



Northeast Energy Efficiency Partnerships

Findings from NEEP's Regional Market Transformation Strategy Report

2016 Home Energy Management
Systems Workshop

Wednesday, September 21st, 2016

10:15am-11:00am

Background

- NEEP is looking at:

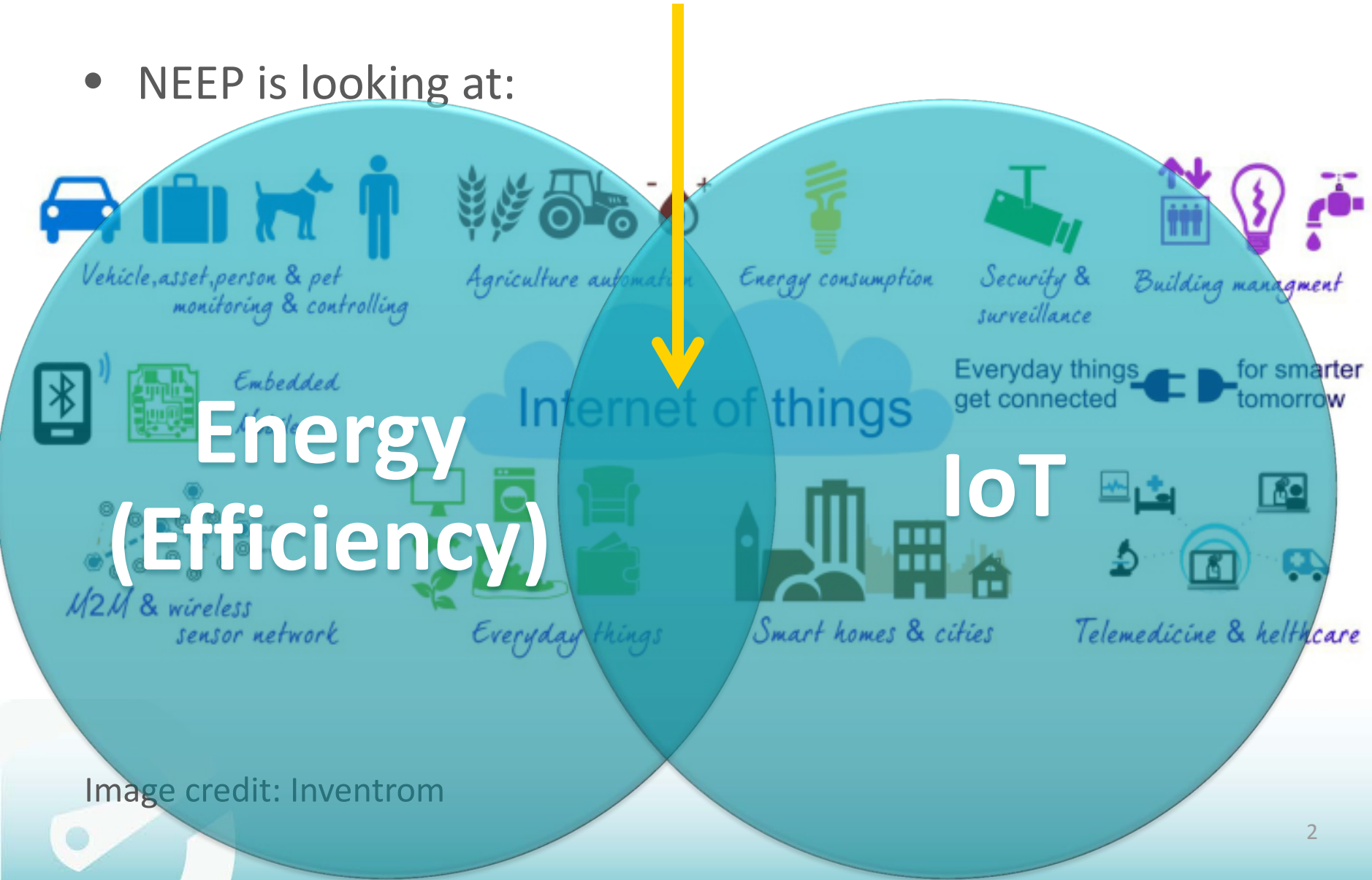
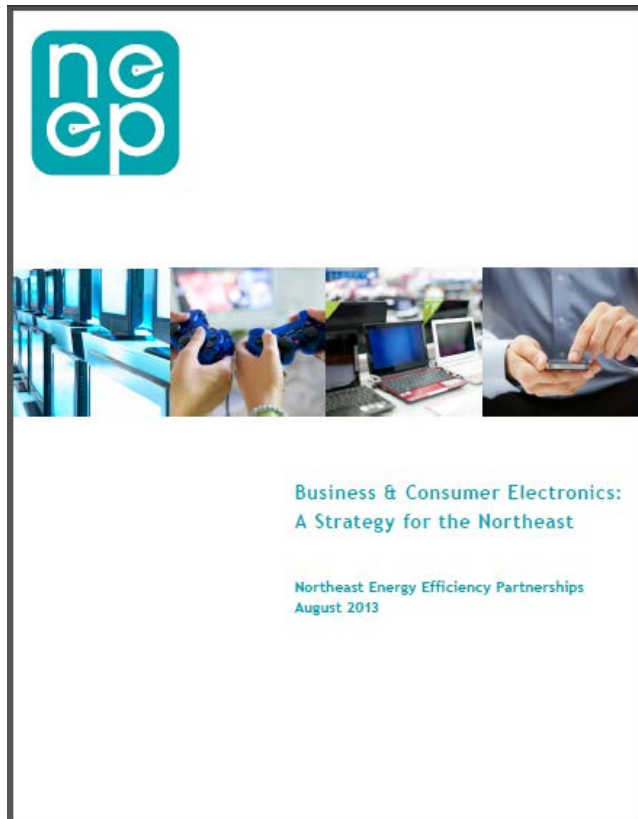


