Agenda

- Introductions
- Study objectives
- Study methodology
- Detailed findings
  - State of the thermostat market
  - Customer behaviors
  - Customer thermostat preferences
  - Customer segmentation
- Conclusions and implications
- Additional survey results, segment profiles, and appendix
INTRODUCTIONS
The Project Team

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STUDY OBJECTIVES
Study Objectives

- Assess current state of the thermostat market
- Understand thermostat replacement behaviors
- Understand customer temperature preferences and thermostat operation behaviors
- Understand customer thermostat preferences and the effect of various thermostat attributes on consumer purchase decisions
- Capture awareness and use of other technologies of interest
- ComEd program awareness and participation
STUDY METHODOLOGY
Data Collection Approach

- Quantitative general population survey

**Target Population**
- ComEd residential customers

**Survey Mode**
- Web with available inbound phone
- Discrete choice module on web survey only

**Survey Outreach**
- Mailed postcard invitations and reminders to 3,677 customers
- Offered incentives up to $15 to encourage participation

**Survey Administration**
- Fielded in January 2019
- 418 customers completed

**Demographic Weights**
- Post-stratification weights help ensure representativeness of results
- Weighted results by home ownership and age
Discrete Choice Shopping Exercise Design

- Aims to replicate thermostat shopping experience
- Comprehensive set of product attributes and levels
  - 5 products per choice set
  - 12 choice sets per respondent

Sample Choice Set from Shopping Exercise:

<table>
<thead>
<tr>
<th>Price</th>
<th>Energy bill savings</th>
<th>Installation cost</th>
<th>Programmable</th>
<th>Home sensing</th>
<th>Learning feature</th>
<th>Remote access</th>
<th>Voice command</th>
<th>Occupancy sensing</th>
<th>Select</th>
</tr>
</thead>
<tbody>
<tr>
<td>$25</td>
<td>Up to $150/yr</td>
<td>DIY/free self-install</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td>Select</td>
</tr>
<tr>
<td>$225</td>
<td>Up to $50/yr</td>
<td>+$100 professional</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Select</td>
</tr>
<tr>
<td>$185</td>
<td>Up to $200/yr</td>
<td>+$150 professional</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Select</td>
</tr>
<tr>
<td>$105</td>
<td>Up to $100/yr</td>
<td>+$100 professional</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td>Select</td>
</tr>
<tr>
<td>$25</td>
<td>Up to $50/yr</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Select</td>
</tr>
</tbody>
</table>
General Population Survey Analysis

- Thermostat Discrete Choice
  - Latent class modeling to quantify preferences and define segments
  - Relative importance of thermostat attributes to customers
  - Price elasticity for smart thermostats
  - Shares of preference simulations under various conditions
  - Characterization of latent class segments

- Descriptive statistics for non-discrete choice survey data analysis (frequency distributions, measures of central tendency, etc.)
DETAILED FINDINGS
 Definitions

**Manual**
Allows the user to set the temperature and adjust it up or down as desired by manually turning a dial or moving a lever; the temperature setting only changes when the user adjusts the thermostat.

**Programmable**
Uses the built-in calendar and clock to adjust the temperature according to programmed settings by day and time but are not Wi-Fi-connected. These thermostats are also called “setback thermostats” or “clock thermostats”.

**Smart**
In addition to doing everything a programmable thermostat does, these thermostats connect to the Internet and allow the user to adjust the temperature through smartphones or tablets. Some also automatically tailor settings based on occupant preferences, heating system type, home energy profile, and outdoor temperature.
State of the Thermostat Market
Key Findings

- Smart thermostat market share has increased dramatically over the past three years, but smart thermostats still comprise just 17% of all thermostats in customers’ homes.

- Customers who currently have smart thermostats fit the profile of early adopters:
  - They are more tech-savvy, younger, more affluent, and have higher levels of educational attainment.

- Customers who have replaced their thermostats over the past three years have taken varied journeys and, as a result, they have selected different thermostat types:
  - Half of those who replaced their thermostats did so because of a precipitating event – an HVAC upgrade, a thermostat failure, or a new addition to their home. These customers were more likely to install a programmable thermostat, largely due to their reliance on contractors who recommended the device.
  - The other half upgraded a functioning thermostat and were more likely to install a smart thermostat.

