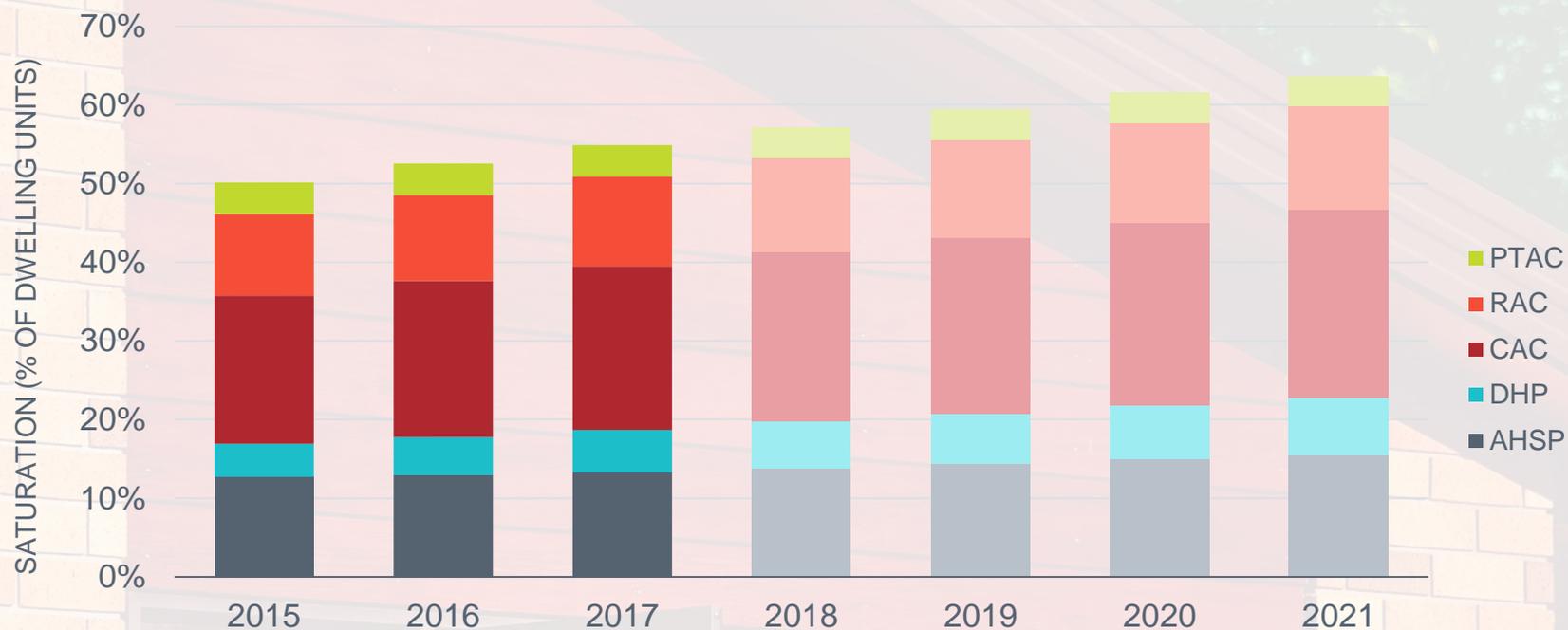


Source: Cadeo analysis of RBSA 2011, RBSA 2016, and Cadeo Residential HVAC Momentum Savings Model



Cooling Saturation on the Rise

REGIONAL COOLING EQUIPMENT SATURATION, 2015-2021



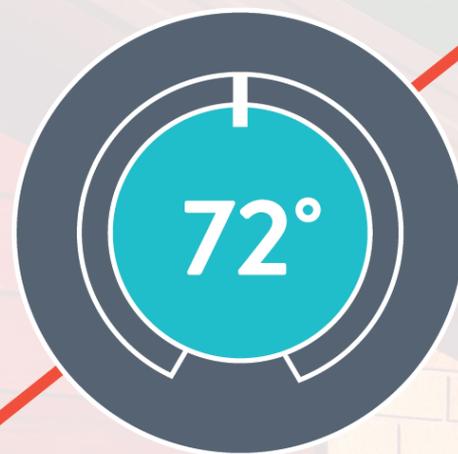
Note: Forecast Years (2018-2021) have lighter shading



Advanced Smart Thermostat Adoption Growing

Advanced smart thermostats have been a big star in the recent smart home trend

- Around 6% of households had advanced smart thermostats in 2016, and saturations is increasing
- In many households, this results in energy savings