Image credit: Inventrom

“Long” History in HEMS



2013



2014



2015

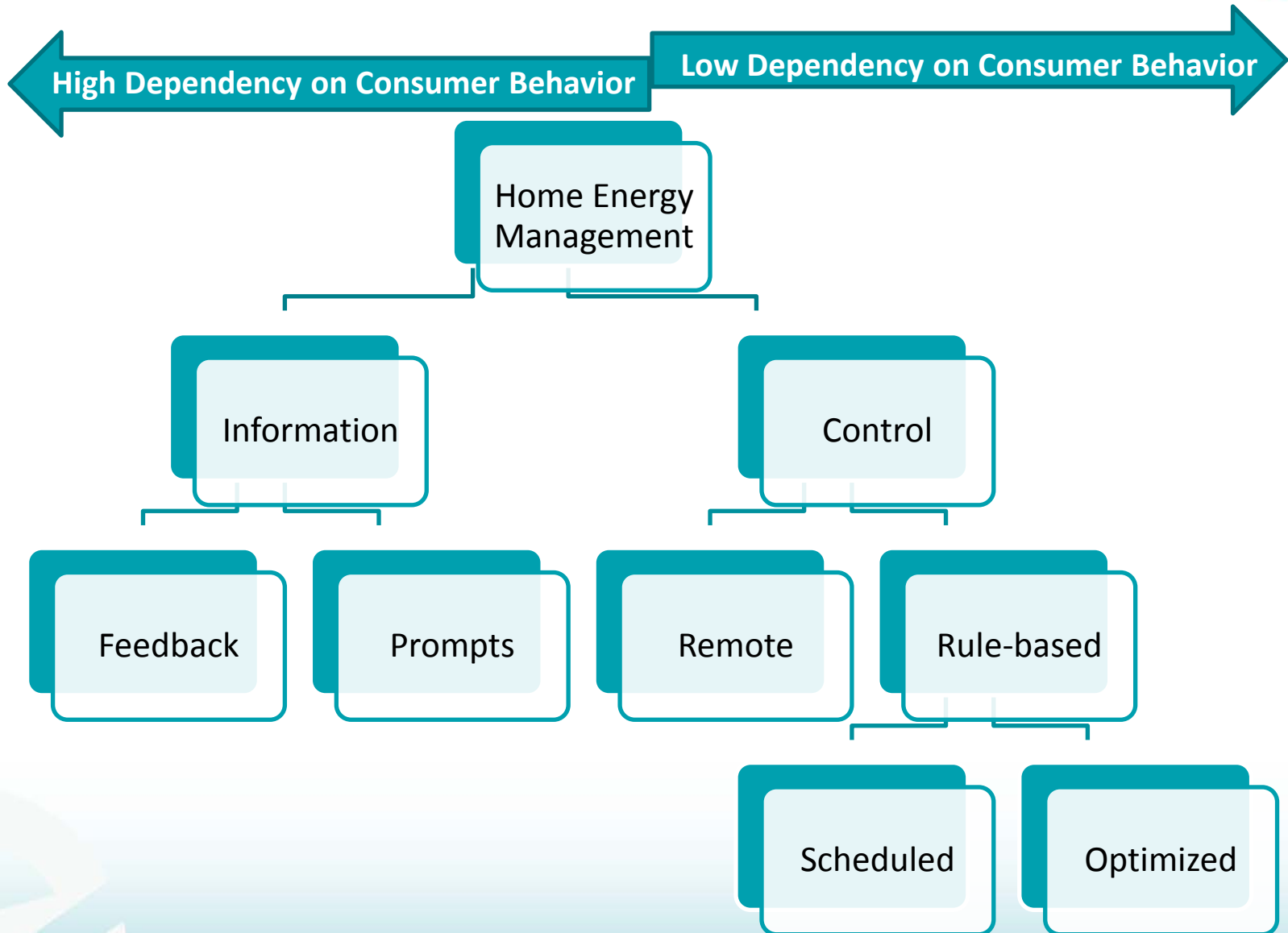
Energy What is the Smart Home?