- Reducing energy consumption is not a priority for smart thermostat owners. In fact, they are less likely than other customers to be concerned with reducing their energy use.
Smart Thermostat Market Saturation

- Programmable thermostats are the most commonly used thermostat type in customer homes
- Smart thermostats represent 17% of all thermostats
- On average, there are 1.23 thermostats per home
- 2.4 million thermostats are available for replacement*
  - 22% of households do not have Internet capabilities to support smart thermostat installation
  - 2 million Wi-Fi enabled smart thermostat potential

*Removes households that do not have a thermostat (5%) or central cooling (24%)
Thermostat Replacement Journey

- Just under half of customers have thermostats that were already installed in their homes when they moved in, while the remaining customers have replaced their thermostats at some point.
- Only 2% of customers moved into a home that had a smart thermostat installed.
- Half of customers who replaced their thermostats did so because of a precipitating event – an HVAC upgrade, a thermostat failure, or a new addition to their home, while the other half did so to upgrade a functioning thermostat.
- Customers who install thermostats due to a precipitating event are more likely to install a programmable thermostat whereas those who choose to upgrade their existing thermostat are more likely to install a smart thermostat.

\[\text{Already installed: } 46\% \quad \text{Precipitating event: } 50\% \quad \text{HVAC upgrade: } 68\% \quad \text{Replacement of broken thermostat: } 28\% \quad \text{New construction: } 4\% \]

\[\text{Replaced: } 54\% \quad \text{Functioning thermostat: } 50\% \quad \text{0\%} \quad \text{30\%} \quad \text{70\%} \]

n=378
Thermostat Replacement Customer Journey (cont.)

- Contractors can play an important role in thermostat selection, particularly as part of an HVAC system upgrade.

n=230

Smart Thermostat Customer Preference Study
Thermostat Replacement Customer Journey (cont.)

- Contractors favor programmable thermostats over smart thermostats

<table>
<thead>
<tr>
<th></th>
<th>Contractor Selected</th>
<th>Customer Selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programmable</td>
<td>11%</td>
<td>7%</td>
</tr>
<tr>
<td>72°F</td>
<td>76%</td>
<td>39%</td>
</tr>
<tr>
<td>72°F</td>
<td>13%</td>
<td>54%</td>
</tr>
</tbody>
</table>

n=54               n=96
Thermostat Replacement Trends

- Over half of customers who have replaced their thermostats did so between 2016 and 2019
- The market share for smart thermostats is increasing dramatically
  - 61% of customers who replaced their thermostats in 2018, installed a smart thermostat compared to 38% of those who replaced their thermostats between 2016 and 2017

$$\begin{align*}
\text{Percent of all purchasers by year grouping} & \\
\text{Purchased within the last year} & 24\% \\
\text{Purchased 2 to 3 years ago} & 31\% \\
\text{Purchased 4 to 5 years ago} & 20\% \\
\text{Purchased 5 to 7 years ago} & 7\% \\
\text{Purchased More than 7 years ago} & 18\% \\
\end{align*}$$

$$\begin{align*}
\text{Smart} & 61\% & 38\% & 21\% & 7\% & 18\% \\
\text{Programmable} & 31\% & 58\% & 66\% & 76\% & 87\% \\
\text{Manual} & 8\% & 4\% & 13\% & 17\% & 13\% \\
\end{align*}$$

$n = 229$
### Sociodemographic Characteristics of Thermostat Owners

- Compared to manual and programmable thermostat owners, smart thermostat owners are more likely to be younger, more affluent, have higher levels of educational attainment, reside in single-family homes, have bigger homes, and own their homes.
- These characteristics are consistent with early adopters.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Manual/Programmable</th>
<th>Smart Thermostat</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reside in single-family homes</td>
<td>57%</td>
<td>77%</td>
<td>85%</td>
</tr>
<tr>
<td>Homeowners</td>
<td>46%</td>
<td>72%</td>
<td>95%</td>
</tr>
<tr>
<td>Central Cooling</td>
<td>60%</td>
<td>87%</td>
<td>99%</td>
</tr>
<tr>
<td>Reside in homes &gt;2,000 sq. ft.</td>
<td>14%</td>
<td>35%</td>
<td>51%</td>
</tr>
<tr>
<td>College degree or higher</td>
<td>37%</td>
<td>55%</td>
<td>74%</td>
</tr>
<tr>
<td>Annual household income $50K+</td>
<td>49%</td>
<td>66%</td>
<td>94%</td>
</tr>
<tr>
<td>Average age</td>
<td>58</td>
<td>51</td>
<td>46</td>
</tr>
<tr>
<td>n=79</td>
<td></td>
<td>n=231</td>
<td>n=73</td>
</tr>
</tbody>
</table>
Attitudinal Characteristics of Thermostat Owners

- Smart thermostat owners are...
  - much more tech-savvy than manual or programmable thermostat owners
  - less concerned with managing energy use than owners of manual thermostats

<table>
<thead>
<tr>
<th></th>
<th>n=79</th>
<th>n=232</th>
<th>n=73</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tech savviness index (1=low, 7=high)*</td>
<td>3.81</td>
<td>3.63</td>
<td>4.74</td>
</tr>
<tr>
<td>Engagement with Energy Use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not concerned</td>
<td>15%</td>
<td>20%</td>
<td>24%</td>
</tr>
<tr>
<td>Idealists (engaged but not proactive)</td>
<td>37%</td>
<td>46%</td>
<td>32%</td>
</tr>
<tr>
<td>Achievers (engaged and proactive)</td>
<td>48%</td>
<td>34%</td>
<td>44%</td>
</tr>
</tbody>
</table>