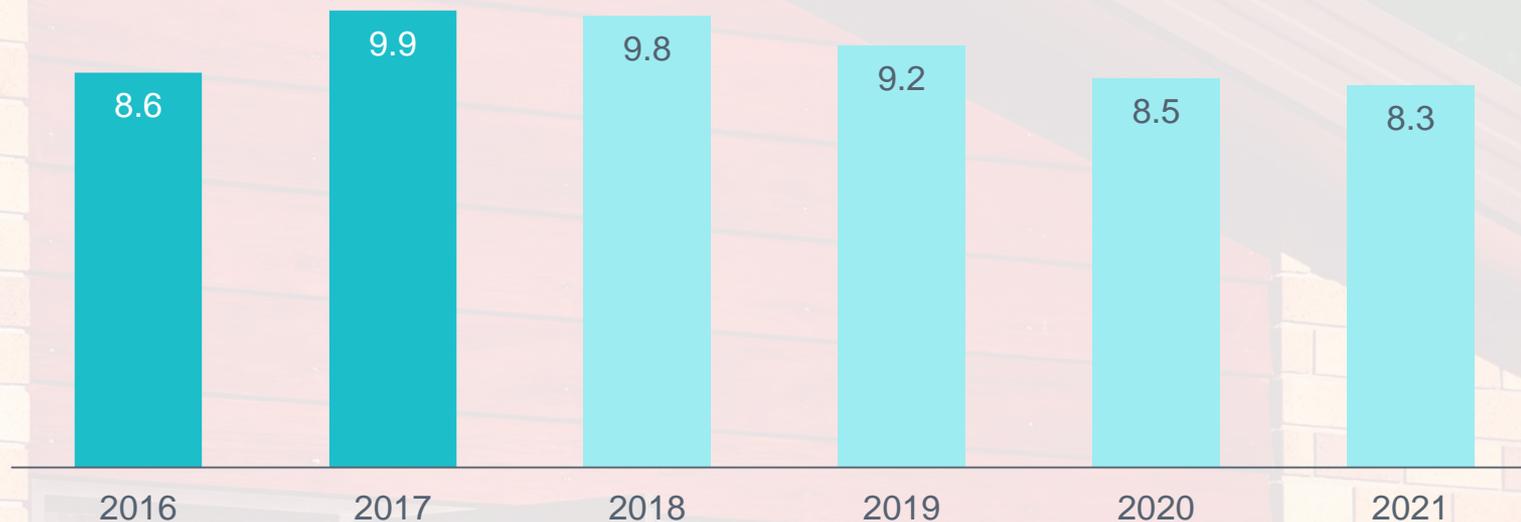




Estimated Momentum Savings Between 8-10 aMW/Year

REGIONAL RESIDENTIAL HVAC MOMENTUM SAVINGS (2016-2021)

TOTAL MOMENTUM SAVINGS
(AMW AT BUSBAR)



Forecasted years = lighter shading



We Will Keep Learning Through Future Updates



Will estimated savings from **ADVANCED SMART THERMOSTATS** be accurate as adoption continues?

Update Market Research

Has there been significant **WEATHERIZATION** outside of programs?

Weatherization Market Research

Will equipment trends toward **EFFICIENT HEAT PUMPS** continue?

New Sales Data (2018-2021)

How is **COOLING EQUIPMENT EFFICIENCY** changing as saturations increase?

Analysis of Sales & Program Data

Non-Residential Lighting Market Model



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Non-Residential Lighting Update

WHAT DID WE UPDATE?