Home Energy Management Systems (HEMS):

- Any hardware and/or software system that can:
 - monitor and provide feedback about a home's energy usage, **and/or**
 - enable advanced control of energy-using systems and devices in the home

HEMS Design



Home Energy Management Technologies

- In-home display, Online portal, load monitor, platform
- Smart: thermostat, appliance, lighting, plug, hub, switch, etc.

— Online list at neep.org

As part of the [HEMS Research Report](#), NEEP reviewed and updated inventories of HEMS technology from existing resources including a comprehensive list as part of the [PG&E HEMS Market Characterization](#), while expanding the inventory lists and providing costs and potential linkages where appropriate. The inventory chart below is the technology assessment from the HEMS Research Report. DISCLAIMER: NEEP does not take responsibility for the products listed here or for the accuracy of the information presented.

Download Spreadsheet

HEMS Technology Assessment

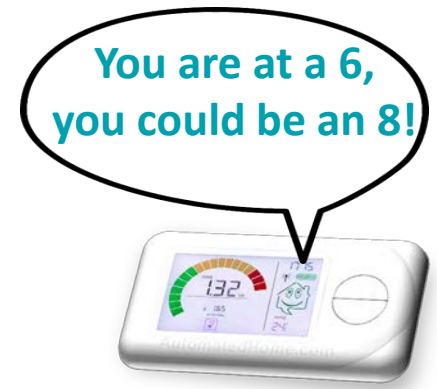
HEMS Technology Assessment: Last updated 2/2016

Company	Product	Description	Product Category
1B First Build	Chill hub Smart refrigerator control	Chill Hub Smart refrigerator and smart refrigerator control hub	Smart Appliance
Aclara	Customer Care Solutions	Unique content and analytics that improve the effectiveness of customer care and billing, enhances customer energy management and increases customer satisfaction by helping customers better understand and manage their bills	Energy Portal
ADT	ADT Pulse	The ADT Pulse® portal provides secure access so you can monitor and manage your home's energy and security via most web-enabled devices.	Smart Home Platform

So Many Opportunities with HEMS!