*Index comprised of six questions
Customer Behaviors
Key Findings

- Users of all thermostat types prioritize convenience and comfort over saving energy when selecting thermostat setpoints.
- Many smart thermostat owners ignore the smart features of their thermostat and use it like manual thermostats.
  - Even those who make use of those features make frequent manual temperature adjustments.
  - New smart thermostat owners could benefit from some education on how to use their thermostat to save energy without sacrificing comfort.
Key Drivers of Setpoint Behaviors

- Users of all thermostat types, prioritize convenience and comfort over saving energy when selecting thermostat setpoints.
Typical Temperature Control Behaviors

- Smart thermostat owners are more likely to program their thermostats on a schedule than to make manual adjustments or set their thermostat to a single temperature setting.
- Still, over a third continue to use their smart thermostat as a manual one, making manual adjustments or setting a single temperature for the season.

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Smart Thermostat Owners</th>
<th>Manual Adjustments</th>
<th>Single Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programmed temperature schedule</td>
<td>0%</td>
<td>32%</td>
<td>65%</td>
</tr>
<tr>
<td>Manually adjusted temperature settings</td>
<td>74%</td>
<td>52%</td>
<td>26%</td>
</tr>
<tr>
<td>Set a single temperature for the season</td>
<td>26%</td>
<td>16%</td>
<td>9%</td>
</tr>
</tbody>
</table>

*(n=49)  (n=204)  (n=67)*

_Optional Dynamics_  

**Note:** Asked of customers with central air conditioning systems.
Frequency of Thermostat Adjustments When Home

- Nearly all customers make manual adjustments to thermostat settings, with about half doing so at least once a day and over two-thirds doing so at least once a week.
- Programmable and smart thermostat owners adjust their thermostats less frequently than manual thermostat owners.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Manual Thermostat (n=45)</th>
<th>Programmable Thermostat (n=192)</th>
<th>Smart Thermostat (n=68)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Once a day or more</td>
<td>75%</td>
<td>37%</td>
<td>25%</td>
</tr>
<tr>
<td>Once to a few times a week</td>
<td>12%</td>
<td>30%</td>
<td>40%</td>
</tr>
<tr>
<td>Several times a month</td>
<td>0%</td>
<td>5%</td>
<td>13%</td>
</tr>
<tr>
<td>Several times over the season</td>
<td>3%</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>Never</td>
<td>10%</td>
<td>14%</td>
<td>8%</td>
</tr>
</tbody>
</table>

Note: Asked of customers with central air conditioning systems. Nearly all smart thermostat owners (99%) have adjusted temperature remotely. Of those, 26% do so at least once a day and another 24% at least once a week.
Use of Thermostats When Away or on Vacation

- While away or on vacation, nearly half of smart thermostat owners use the away or vacation mode function, yet other customers also tend to make energy-saving adjustments.

<table>
<thead>
<tr>
<th>Action</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turned off air conditioning system</td>
<td>45%</td>
<td>38%</td>
<td>15%</td>
</tr>
<tr>
<td>Set thermostat to higher temperature</td>
<td>41%</td>
<td>51%</td>
<td>33%</td>
</tr>
<tr>
<td>Set thermostat to away/vacation mode</td>
<td>6%</td>
<td>3%</td>
<td>48%</td>
</tr>
<tr>
<td>Left thermostat on usual setting</td>
<td>8%</td>
<td>8%</td>
<td>4%</td>
</tr>
</tbody>
</table>

*(n=41) (n=166) (n=62)*

*Note: Asked of customers with central air conditioning systems*
Customer Thermostat Preferences
Key Findings

- Most customers like the features of smart thermostats and would be willing to purchase one if they had to replace their thermostat.

- Thermostats have long lifespans and do not require frequent replacement. Customers will need to be encouraged to replace their older functioning thermostats.

- Customer preferences are relatively price inelastic. Thermostat control features, rather than price, drive thermostat preferences, suggesting that discounts and incentives may have less value in encouraging adoption.

- The main barrier to customers purchasing smart thermostats appears to be motivating them to replace a working thermostat.
Thermostat Attribute Relative Importance

- When shopping for a thermostat, customers prioritize control features followed by cost.
- Energy savings is a lower priority.

Attribute Relative Importance Scores

1 Includes both price and installation cost
2 Captures whether thermostat is manual, programmable, or has advanced control capabilities

n=390
If shopping for a new thermostat...
- Two-thirds of customers would select a smart thermostat
- Few would select a manual or programmable thermostat
- Nearly one-fifth would not choose one of the options available and keep their current thermostat
Share of Preference Under Different Price Scenarios

- Customer demand is relatively price inelastic
  - Discounting smart thermostats by $100 increases their share of preference by 10 percentage points
  - A small and consistent share of customers will not purchase a new thermostat or will select a manual thermostat regardless of smart thermostat price

![Diagram showing shares of smart thermostat preference by price point.][1]

