



Northeast Energy Efficiency Partnerships

The Smart Energy Home: Strategies for the Region

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About NEEP

Mission

Accelerate energy efficiency as an essential part of demand-side solutions that enable a sustainable regional energy system

Approach

Overcome barriers and transform markets via ***Collaboration, Education and Enterprise***

Vision

Region embraces **next generation energy efficiency** as a core strategy to meet energy needs in a carbon-constrained world



One of six regional energy efficiency organizations (REEOs) funded by the US Department of Energy (US DOE) to link regions to US DOE guidance, products and programs

Background

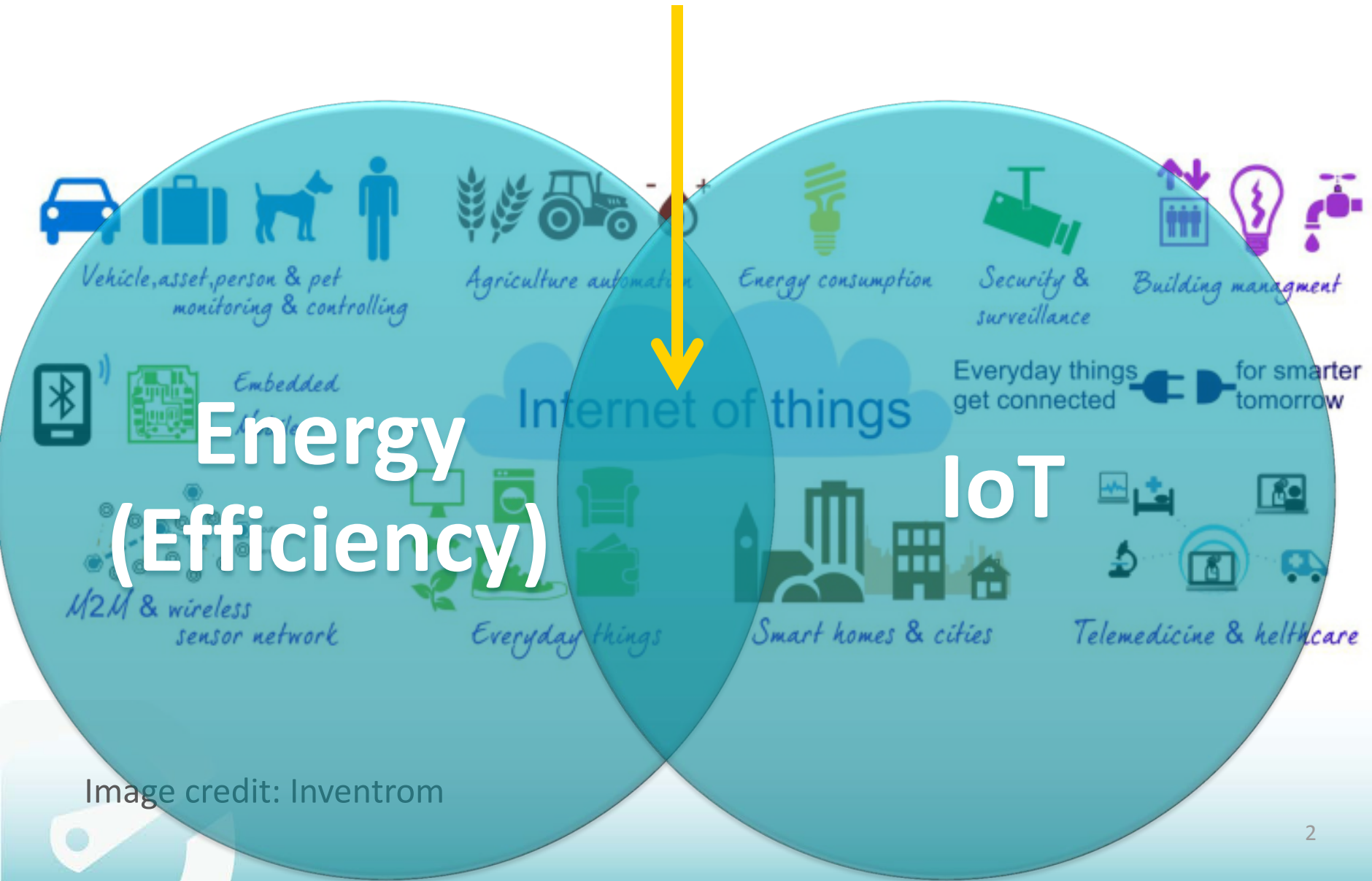
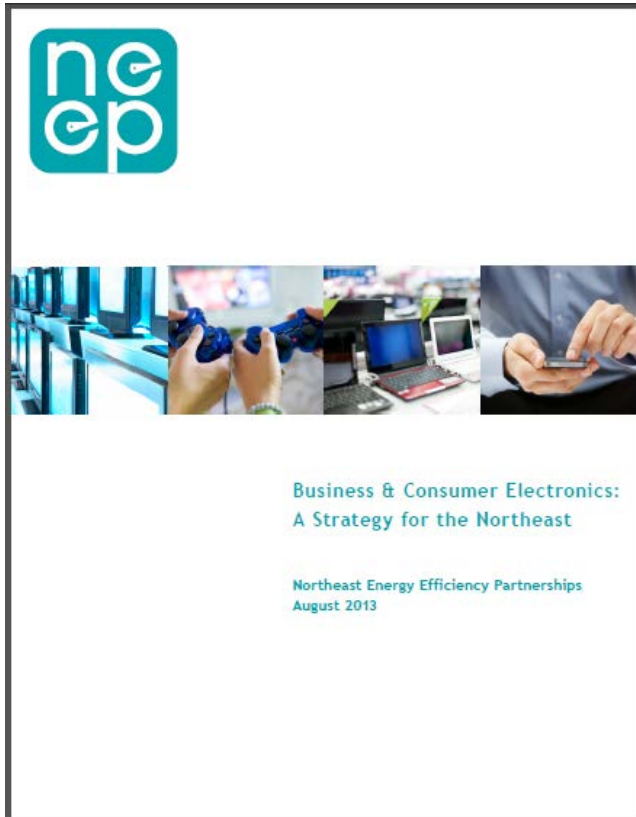


