IS “SMART” THE NEW “GREEN”?

Unraveling a New, Dynamic and Complex Market

November 7, 2018
WHY DO WE CARE ABOUT THERMOSTATS?

1. Gain insights into an evolving and growing market

2. Determine how savings will be incorporated into the momentum savings model
RESEARCH OBJECTIVES

Define
- technologies in market

Learn
- what others found

Understand
- market dynamics

Assess
- compatibility issues
RESEARCH ACTIVITIES

Market Actor Interviews

Literature Review
WHAT IS A "SMART THERMOSTAT"?

MANUAL

PROGRAMMABLE

CONNECTED

SMART

ADVANCED SMART
MAPPING FEATURES TO DEFINITIONS

**Connected**
- Scheduled setbacks
- Adjust remotely / has an app

**Smart**
- Connected+
  - Proximity sensing (Geofencing)

**Advanced Smart**
- Smart+
  - Onboard occupancy sensing
  - Heat pump optimization
  - Learning algorithms
REGIONAL DEFINITIONS OF “SMART” ARE INCONSISTENT

<table>
<thead>
<tr>
<th>Entity</th>
<th>What is included in their “smart” definition?</th>
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<tbody>
<tr>
<td>BPA and Energy Trust</td>
<td>Advanced Smart Thermostats ONLY</td>
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<tr>
<td>RTF and RBSA II</td>
<td>Smart and Advanced Smart Thermostats</td>
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<tr>
<td>ENERGY STAR, PSE, and RBSA Wi-Fi category</td>
<td>Connected, Smart and Advanced Smart</td>
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WHAT FEATURES SAVE ENERGY?

Scheduled Setbacks

Proximity Sensing

Learning Algorithms

Heat Pump Optimization

On-board Occupancy Sensing

LEAST INFLUENCE ON EFFICIENCY  MOST
ENERGY SAVINGS CAN EXIST...
FOR ADVANCED SMART THERMOSTATS

Nest-only studies
Nest & other
Nest & ecobee
ecobee-only
Research findings in the Pacific NW are fairly consistent.

- **BPA/Franklin PUD**
  - 4% of total consumption
  - 12% of heating and cooling load
  - 745–955 kWh Annual Savings

- **Energy Trust**
  - 4.7% of total consumption
  - 12% of heating and cooling load
  - 781 kWh Annual Savings
ADVANCED SMART THERMOSTATS DON’T NECESSARILY ALWAYS SAVE ENERGY

- Algorithms need time to learn
- Default settings may not maximize energy savings
- Users may change default settings
- Incorrect installation can increase energy use
NEW COMPLEXITY IN SUPPLY CHAIN

- Brick-and-Mortar Retail
- Distributor
- Manufacturer
- Online Retail
- Contractor/Builder
- EE Programs
- Other Providers

Consumer
Analysis of RBSA II data suggests regional saturation of advanced smart thermostats was about 2% in 2016.
WHERE ARE THEY INSTALLED?

- Installed throughout the region, though mostly in urban areas
- 32% Puget Sound
- 19% Western Oregon
- 16% Eastern Washington
- 12% Eastern Oregon
- 9% Western Montana
- 7% Western Washington
- 5% Idaho

- Single family residences: 93%
- Manufactured homes: 7%
WITH WHAT SYSTEMS ARE THEY PAIRED?

Cooling
- 54% paired with central air conditioners
- 46% paired with air source heat pumps

Heating
- 54% paired with gas furnaces
- 35% paired with air source heat pumps
- 6% paired with propane furnaces
- 4% paired with electric furnaces
- 1% paired with boilers
EXPLOSIVE GROWTH IS EXPECTED

DEVICE SHIPMENTS

2015

1M

2025

30M
THEY DON’T CURRENTLY WORK WITH EVERYTHING
Coalesce Around Definitions

Strategy for Tracking Market Change and Savings

Research and Data on Growth and Performance

Awareness of New Products
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Get a copy of the detailed memo:
https://www.bpa.gov/EE/Utility/research-archive/Pages/hvac-market-research.aspx