Efficiency Vermont

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Old Dog, New Tricks? Smart Lighting

Emerging Data Opportunities in the Smart Home

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Who is Efficiency Vermont?

- Statewide energy efficiency utility
- Sustainable energy solutions for all Vermonters
  - Education - Rebates and financing
  - Services

VEIC Contract

Vermont Energy Investment Corporation

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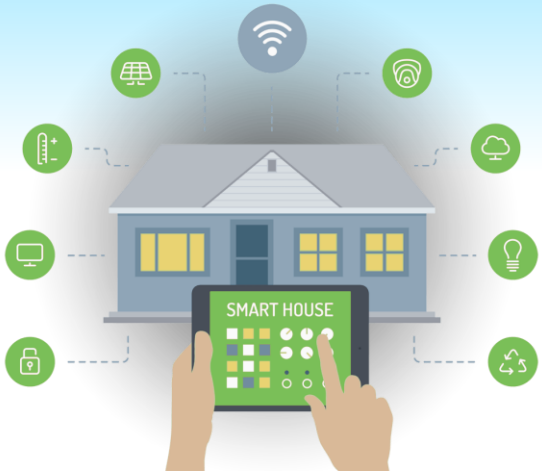
EFFICIENCY$MART

DC SUSTAINABLE ENERGY UTILITY

Overview



- Enter the Smart Home
- Efficiency Vermont's Study
  - Design
  - Results
    - Dimming / Demand Response
- The Future of (Smart) Lighting
- Next Steps

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The Opportunity

Temperature

On / Off

Weather

Light Levels

Occupancy

Window / Door Open / Closed

Performance

Air Quality

Hours of Use

Leak Detection

Power Draw

Humidity

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Customer Experience is Key

- Smart Home market still new & unstable
  - Compatibility Challenges
  - Ease of Use
  - Product Longevity
  - Associated Costs

- Efficiency Vermont's 2015 R&D study:
  - Begin to understand these challenges & implications.

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Study Objective

Begin to map, define and measure the interactions of smart hubs & their connected devices.

- Map the baseline energy use of smart lighting
- Catalogue consumer use of smart outlets

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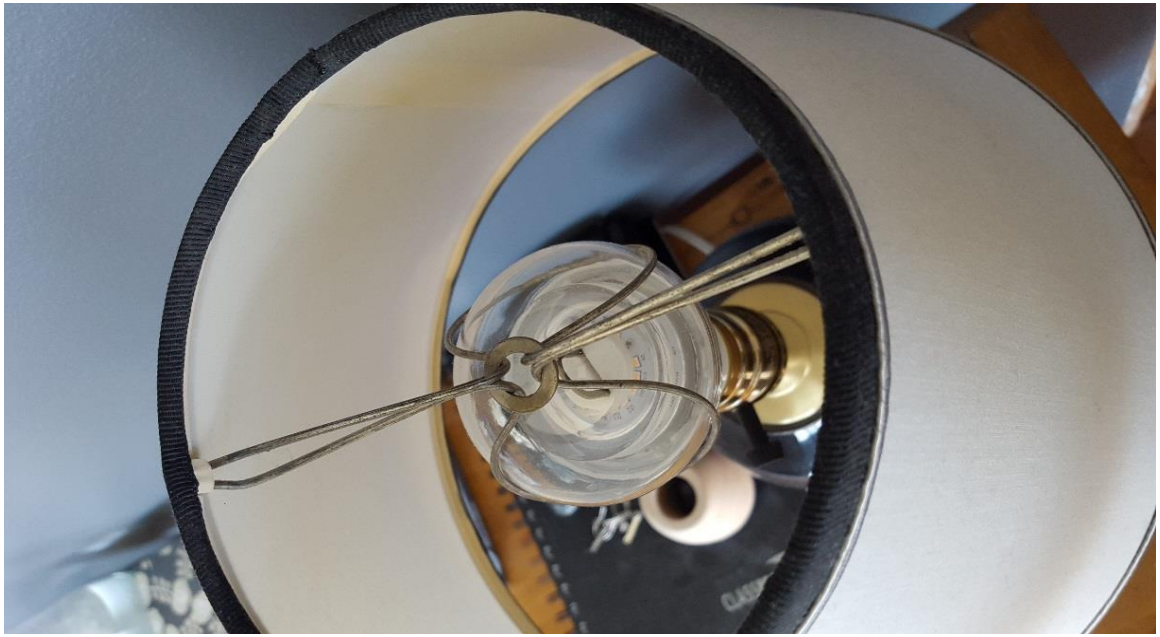
Secondary Objective

Understand consumer experience with set-up, engagement & use of smart / Home Energy Management System (HEMS) devices.