Sales Data



Program Savings



Wattage



Retrofit Rate

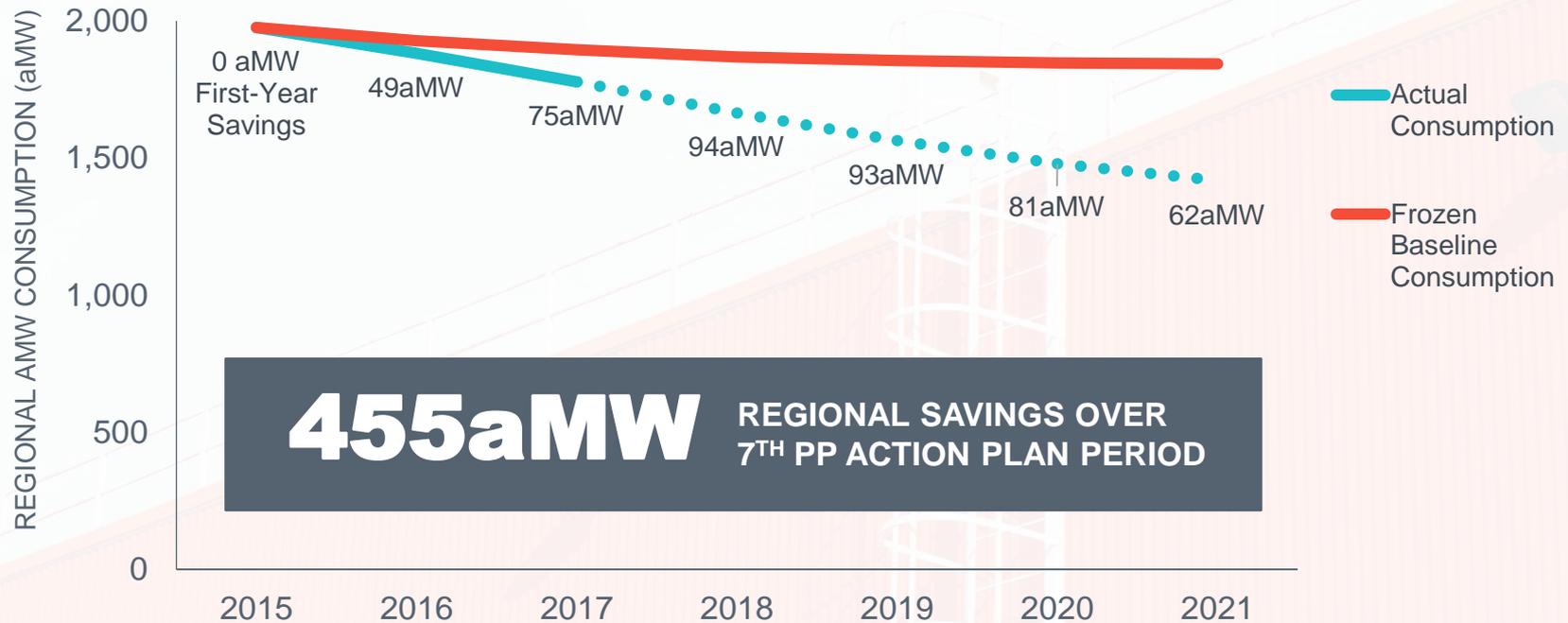


Industrial Building Stock



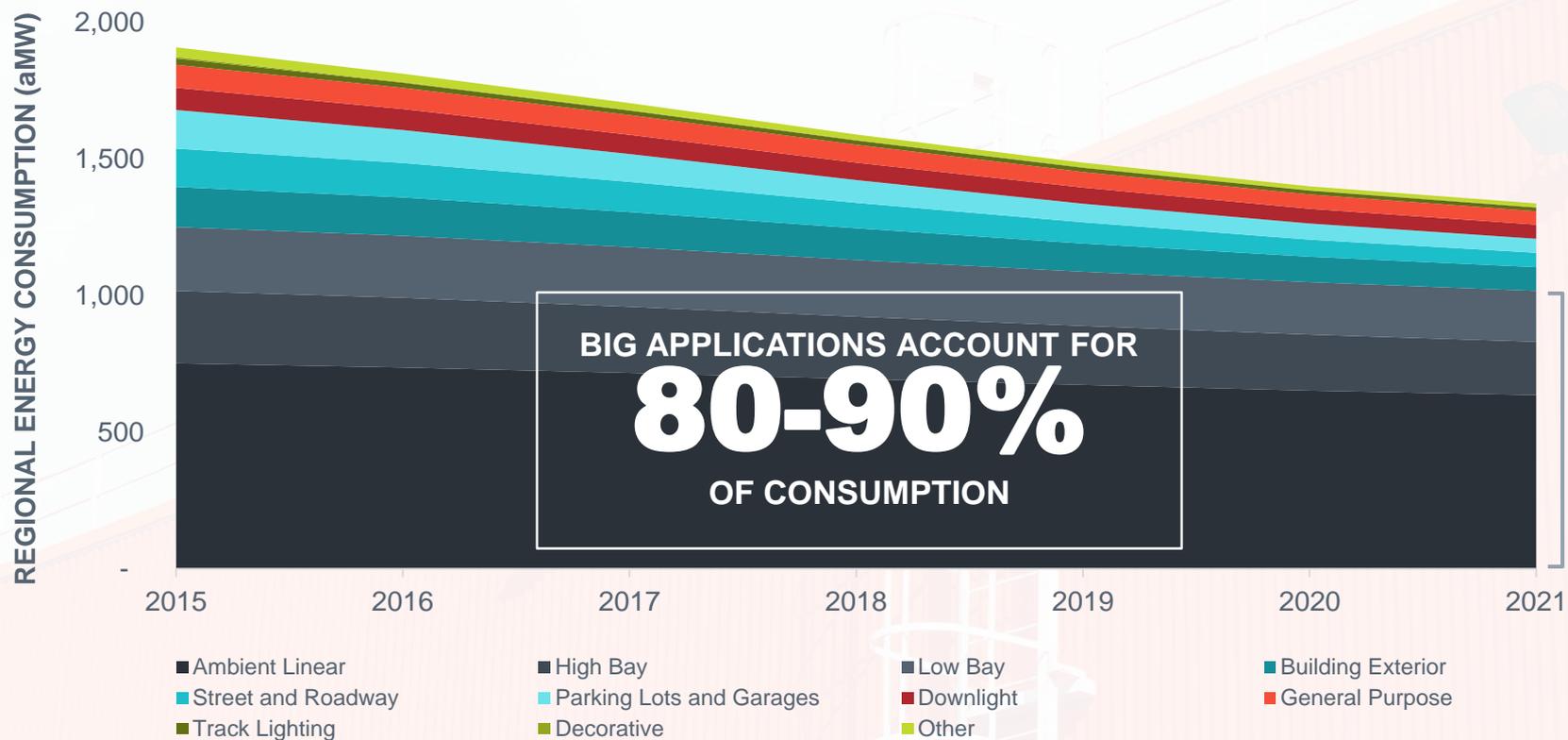


Energy Consumption Continues to Decline





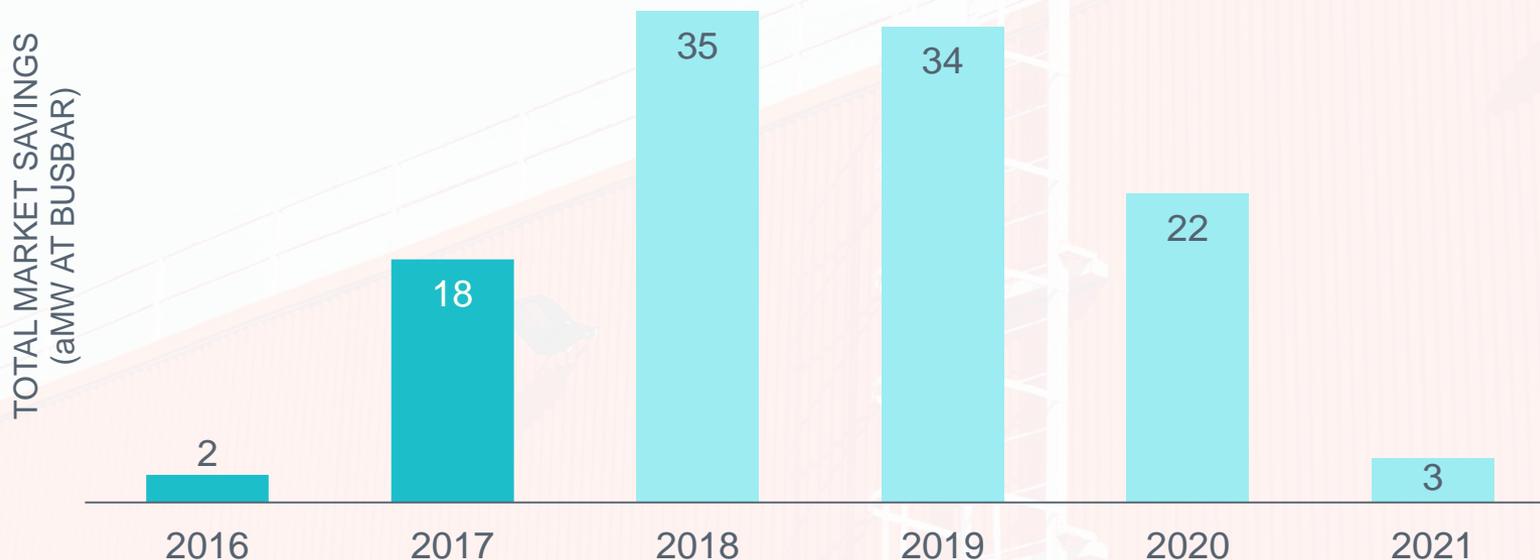
Regional Consumption Is Driven by Ambient Linear and High/Low Bay Lighting





Forecast Estimates 115 aMW Momentum Savings

REGIONAL NON-RESIDENTIAL LIGHTING MOMENTUM SAVINGS (2016-2021)

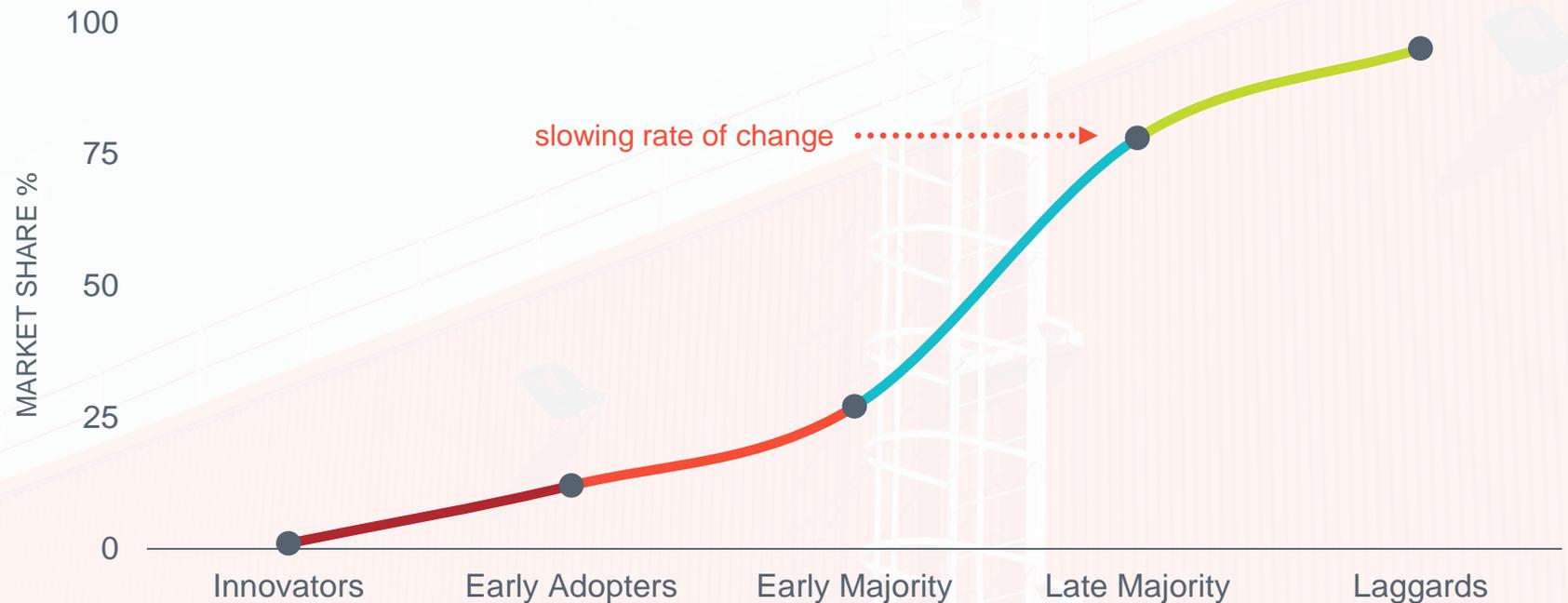


Forecasted years = lighter shading



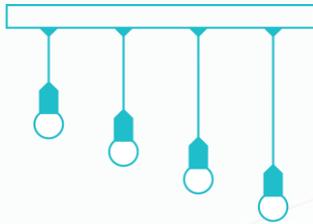
Are We Reaching the Inflection Point?

SAVINGS FORECAST SLOWING DOWN AFTER 2019
LEDS STILL GROWING, BUT NOT AS FAST





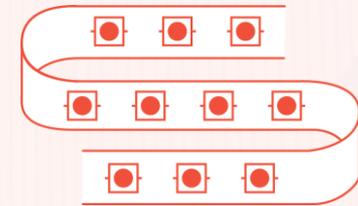
Market Intelligence Says: Growth May Taper Off but LED Is Still #1



As more LEDs get installed, replacement (and therefore sales) slows down



Most (all?) lighting projects are installing LED



Manufacturers are no longer focused on gains in LED efficacy



What Don't We Know?