---

[1]: #1
Customer Segmentation
Key Findings

- LCDC modeling identified five customer segments based on the thermostat purchase preferences
- Each segment places emphasis differently on the various thermostat attributes, calling for customized marketing, messaging, and intervention approaches
- Segments differ based on demographic characteristics, attitudes, and behaviors
Customer Segmentation – Summary

7% Frugal Traditionalists
- Most price sensitive and the only customers to prefer manual
- Least likely to adopt smart thermostats
- None own a smart thermostat
- Disproportionately older, lower income, and less educated

25% Tech Devotees
- Tech-savvy early adopters with strong preference for advanced control features
- Most likely to already own a smart thermostat and to buy at full price

20% Biggest Bang for the Buck
- Looking for as many smart features as possible without overspending
- Exceptionally low motivation to purchase a new thermostat
- Most likely to own their home

7% Design at All Costs
- Willing to spend any amount for name brand and modern design
- Most would buy smart thermostats regardless of price
- Tech-savvy

42% Tech-Appreciating Savings Seekers
- Interest in at least some programmability with appreciation for added tech
- Open and willing to purchase smart thermostats, especially as the prices drop
- Most energy-conscious
Customer Segmentation – Attribute Preferences

- LCDC model identified five customer segments with distinct patterns of preference
  - Four of the five segments care primarily about control features and prefer advanced controls

Attribute Relative Importance by Segment

1. Tech Devotees
   - Attribute: Brand
   - Importance: 15
   - Attribute: Appearance
   - Importance: 66
   - Attribute: Cost
   - Importance: 9
   - Attribute: Control Features
   - Importance: 6
   - Attribute: Occupancy Sensing
   - Importance: 7
   - Attribute: Voice Control
   - Importance: 4
   - Attribute: Savings
   - Importance: 1
   - Attribute: ENERGY STAR
   - Importance: 1

2. Design at All Costs
   - Attribute: Brand
   - Importance: 15
   - Attribute: Appearance
   - Importance: 32
   - Attribute: Cost
   - Importance: 2
   - Attribute: Control Features
   - Importance: 43
   - Attribute: Occupancy Sensing
   - Importance: 12
   - Attribute: Voice Control
   - Importance: 3
   - Attribute: Savings
   - Importance: 1
   - Attribute: ENERGY STAR
   - Importance: 1

3. Tech-Anticipating Savings Seekers
   - Attribute: Brand
   - Importance: 2
   - Attribute: Appearance
   - Importance: 30
   - Attribute: Cost
   - Importance: 4
   - Attribute: Control Features
   - Importance: 47
   - Attribute: Occupancy Sensing
   - Importance: 2
   - Attribute: Voice Control
   - Importance: 2
   - Attribute: Savings
   - Importance: 15
   - Attribute: ENERGY STAR
   - Importance: 2

4. Biggest Bang for the Buck
   - Attribute: Brand
   - Importance: 1
   - Attribute: Appearance
   - Importance: 33
   - Attribute: Cost
   - Importance: 4
   - Attribute: Control Features
   - Importance: 47
   - Attribute: Occupancy Sensing
   - Importance: 4
   - Attribute: Voice Control
   - Importance: 5
   - Attribute: Savings
   - Importance: 1
   - Attribute: ENERGY STAR
   - Importance: 1

5. Frugal Traditionalists
   - Attribute: Brand
   - Importance: 7
   - Attribute: Appearance
   - Importance: 8
   - Attribute: Cost
   - Importance: 69
   - Attribute: Control Features
   - Importance: 10
   - Attribute: Occupancy Sensing
   - Importance: 1
   - Attribute: Voice Control
   - Importance: 32
   - Attribute: Savings
   - Importance: 1
   - Attribute: ENERGY STAR
   - Importance: 1

1 Includes both price and installation cost
2 Captures whether thermostat is manual, programmable, or has advanced control capabilities
Customer Segmentation – Current Thermostat Ownership

- Customers in each segment can be characterized using other survey responses
- Demographic patterns could support targeted marketing to segments with certain preferences

Thermostats Currently Installed by Segment

<table>
<thead>
<tr>
<th>Segment</th>
<th>Tech Devotees (n=96)</th>
<th>Design at All Costs (n=27)</th>
<th>Tech-Appreciating Savings Seekers (n=164)</th>
<th>Biggest Bang for the Buck (n=77)</th>
<th>Frugal Traditionalists (n=27)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17%</td>
<td>34%</td>
<td>24%</td>
<td>23%</td>
<td>55%</td>
</tr>
<tr>
<td></td>
<td>51%</td>
<td>44%</td>
<td>67%</td>
<td>50%</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td>32%</td>
<td>22%</td>
<td>9%</td>
<td>27%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Customer Segmentation – Price Sensitivity

- Price sensitivity varies across segments, but most segments are not highly price-motivated
- The most price sensitive is the one that prefers manual thermostats