- Demand Response
- Optimizing Variable Use Pricing
- Water management
- Energy Storage
- Load shifting/Energy Balancing
- Green House Gas Emissions
- Integration with Home Energy Labeling
- Energy Efficiency...



Priorities for Energy Savings



HEMS Savings Estimates

HEMS Savings Estimates by End-Use

End-Use	Savings Range INFORMATION			Savings Range CONTROL		
	Low	Avg.	High	Low	Avg.	High
Space Heating	1%	8%	15%	1%	7%	13%
Space Cooling	1%	5%	9%	1%	9%	17%
Water Heating	1%	8%	15%	1%	8%	15%
Appliances	<1%	1%	1%	<1%	3%	6%
Plug Loads	<1%	2%	3%	<1%	3%	5%
Lighting	<1%	2%	3%	1%	2%	3%

For Reference:



Opportunities for Home Energy Management Systems (HEMS) in Advancing Residential Energy Efficiency Programs

August 2015



NEEP's Forthcoming Smart Energy Home Publications



1. HEMS Regional Market Transformation Strategy Report**
2. “Smarter” Home EM&V
 - a. Both technology and analytics
3. NYSERDA Smart Thermostat Market Characterization



**still hoping for a better title. Ideas?

Two Schools of Thought

1. This is a great opportunity that we need to push
2. There are benefits there that we can't let pass us by



Google news TODAY for “Smart Home”



6 ways Apple's new **smart home** app succeeds (and 5 ways it still ...

CNET - 18 hours ago

Apple was one of the first consumer-facing tech companies to commit to the **smart-home** industry, but it entered almost quietly. Rather than ...

Schlage Sense **Smart** Deadbolt now fully supports HomeKit with iOS ...

9 to 5 Mac - 21 hours ago

[View all](#)



Canary flexes its **smart-home** muscle with new camera - CNET

CNET - 22 hours ago

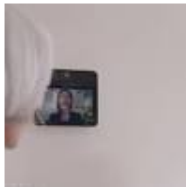
Canary's \$199 Flex security camera has a high-definition resolution, live streaming and a whole lot more. Read Less. Meet the Canary Flex. Read editors' take.



Smart Home Goes Mainstream Amidst Endemic Security Issues

Infosecurity Magazine - 17 hours ago

Smart home adoption has reached a tipping point, but the ecosystem remains woefully insecure due to users' failure to follow best practices.



Amazon's Alexa Fund leads \$5.6 million round for **smart home** ...

VentureBeat - 2 hours ago

Enabled by Wi-Fi, Nucleus lets you use voice or video in the **home** to ... Nucleus acquired competitor Insensi, maker of the Ily **smart** phone, for ...

Nucleus raises \$5.6M in Series A funding led by Amazon's Alexa fund

TechCrunch - 2 hours ago

[View all](#)



iDevices '**Smart Home** Essentials' kit is Apple HomeKit and Amazon ...

BetaNews - Sep 19, 2016

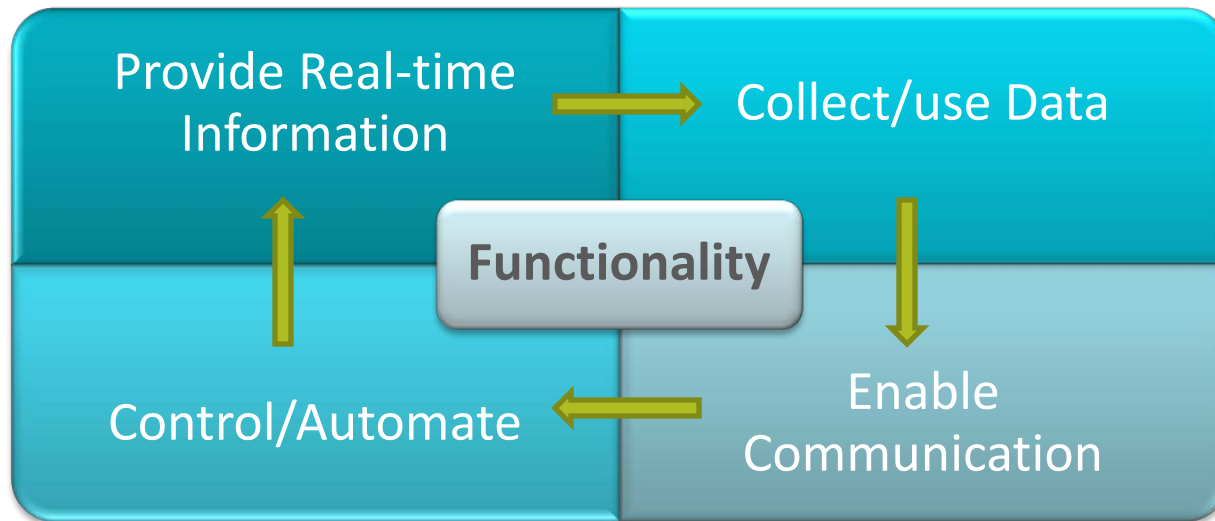
"The **Smart Home** Essentials kit was born from iDevices' vision that home ... The Essentials kit serves as a **smart home** foundation which users ...