Will **FORECASTED**
MODEST INCREASES in
LED % sales be accurate?



How is the **RETROFIT**
RATE CHANGING over
time?



Are new LED form
factors **CHANGING**
THE STRUCTURE
of the lighting market?



Will LED-to-LED
RETROFITS BECOME
MORE COMMON?



Our Plan: Keep Learning Through Future Updates

REASSESSING MODEL STRUCTURE



Full-Space Lighting Redesigns



Application Definitions



Lighting Controls

NEW DATA



CBSA



OLSA: Street and Outdoor



DOE SSL Report



Ongoing Updates

- Sales data
- Program data

Residential Hot Water





How Is the Residential Hot Water Model Different Than Other Models?

We need to understand how residential *hot water* consumption (*gallons of hot water*) is changing to understand how hot water *energy consumption* is changing.





What Is the Scope of the Residential Hot Water Model?



Geography:

Oregon, Washington, Idaho, Western Montana



Unit of Account:

Dwelling Unit (i.e., Household)



Sector/Building Type:

All residential housing types. Single family, manufactured homes, multifamily units



Technology:

All in-unit water heating and hot water end use technologies



Fuel Type:

Electric water heating



Two Methods for Estimating Stock Change in Hot Water Model



STOCK TURNOVER

- For water heaters and clothes washers
- Based on sales and/or shipments data
- Process same as HVAC

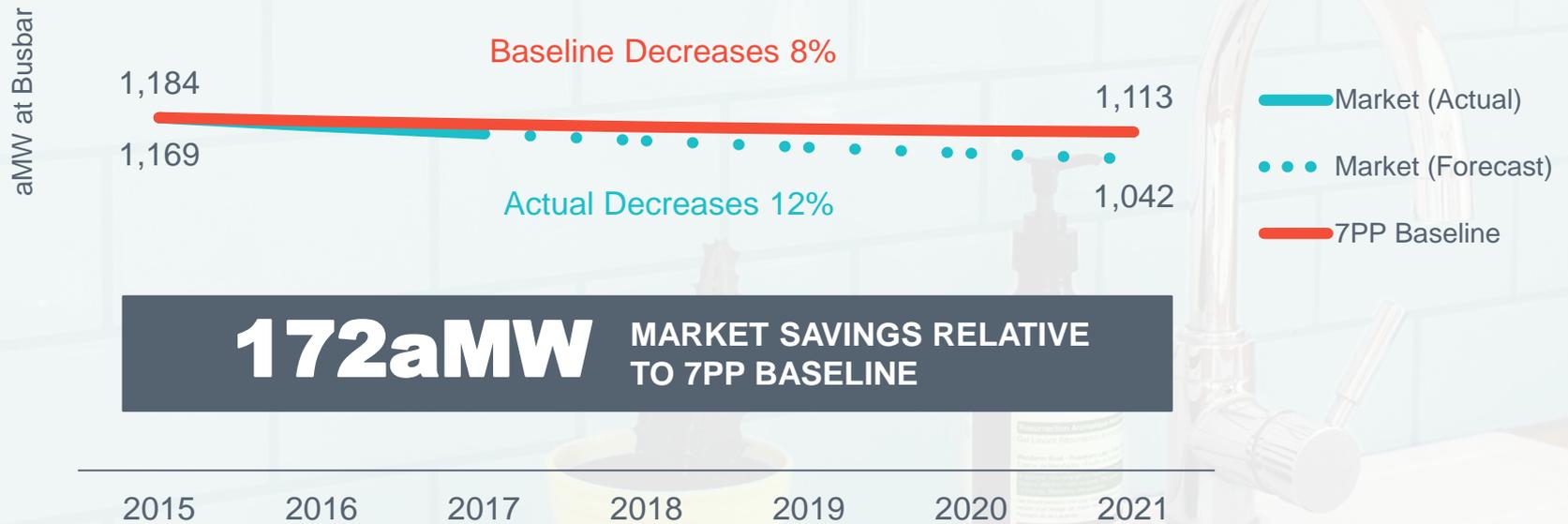


STOCK-TO-STOCK

- Showerheads, faucets, dishwashers
- No sales or shipments data, so based on RBSAs and other data