Smart Thermostat Shares of Preference Under Variable Pricing Conditions

- **Tech Devotees** (n=96):
  - Full Price: 87%
  - Discounted by $100: 91%
  - Priced at $25: 92%
- **Design at All Costs** (n=27):
  - Full Price: 79%
  - Discounted by $100: 83%
  - Priced at $25: 84%
- **Tech-Apreciating Savings Seekers** (n=164):
  - Full Price: 70%
  - Discounted by $100: 83%
  - Priced at $25: 87%
- **Biggest for the Buck** (n=77):
  - Full Price: 52%
  - Discounted by $100: 65%
  - Priced at $25: 67%
- **Frugal Traditionalists** (n=27):
  - Full Price: 7%
  - Discounted by $100: 20%
  - Priced at $25: 26%
Customer Segmentation – Demographics

- Customer segments differ across a range of sociodemographic characteristics, including age, education, income, and homeownership status.

<table>
<thead>
<tr>
<th>Segment Size (Householders)</th>
<th>Tech Devotees</th>
<th>Design at All Costs</th>
<th>Tech-Applauding Savings Seekers</th>
<th>Biggest Bang for the Buck</th>
<th>Frugal Traditionalists</th>
<th>General Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Population</td>
<td>834,700</td>
<td>235,960</td>
<td>1,425,960</td>
<td>671,500</td>
<td>231,880</td>
<td>3,400,000</td>
</tr>
<tr>
<td>Age &lt;35</td>
<td>25%</td>
<td>7%</td>
<td>42%</td>
<td>20%</td>
<td>7%</td>
<td>19%</td>
</tr>
<tr>
<td>Age &lt;35-54</td>
<td>54%</td>
<td>27%</td>
<td>42%</td>
<td>34%</td>
<td>19%</td>
<td>41%</td>
</tr>
<tr>
<td>Age 55+</td>
<td>29%</td>
<td>42%</td>
<td>38%</td>
<td>46%</td>
<td>74%</td>
<td>40%</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS or less</td>
<td>15%</td>
<td>32%</td>
<td>14%</td>
<td>19%</td>
<td>33%</td>
<td>18%</td>
</tr>
<tr>
<td>Some college</td>
<td>31%</td>
<td>27%</td>
<td>27%</td>
<td>25%</td>
<td>25%</td>
<td>27%</td>
</tr>
<tr>
<td>BA or higher</td>
<td>54%</td>
<td>41%</td>
<td>59%</td>
<td>56%</td>
<td>42%</td>
<td>55%</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>76%</td>
<td>71%</td>
<td>72%</td>
<td>67%</td>
<td>72%</td>
<td>72%</td>
</tr>
<tr>
<td>Retired/Unemployed</td>
<td>24%</td>
<td>29%</td>
<td>28%</td>
<td>33%</td>
<td>28%</td>
<td>28%</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $50k</td>
<td>33%</td>
<td>43%</td>
<td>37%</td>
<td>31%</td>
<td>45%</td>
<td>46%</td>
</tr>
<tr>
<td>$50k-less than $75k</td>
<td>14%</td>
<td>36%</td>
<td>15%</td>
<td>17%</td>
<td>25%</td>
<td>17%</td>
</tr>
<tr>
<td>$75k or more</td>
<td>53%</td>
<td>22%</td>
<td>47%</td>
<td>52%</td>
<td>30%</td>
<td>47%</td>
</tr>
<tr>
<td>Home ownership</td>
<td>63%</td>
<td>61%</td>
<td>65%</td>
<td>76%</td>
<td>64%</td>
<td>66%</td>
</tr>
</tbody>
</table>

n=96 n=27 n=164 n=77 n=27 n=390
Segment Targeting Considerations

**Tech Devotees**
- Size: 25%
- Segment Summary:
  - Tech-savvy early adopters with strong preference for advanced control features
  - Most likely to already own a smart thermostat and to buy at full price
- Targeting Considerations:
  - Highly likely to adopt smart thermostats on their own
  - Aware of smart thermostat technology and do not require education or incentives

**Design at All Costs**
- Size: 7%
- Segment Summary:
  - Willing to spend any amount for name brand and modern design
  - Most would buy smart thermostats regardless of price
  - Tech-savvy
- Targeting Considerations:
  - Likely to adopt smart thermostats on their own
  - Lowest concern with energy savings signals reduced likelihood of achieving savings without further education
  - Incentives are likely to be low-impact
  - Messaging should be visual and highlight thermostat design

**Tech Appreciating Savings Seekers**
- Size: 42%
- Segment Summary:
  - Interest in at least some programmability with appreciation for added tech
  - Open and willing to purchase smart thermostats, especially as prices drop
  - Most energy conscious segment
- Targeting Considerations:
  - Marketing to get customers to shop for thermostats is key
  - Messaging about energy savings is likely to fuel interest
  - Incentives will likely help boost smart thermostat adoption

**Biggest Bang for the Buck**
- Size: 20%
- Segment Summary:
  - Looking for as many smart features as possible without overspending
  - Exceptionally low motivation to purchase a new thermostat
  - Most likely to own their home
- Targeting Considerations:
  - Especially unlikely to replace a working thermostat, but likely to choose a smart thermostat over other products
  - Incentives are likely to help in overcoming complacency
  - Less concern with energy use indicates additional education may be needed to promote engagement and maximize savings