iDevices **Smart Home** Essentials Kit bundles tech support, HomeKit ...

AppleInsider (press release) (blog) - Sep 19, 2016

Definitions: HEMS vs. Smart?

We needed more than what the WG Definition could give us.
“Smarts” systems monitor energy use and:



While HEMS can be any end use, for the focus of this report, we're focusing on the major household energy using systems: **HVAC, Water Heating, and Plug Loads***

What about smart lighting?

- Recap of yesterday's session
 - Customers are interested
 - Products are developing
 - Hints at potential energy savings
- Given:
 - unclear savings
 - higher costs
 - Constant standby power loads
 - Is it even worth it?

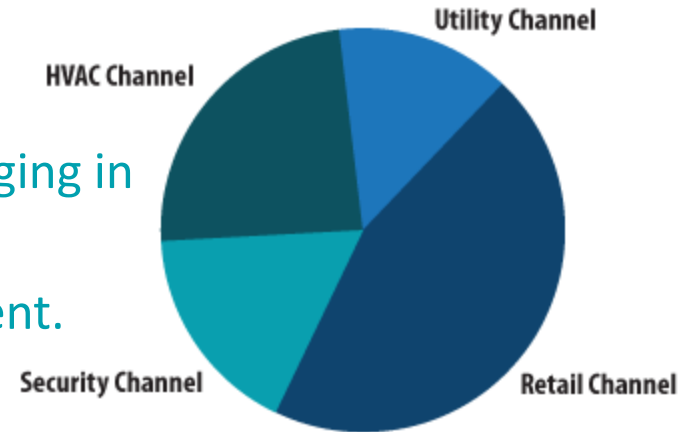


HEMS Market Barriers

- Key Program Barriers
 - Limited energy savings potential for all products except smart thermostats, which has un-reliable individual savings.
 - Smart energy products are difficult to evaluate**
 - Equity challenges—these are expensive, non-critical devices
- Consumer barriers:
 - Low consumer awareness
 - First Cost
 - Security concerns
 - Early days for many companies, customer support may be lacking
- Technology barriers:
 - Interoperability
- Grid Barriers:
 - AMI infrastructure is inconsistent throughout region

HEMS Market Opportunities

Share of Smart Thermostats Sold in U.S. in 2015



© Parks Associates

- Customer opportunities:
 - Interest in, and demand for, smart home technologies is increasing.
 - Voice-controlled interface devices are surging in popularity.
 - Home Security is a motivator for investment.
- Grid Opportunities:
 - Increased need to manage peak electricity use/residential demand response
 - Increase appetite for distributed energy resources
- Program Opportunities:
 - Program administrators already have appliance, lighting, and water heater rebates