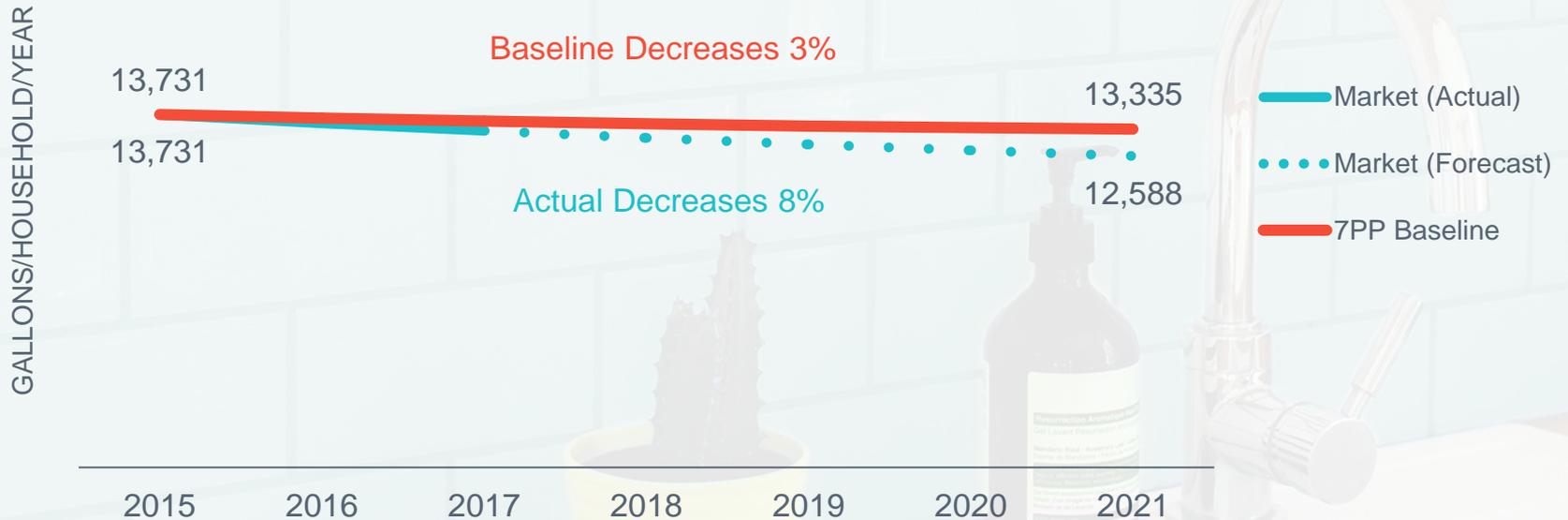
Regional Energy Consumption Declining...





Partially Due to Decreasing Hot Water Use

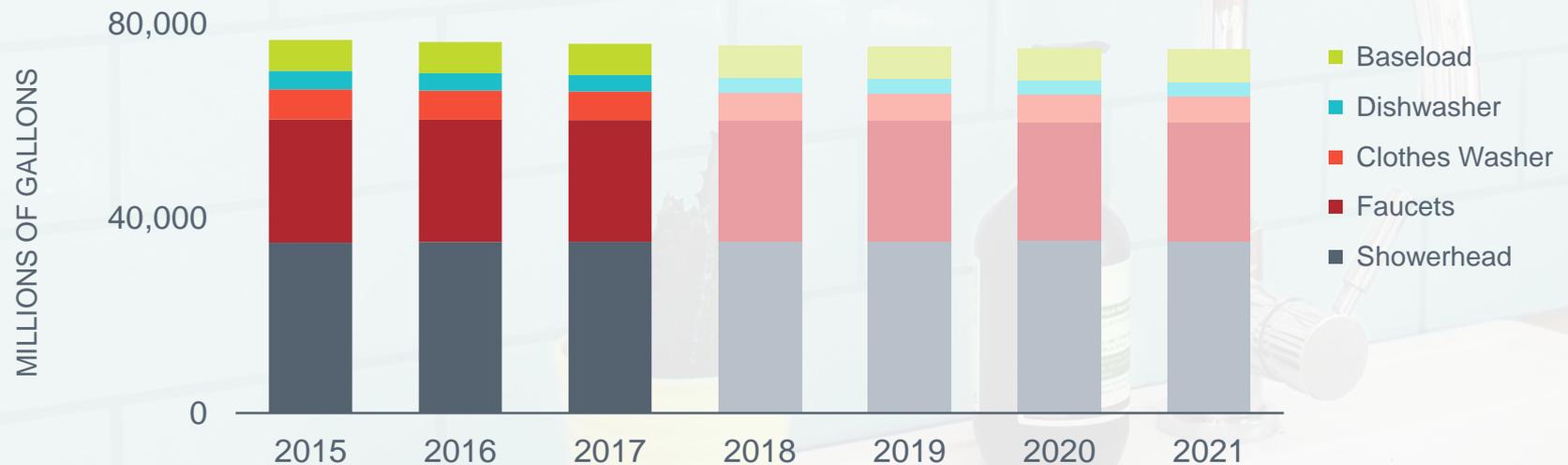
PER-DWELLING UNIT ANNUAL HOT WATER CONSUMPTION