**Frugal Traditionalists**
- Size: 7%
- Segment Summary:
  - Most price-sensitive and the only customers to prefer manual
  - Least likely to adopt smart thermostats
  - None own a smart thermostat
  - Disproportionately older, lower income, and less educated
- Targeting Considerations:
  - Hard-to-reach segment
  - Steep economic and knowledge barriers to adoption
  - Incentives will play the biggest role in driving smart thermostat adoption, but overall adoption within the segment will be limited even with generous incentives
  - Best fit for direct install programs
CONCLUSIONS AND IMPLICATIONS
Conclusions: The Smart Thermostat Market

- Smart thermostat market share has increased dramatically over the past three years, but smart thermostats still comprise just 17% of all thermostats installed.
- Customers who currently have smart thermostats fit the profile of early adopters:
  - They are more tech-savvy, younger, more affluent, and have higher levels of educational attainment. They are also less concerned with managing their energy use.
- The remaining market for smart thermostats is large – an estimated 2 million customers have manual or programmable thermostats.
Conclusions: Increasing Smart Thermostat Adoption

- Most customers like the features of smart thermostats and would be willing to purchase one if they had to replace their thermostat
- Thermostats have long lifespans and do not require frequent replacement. Customers will need to be encouraged to replace their older functioning thermostats
  - Thermostat control features, rather than price, drive thermostat preferences, suggesting that discounts and incentives may have less value in encouraging adoption
  - Different customer segments place differing emphasis on various thermostat attributes, calling for customized marketing, messaging, and intervention approaches
  - Thermostats are the latest tech gadget for the early adopters, but customers who aren’t tech driven and have a working thermostat could be a more difficult sell
- HVAC upgrades are opportunities to increase customer demand but contractors are a barrier to smart thermostat adoption. Contractors are more likely to recommend and install programmable than smart thermostats whereas customers who select their own thermostats are more likely to purchase a smart thermostat
  - Contractor education is needed to increase adoption as part of HVAC upgrades
Conclusions: Thermostat Usage

- Users of all thermostat types prioritize convenience and comfort over saving energy when selecting thermostat setpoints.

- Many smart thermostat owners ignore the automated smart features of their thermostat and use it like their old thermostat.
  - Even those that make use of those features make frequent manual temperature adjustments.
  - New smart thermostat owners could benefit from some education on how to use their thermostat to save energy without sacrificing comfort.
DISCUSSION
Other Equipment Penetration
Other Equipment Penetration

Smart Strips
- 93% of homes have at least one power strip
- 11% of homes have at least one smart strip

Air Purifiers
- A quarter of households have at least one air purifier
ComEd Program Awareness and Participation
Awareness of ComEd Programs

- 80% of customers are aware of one or more ComEd energy efficiency programs
- The Refrigerator/Freezer Recycling program has the greatest awareness with close to half of customers aware (49%)
- Approximately one-third of customers (34%) are aware of smart thermostat rebates

<table>
<thead>
<tr>
<th>Program</th>
<th>Awareness</th>
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<tbody>
<tr>
<td>Refrigerator/freezer recycling rebates</td>
<td>49%</td>
</tr>
<tr>
<td>Discounted light bulbs</td>
<td>38%</td>
</tr>
<tr>
<td>New appliance rebates</td>
<td>36%</td>
</tr>
<tr>
<td>Smart thermostat rebates</td>
<td>34%</td>
</tr>
<tr>
<td>Air conditioner/ heating equipment (HVAC) rebates</td>
<td>26%</td>
</tr>
<tr>
<td>Water heater rebates</td>
<td>17%</td>
</tr>
<tr>
<td>Rebates for weatherization services</td>
<td>15%</td>
</tr>
<tr>
<td>Smart or advanced power strip rebates</td>
<td>9%</td>
</tr>
<tr>
<td>Pool pump rebates</td>
<td>1%</td>
</tr>
</tbody>
</table>

n=418
Sources of Program Awareness

- Bill inserts and mailers from utility are the most common sources of program awareness

- Bill insert/mail from utility: 50%
- TV or radio ad: 26%
- Utility website: 21%
- Family/Friends: 21%
- Online advertising: 13%
- Contractor: 7%
- Social Media: 6%
- Other: 7%

n=333
### Participation in Programs

- Overall, 14% received one more rebates or purchased discounted products from ComEd in the last year.
- Smart thermostats were the most common product with 7% reporting a rebate or discounted purchase. Smaller percentages purchased rebated or discounted power strips (3%), air purifiers (2%), and pool pumps (2%). Even fewer reported receiving an incentive for another product, including refrigerators, light bulbs, and room air conditioners.

