Nest Learning Thermostat: Can You Teach an Old Thermostat New Tricks?

Carlyn Aarish
February 11, 2015
Evolution of Thermostats

- **Manual**
  User manually adjusts setpoints

- **Programmable**
  User programs setpoint schedule

- **Wi-Fi Connected**
  User adjusts/programs setpoints remotely

- **Smart**
  Thermostat adjusts/programs setpoints
Objectives

Gas saved on heating
(Gas furnaces)

Electricity saved on cooling
(Central AC)
Program Design

Test

N = 1,400

n = 700

Control

N = 4,645

n = 700
Methods

Pre/Post billing analysis
Methods

Pre/Post billing analysis

Indoor temperature metering
Methods

Pre/Post billing analysis

Indoor temperature metering

AC run time metering
Methods

Pre/Post billing analysis

Indoor temperature metering

AC run time metering

Participant surveys
Heating Season Gas Savings

Savings

- 13%
- 6%
Cooling Season Electric Savings

- 15% Savings
- 14% Savings
Heating Season Temp Profile

- Asleep
- Home
- Away
- Home

Temperature (°F)

12:00 AM 6:00 AM 8:00 AM 6:00 PM 11:00 PM

Weekday  Weekend

AESP
ASSOCIATION OF ENERGY SERVICES PROFESSIONALS
Heating Season Temp Profile

Temperature (°F)

Asleep  Home  Away  Home

12:00 AM  6:00 AM  8:00 AM  6:00 PM  11:00 PM

Weekday  Weekend

AESP 25th Anniversary 1990-2015
Cooling Season Temp Profile

- Asleep
- Home
- Away
- Home

Temperature (°F)

12:00 AM 6:00 AM 8:00 AM 6:00 PM 11:00 PM

Weekday

Weekend

AESP
ASSOCIATION OF ENERGY SERVICES PROFESSIONALS

Cooling Season Temp Profile

Temperature (°F)

12:00 AM  6:00 AM  8:00 AM  6:00 PM  11:00 PM

Asleep  Home  Away  Home

Weekday  Weekend
Reasons for Low Cooling Season
Savings Potential
Reasons for Low Cooling Season Savings Potential

1. Children out of school
Reasons for Low Cooling Season Savings Potential

1. Children out of school

2. Cooling season shorter than heating season
Reasons for Low Cooling Season Savings Potential

1. Children out of school

2. Cooling season shorter than heating season

3. HVAC run times shorter in summer
How I Think I Look
How I Actually Look
Ideal
Actual

Temperature (°F)

NOV          DEC          JAN          FEB
Actual

Temperature (°F)

OCT  NOV  DEC
Taking Analysis Further
Taking Analysis Further

• What are impacts on utility peak demand?
Taking Analysis Further

- What are impacts on utility peak demand?
- What are impacts if paired with DR program?
Taking Analysis Further

- What are impacts on utility peak demand?
- What are impacts if paired with DR program?
- Do savings persist over time?
Taking Analysis Further

• What are impacts on utility peak demand?
• What are impacts if paired with DR program?
• Do savings persist over time?
• How do other smart thermostats compare?
Taking Analysis Further

• What are impacts on utility peak demand?
• What are impacts if paired with DR program?
• Do savings persist over time?
• How do other smart thermostats compare?
• **What are impacts in different climate regions?**
Taking Analysis Further

• What are impacts on utility peak demand?
• What are impacts if paired with DR program?
• Do savings persist over time?
• How do other smart thermostats compare?
• What are impacts in different climate regions?
• **What are impacts on different HVAC equipment?**
Taking Analysis Further

• What are impacts on utility peak demand?
• What are impacts if paired with DR program?
• Do savings persist over time?
• How do other smart thermostats compare?
• What are impacts in different climate regions?
• What are impacts on different HVAC equipment?
• What areas would YOU examine?
Carlyn Aarish
617-673-7139
carlyn.aarish@cadmusgroup.com

CADMUS
Save The Dates

May 19-21, 2015
AESP’s Spring Conference
Portland, OR

August 25-27, 2015
AESP’s Summer Conference
Niagara Falls, ON

February 1-4, 2016
AESP’s National Conference
Phoenix, AZ

For more information - www.aesp.org