Most Market Change Comes from Showerheads and Aerators

ANNUAL REGIONAL HOT WATER TECHNOLOGY
HOT WATER CONSUMPTION—ACTUAL SCENARIO



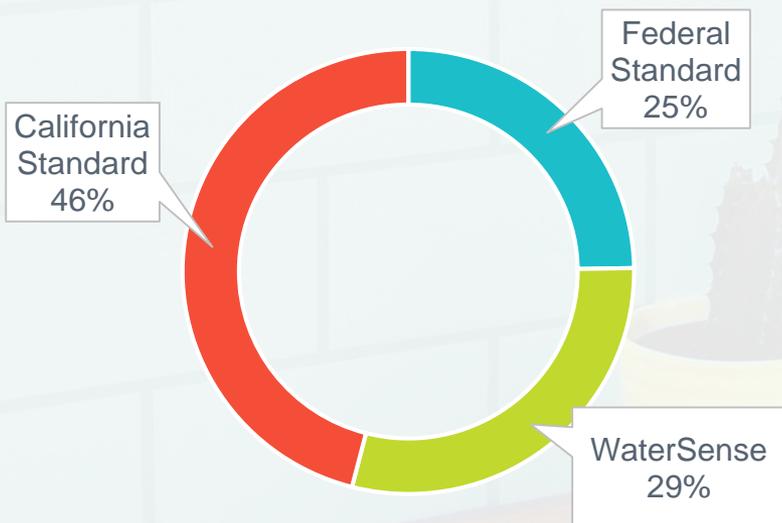
Forecasted years = lighter shading



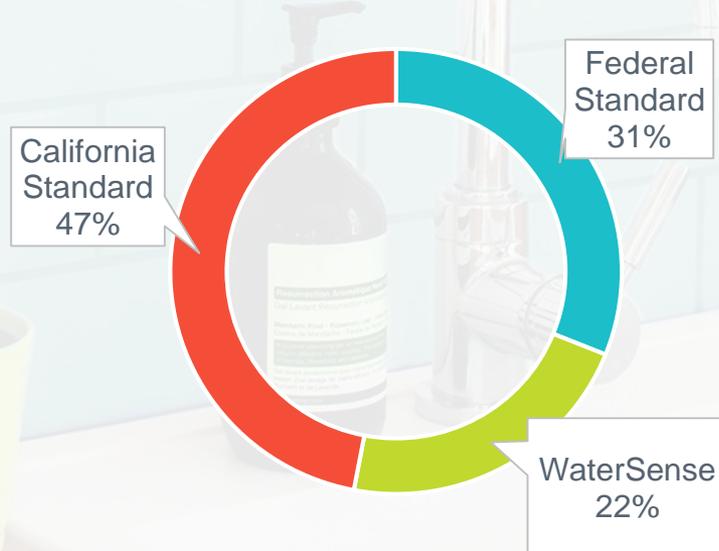
The Showerhead and Faucet Market Is Getting More Efficient

NUMBER OF PRODUCTS AVAILABLE IN THE MARKET NATIONALLY

Showerhead Products



Faucet Products



Source: CCMS Database, Extracted January 2019



Northwest Stores Primarily Stock Efficient Products

RETAIL PRODUCTS ON NORTHWEST SHELVES

	Kitchen Faucets	Bathroom Faucets	Showerheads
WALMART	100% CA standard or lower	85% WaterSense or lower	100% CA standard or lower
LOWE'S	100% CA standard or lower	100% CA standard or lower	Data not available
HOME DEPOT	100% CA standard or lower	100% CA standard or lower	90% CA standard or lower

Source: Online research of in-store product availability of three Northwest cities



How Do We Continue to Save Hot Water?

FOCUS ON GETTING PEOPLE TO REPLACE THEIR OLD SHOWERHEADS AND FAUCETS RATHER THAN PUSHING FLOW RATES LOWER

What People Want

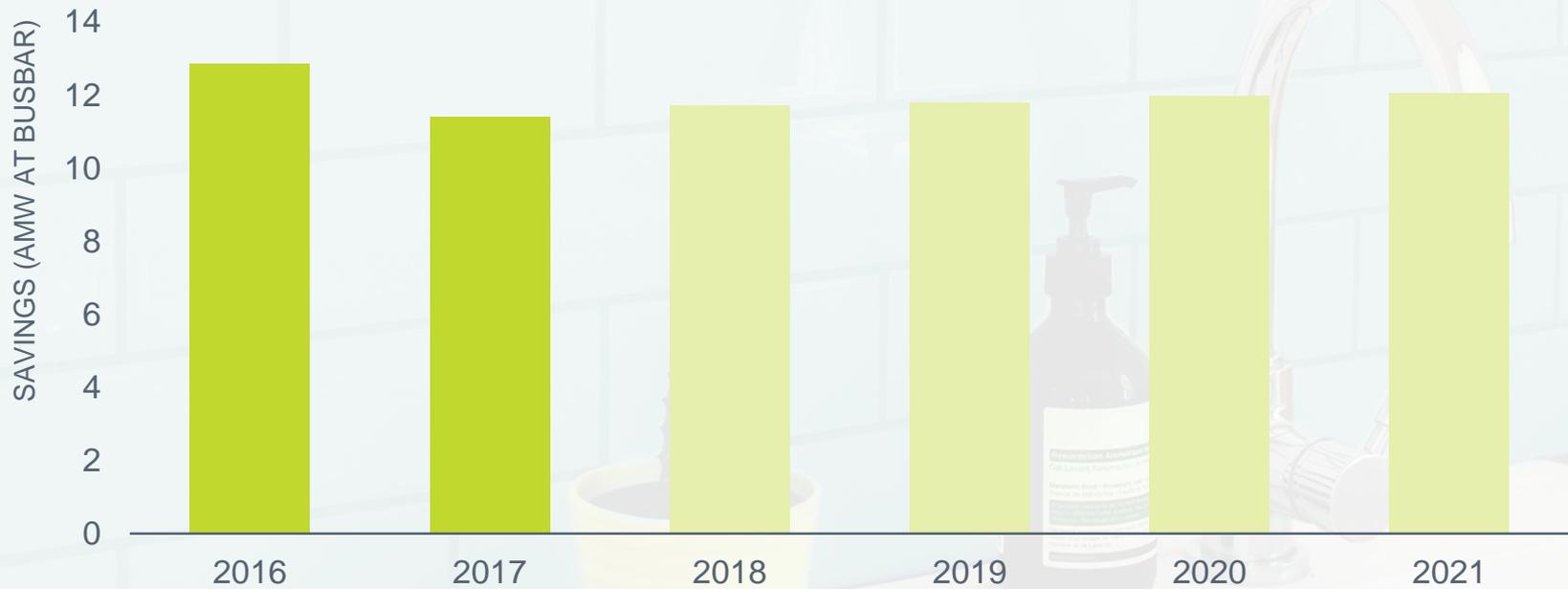
- Performance
- Features (multiple spray options, rain showers, “spa-like” features)
- No impact to their shower experience