<table>
<thead>
<tr>
<th>Product</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart thermostats</td>
<td>7%</td>
</tr>
<tr>
<td>Smart or advanced power strips</td>
<td>3%</td>
</tr>
<tr>
<td>Air purifiers</td>
<td>2%</td>
</tr>
<tr>
<td>Pool pumps</td>
<td>2%*</td>
</tr>
<tr>
<td>Other</td>
<td>3%</td>
</tr>
</tbody>
</table>

*Based on people who have pools, n=418*
SEGMENT PROFILES
Tech Devotees

- Tech-savvy early adopters
- More likely than any other segment to own smart thermostats
- Strong preference for advanced thermostat control features
- Willing to purchase smart thermostats at full price

### Tech Devotees vs. General Population

<table>
<thead>
<tr>
<th>Segment Size (Householders)</th>
<th>Tech Devotees</th>
<th>General Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>834,700</td>
<td>3,400,000</td>
</tr>
<tr>
<td>% of Population</td>
<td>25%</td>
<td>N/A</td>
</tr>
<tr>
<td>Age &lt;35</td>
<td>18%</td>
<td>19%</td>
</tr>
<tr>
<td>Age &lt;35-54</td>
<td>54%</td>
<td>41%</td>
</tr>
<tr>
<td>Age 55+</td>
<td>29%</td>
<td>40%</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS or less</td>
<td>15%</td>
<td>18%</td>
</tr>
<tr>
<td>Some college</td>
<td>31%</td>
<td>27%</td>
</tr>
<tr>
<td>BA or higher</td>
<td>54%</td>
<td>55%</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>76%</td>
<td>72%</td>
</tr>
<tr>
<td>Retired/Unemployed</td>
<td>24%</td>
<td>28%</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $50k</td>
<td>33%</td>
<td>36%</td>
</tr>
<tr>
<td>$50k-less than $75k</td>
<td>14%</td>
<td>17%</td>
</tr>
<tr>
<td>$75k or more</td>
<td>53%</td>
<td>47%</td>
</tr>
<tr>
<td>Home ownership</td>
<td>63%</td>
<td>66%</td>
</tr>
</tbody>
</table>

### Engagement with Energy Use

- Not concerned: 15%
- Idealists (engaged but not proactive): 49%
- Achievers (engaged and proactive): 36%

### Thermostat Attribute Relative Importance Scores

- Tech-Savviness Index: 4.4/5
- n=96

### Current Distribution of Thermostat by Type

- 17% Full Price
- 51% Discounted by $100
- 32% Priced at $25

- Smart
- Programmable
- Manual

- Full Price
- Discounted by $100
- Priced at $25
- n=96
Design at All Costs

- Willing to spend any amount for name brand and modern design
- Place great importance on advanced control features
- Most would buy smart thermostats regardless of price
- Tech-savvy
- Lower levels of educational attainment and lower income levels

### Thermostat Attribute Relative Importance Scores

<table>
<thead>
<tr>
<th>Brand</th>
<th>Appearance</th>
<th>Cost</th>
<th>Control Features</th>
<th>Occupancy Sensing</th>
<th>Voice Control</th>
<th>Savings</th>
<th>ENERGY STAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>32</td>
<td>2</td>
<td>43</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

### Current Distribution of Thermostat by Type

- Full Price: 34%
- Discounted by $100: 44%
- Priced at $25: 22%

### Engagement with Energy Use

- Not concerned: 24%
- Idealists (engaged but not proactive): 40%
- Achievers (engaged and proactive): 36%

### Share of Preference by Smart Thermostat Price Point

- None: 9%
- Smart: 79%
- Programmable: 83%
- Manual: 84%

### Tech-Savviness Index: 4.3/5

<table>
<thead>
<tr>
<th>Age &lt;35</th>
<th>Age &lt;35-54</th>
<th>Age 55+</th>
</tr>
</thead>
<tbody>
<tr>
<td>31%</td>
<td>27%</td>
<td>42%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th>HS or less</th>
<th>Some college</th>
<th>BA or higher</th>
</tr>
</thead>
<tbody>
<tr>
<td>32%</td>
<td>27%</td>
<td>55%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Employment</th>
<th>Employed</th>
<th>Retired/Unemployed</th>
</tr>
</thead>
<tbody>
<tr>
<td>71%</td>
<td>29%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Income</th>
<th>Less than $50k</th>
<th>$50k-less than $75k</th>
<th>$75k or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>43%</td>
<td>36%</td>
<td>22%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Home ownership</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>61%</td>
<td>66%</td>
</tr>
</tbody>
</table>

### Segment Size (Householders) vs General Population

- Design at All Costs: 235,960 (7%)
- General Population: 3,400,000 (N/A)

- Age <35: 31% (19%)
- Age <35-54: 27% (41%)
- Age 55+: 42% (40%)

- Education: HS or less: 32% (18%)
- Some college: 27% (27%)
- BA or higher: 41% (55%)

- Employment: Employed: 71% (72%)
- Retired/Unemployed: 29% (28%)