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Program / Pilot Design

- **Assess DIY-nature of HEMS hubs & smart lighting**
- **No instruction regarding set-up, or use of product**
  1. Participant attempts to install product on their own
  2. Staff verifies/adjusts install at initial visit to ensure basic functionality
  3. Participant uses products over 3 month period
- **Light Loggers record data**
  - 5 smart LED bulbs, 5 regular LED bulbs
- **Smart Outlet**
  - Record devices plugged in - 3x throughout study

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Program / Pilot Design

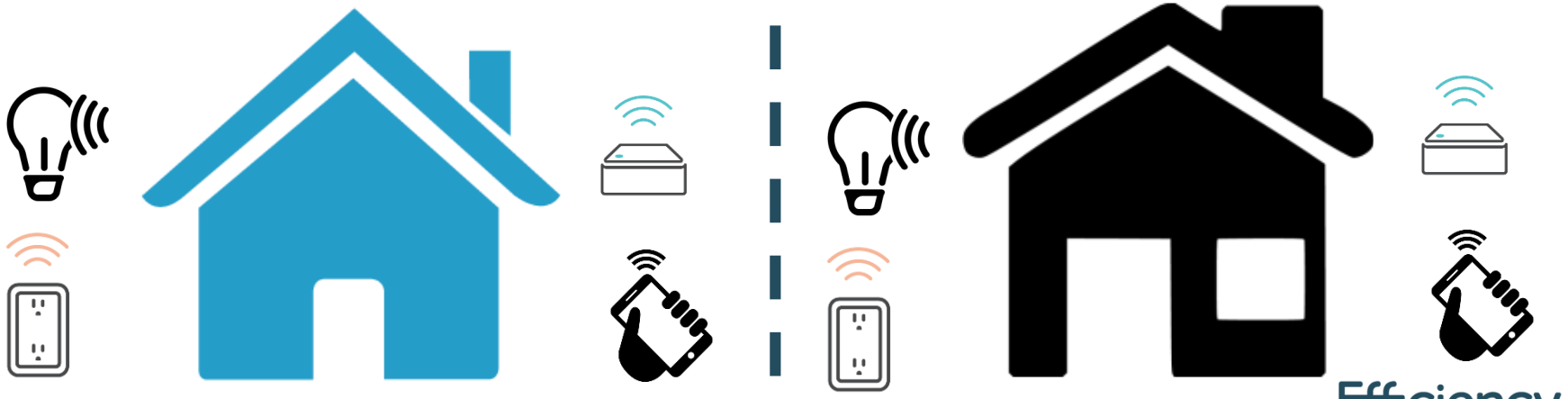
15 study homes in Vermont

- Representative sample

2 different smart ecosystems:

8 homes

7 homes



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What did we find?

Nota Bene: The 15 home sample-size is not statistically significant. Further study is warranted to verify these results.

Smart bulb projected annual HOU

- Close to or less than 1,000 hours/year
- Less than our standard lighting program HOU

Compared to standard / non-smart bulbs in Northeast Residential Lighting (NRL) study

- Up to 27 % reduction in HOU with smart bulbs

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The Dimming Opportunity

Smart bulbs make dimming possible where none had existed before.

- In the average home: 10 % of bulbs are on dimmer switches

Participants dimmed bulbs 38% of the time

Demand Response Opportunity

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Other Program Considerations

No statistically significant HOU difference in:

Homes that Regularly Used Automation

- Opportunity for Efficiencies in Scheduling

Manufacturer's Ecosystems

- Program could be scaled across manufacturers assuming strict selection criteria

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Market Readiness for EE Programs

In an ideal set-up, with major industry barriers removed…

- **Installation experience – not a major blocker**
- **Indicates viability for a retail program**

Given this price point, would you recommend?

87% Smart Bulb

80% HEMS Hub

At $15 / bulb, cost not a barrier.

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Market Readiness for EE Programs

- Measurement & Verification 2.0
  - Efficiency Vermont's study used light loggers
  - Data opportunities:
    - Light level
    - Hours of Use

  - Efficiency Utilities need to come to consensus about what data streams we need
  - Manufacturer data-sharing opportunities

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The Future of Lighting

- When is the market transformed?
- Decreasing savings
- Remaining lighting opportunity?

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Where do we go from here?

- Additional research needed
  - Initial smart lighting findings are favorable
  - What data do utilities need from manufacturers to validate programs?
- Smart Home is the home of the future
  - Utilities need to get involved early
  - Opportunity to influence design

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Thank you!

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Find the Full Report Here:

www.efficiencyvermont.com/news-blog/whitepapers

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