11-13 aMW of Market Savings Annually

ANNUAL, REGIONAL TOTAL MARKET SAVINGS



Forecasted years = lighter shading



Possibilities for Future Updates

 Showerhead & Faucet Use and Saturations	<ul style="list-style-type: none">• Regional research• Stock assessments, which could include future program evaluations• Sales or shipments data
 NEEA Water Heater & Clothes Washer Market Data	<ul style="list-style-type: none">• Need new source for clothes washer sales data
 Updated Program & Code Savings Data	<ul style="list-style-type: none">• Update with new program achievements• Leverage NEEA's code savings analysis

Questions?

Contact

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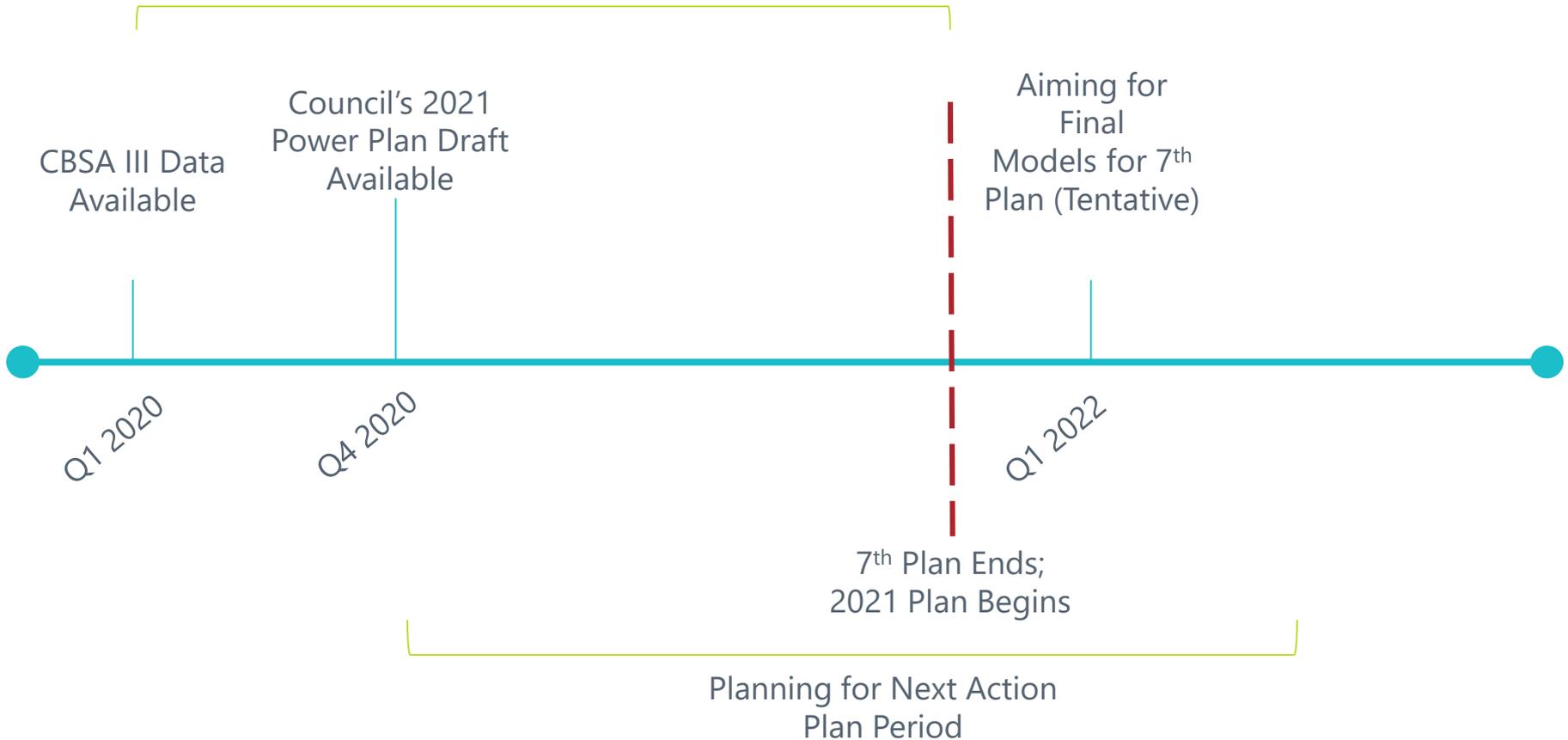
2020 OUTLOOK

Market Studies Overview

High-Focus Market Areas	BPA Lead
Residential HVAC	Hanna Lee - Project Lead Bonnie Watson - Technical Advisor
Commercial HVAC (New!)	Bonnie Watson
Data Centers	Hanna Lee
Adjustable Speed Drives (New!)	Hanna Lee
Non-Residential Lighting	TBD
Others (TBD)	TBD

Long-Term Planning: Tentative Timing

Ongoing Data Collection
& Model Updates



QUESTIONS?



Please Join Us for Future BPA Quarterly Calls

Link to BPA Quarterly Call Schedule:

<https://www.bpa.gov/EE/Utility/Momentum-Savings/Pages/Calls.aspx>

See You on May 6th!