- Income: Less than $50k: 43% (36%)
- $50k-less than $75k: 36% (17%)
- $75k or more: 22% (47%)

- Home ownership: 61% (66%)

n=27 n=390
Tech-Appreciating Savings Seekers

- Interest in at least some programmability with appreciation for advanced controls and features
- Open and willing to purchase smart thermostats, especially as prices drop
- Most energy conscious segment

Thermostat Attribute Relative Importance Scores

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Tech-Appreciating Savings Seekers</th>
<th>General Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand</td>
<td>3.6/5</td>
<td>4.0/5</td>
</tr>
<tr>
<td>Appearance</td>
<td>30%</td>
<td>43%</td>
</tr>
<tr>
<td>Cost</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Control Features</td>
<td>15%</td>
<td>2%</td>
</tr>
<tr>
<td>Occupancy Sensing</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Voice Control</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Savings</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>ENERGY STAR</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Engagement with Energy Use

- Not concerned: 15%
- Idealists (engaged but not proactive): 44%
- Achievers (engaged and proactive): 41%

Current Distribution of Thermostat by Type

- Non-smart: 24%
- Smart: 67%
- Programmable: 9%
- Manual: 9%

Share of Preference by Smart Thermostat Price Point

- Full Price: 13%
- Discounted by $100: 9%
- Priced at $25: 7%
Biggest Bang for the Buck

- Looking for as many smart features as possible without overspending
- Least motivation of any segment to purchase a new thermostat
- Most likely of all segments to own their home

### Thermostat Attribute Relative Importance Scores

<table>
<thead>
<tr>
<th>Tech-Savviness Index:</th>
<th>3.8/5</th>
</tr>
</thead>
</table>

### Current Distribution of Thermostat by Type

- 23% for the Buck
- 50% General Population

### Share of Preference by Smart Thermostat Price Point

- 72% for the Buck
- 27% General Population

### Engagement with Energy Use

- 26% Not concerned
- 38% Idealists (engaged but not proactive)
- 36% Achievers (engaged and proactive)
Frugal Traditionalists

- Most price-sensitive
- Prefer manual thermostats
- Least likely to adopt smart thermostats
- None currently own a smart thermostat
- Disproportionately older, lower income, and less educated

<table>
<thead>
<tr>
<th>Segment Size (Householders)</th>
<th>Frugal Traditionalists</th>
<th>General Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &lt;35</td>
<td>7%</td>
<td>19%</td>
</tr>
<tr>
<td>Age 35-54</td>
<td>19%</td>
<td>41%</td>
</tr>
<tr>
<td>Age 55+</td>
<td>74%</td>
<td>40%</td>
</tr>
<tr>
<td>Education</td>
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<td></td>
</tr>
<tr>
<td>HS or less</td>
<td>33%</td>
<td>18%</td>
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<td>27%</td>
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<tr>
<td>BA or higher</td>
<td>42%</td>
<td>55%</td>
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<tr>
<td>Employment</td>
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<tr>
<td>Employed</td>
<td>72%</td>
<td>72%</td>
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<tr>
<td>Retired/Unemployed</td>
<td>28%</td>
<td>28%</td>
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<tr>
<td>Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $50k</td>
<td>45%</td>
<td>36%</td>
</tr>
<tr>
<td>$50k-less than $75k</td>
<td>25%</td>
<td>17%</td>
</tr>
<tr>
<td>$75k or more</td>
<td>30%</td>
<td>47%</td>
</tr>
<tr>
<td>Home ownership</td>
<td>64%</td>
<td>66%</td>
</tr>
</tbody>
</table>

| Tech-Savviness Index:       | 3.5/5                  | n=27               |

Engagement with Energy Use

- Not concerned: 46%
- Idealists (engaged but not proactive): 21%
- Achievers (engaged and proactive): 33%

Current Distribution of Thermostat by Type

- Smart: 55%
- Programable: 45%
- Manual: 0%

Share of Preference by Smart Thermostat Price Point

- Full Price: 13%
- Discounted by $100: 35%
- Priced at $25: 45%
APPENDIX
# Smart Thermostat Customer Preference Study

## Attributes

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Manual</th>
<th>Programmable</th>
<th>Ecobee Lite</th>
<th>Nest E</th>
<th>Ecobee 4</th>
<th>Nest Learning</th>
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<tbody>
<tr>
<td>Brand</td>
<td>Honeywell</td>
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<td>Ecobee</td>
<td>Nest</td>
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<td>Nest</td>
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<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
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<tr>
<td>Occupancy sensing</td>
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<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Voice command-enabled</td>
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<td>Yes</td>
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<tr>
<td>Energy savings potential</td>
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<td>Up to $100 per year</td>
<td>Up to $140 per year</td>
<td>Up to $140 per year</td>
<td>Up to $140 per year</td>
<td>Up to $140 per year</td>
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<tr>
<td>ENERGY STAR certified</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* Includes both price and installation cost
Contact Information

Kessie Avseikova
Director
kavseikova@opiniondynamics.com
617-301-4632