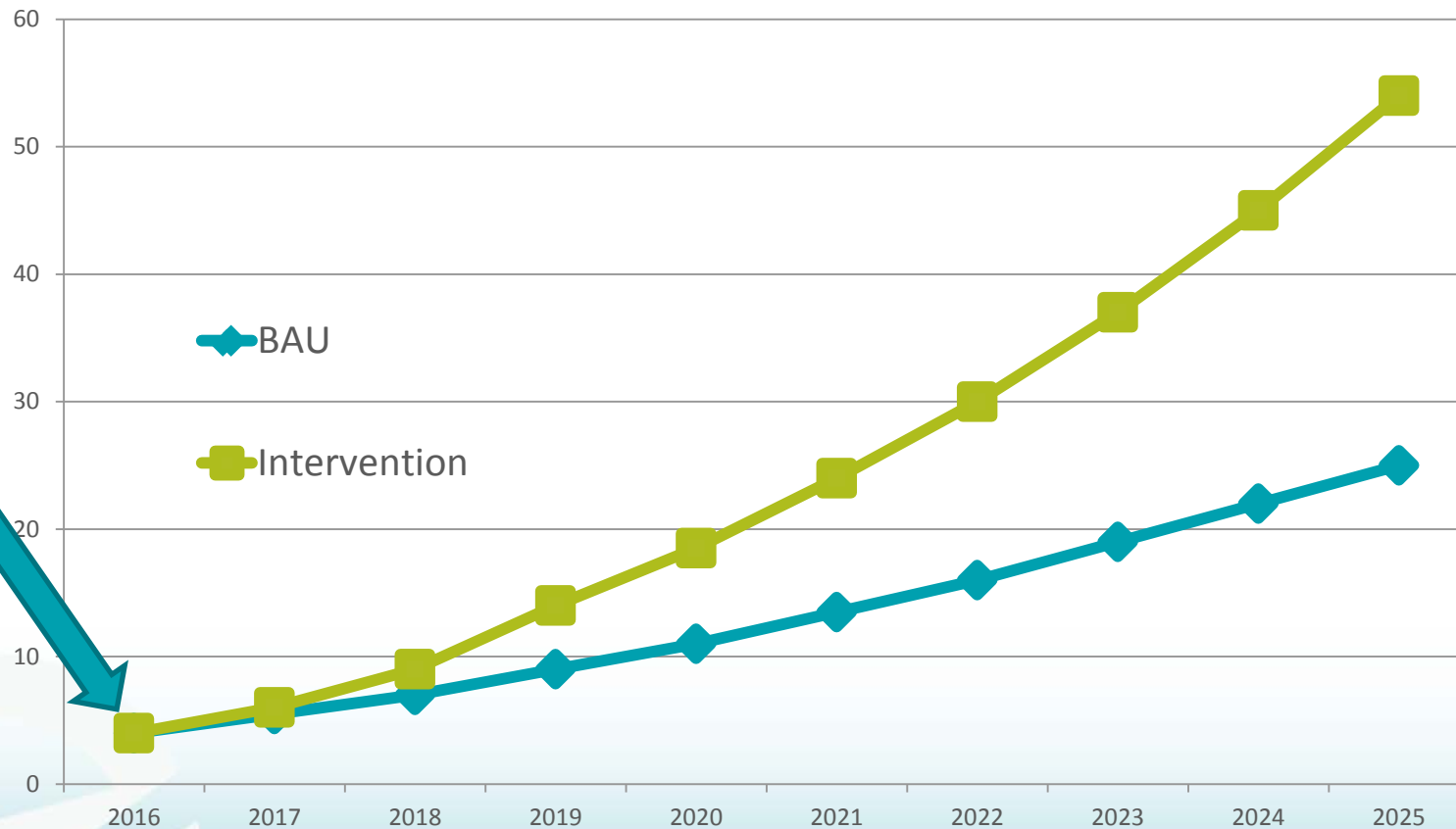
Regional Market Transformation GOAL

Truly smart homes will:

- Delight the resident and optimize the energy components of a home
- Regional goal: **BY 2030**, more than *50% of total homes* (75% New construction, 40% existing homes) in the Northeast and Mid-Atlantic have at least two “energy smart” major systems (HVAC, Water heating, plug loads). This means they:
 - optimize major system energy savings,
 - can optimize distributed energy resources,
 - can optimize devices for the grid (through time-of-use pricing, load shifting, demand response), and
 - can drive other home improvements through a feedback mechanism.

Market Transformation Curve

This is still being finalized, but roughly...



Strategies

1. (Home Performance) PAs : Leverage any/all HEMS infrastructure to drive home efficiency improvements.
 - Use the user interface and other existing smart devices to get users hooked on the feedback, motivated towards action.
2. ALL: Smarten Water Heating
 - This will result in the optimization of energy efficiency, demand responses, distributed energy resources, and variable use pricing
3. PAs and Regulators: Adjust savings expectations for smart thermostats, then put into permanent programs.
 - Consistent DR opportunities, but need to shift to aggregated savings across a service territory to evaluate.
 - Lean on ENERGY STAR process

More Strategies

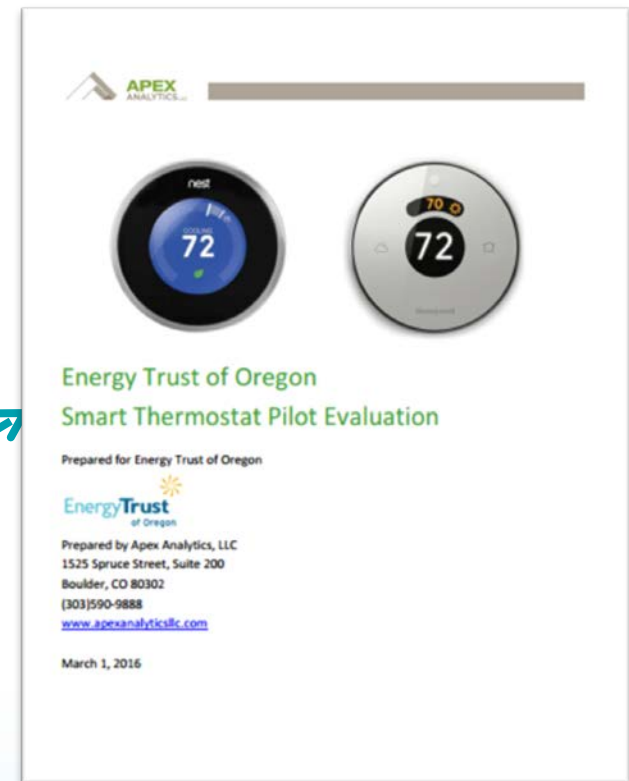
4. PAs (esp Utilities): Smart Appliances, water heaters, and lighting have DR/DER/TOU potential
 - don't lose opportunity to promote the smart versions of these products in existing programs
 - Look towards pilots to prove both energy and grid benefits
5. Efficiency stakeholders: Engage (seriously) with service providers in the IoT space, especially home security
 - These “untraditional” market actors are moving a LOT of products. Need to build partnerships, not try to complete

Even More Strategies

6. PAs: As HEMS move from early adopters to the real worlds, need to shift support away from only traditional monetary incentives to help build the penetration and user success of HEMS
 - Need to focus on building the complete turn-key customer service model
 - Smart Energy Audit: Helping with the installation, set up, ongoing energy advisor role for these products and systems
7. Efficiency Stakeholders: Investigate user friendly technologies, such as voice control
 - Huge opportunity to increase persistence of scenes and energy efficient settings through more fool-proof technologies.
 - Partner with players such as Amazon, Google, Apple
8. Policymakers/regulators/utilities: Promotion of TOU/Dynamic pricing

“Smarter” Home EM&V

- The homes are smarter AND/OR
- The evaluation, measurement, and verification is “smarter”**



**employing advanced analytics and tools

“Smarter” Home EM&V

What to expect from the brief?

- Clarity of concept
- Terminology discussion (Auto m&V, EM&V 2.0, etc)
- How to evaluate HEMS as widgets
 - Challenge of evaluating smart TSTATs
- How HEMS can be used as an evaluation tool
 - i.e. data collected by HEMS helps evaluate program
- Updates on the residential advanced analytics world to evaluate savings residential savings
- Recommendations

Questions