Image credit: Inventrom

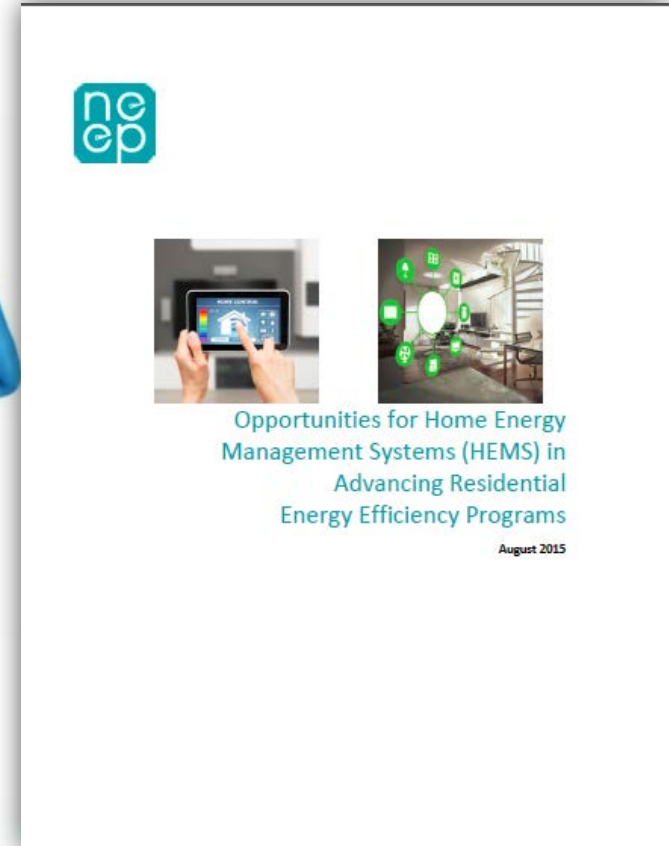
History in HEMS



2013



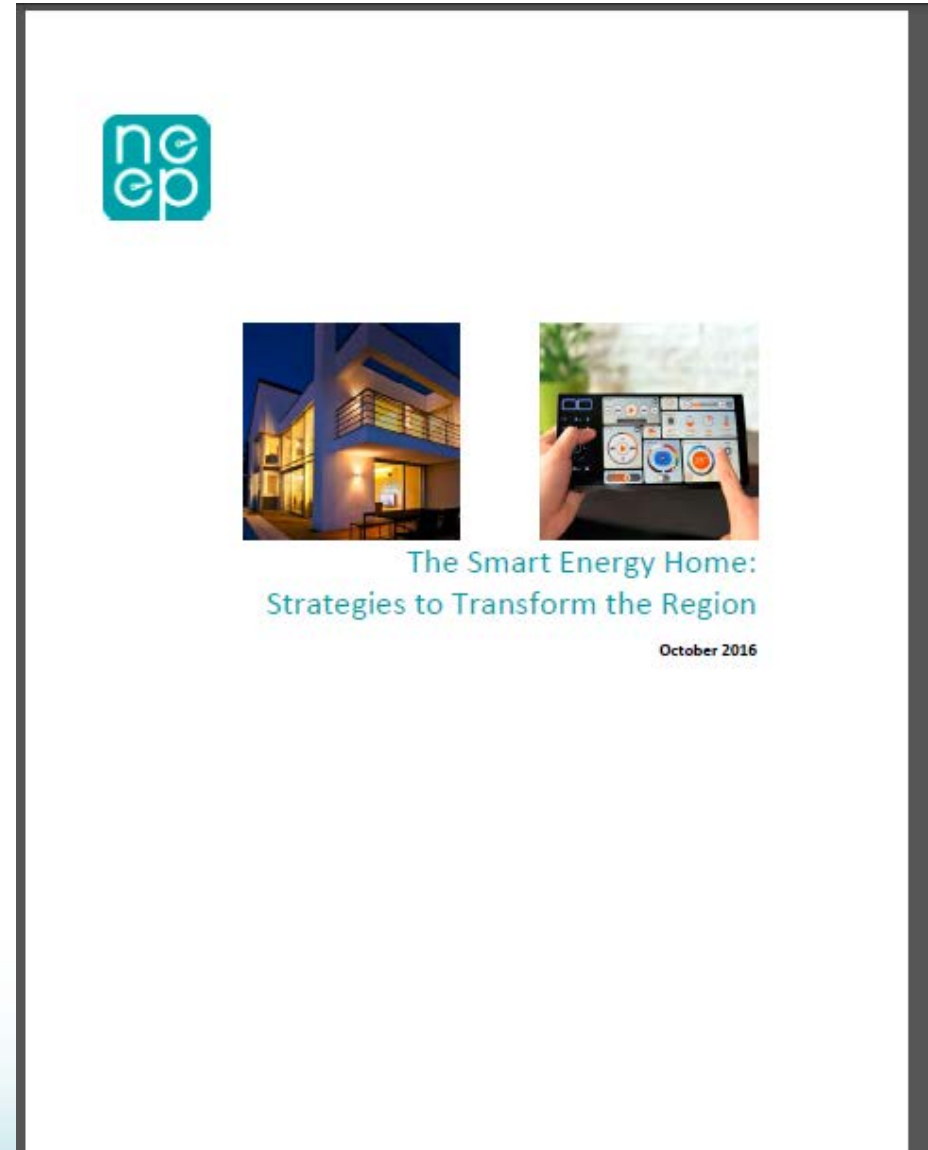
2014



2015

New Report!

- *The Smart Energy Home: Strategies to Transform the Region*
- Released in early October, 2016
- ~30 pages with short executive summary
- READ IT!





Northeast Energy Efficiency Partnerships

PUBLIC POLICY

- Connecticut
- Delaware
- District of Columbia
- Maine
- Maryland
- Massachusetts
- New Hampshire
- New Jersey
- New York
- Pennsylvania
- Rhode Island
- Vermont

💡 HIGH EFFICIENCY PRODUCTS

- Advanced Power Strips
- Advanced Rooftop Units
- Air Source Heat Pumps
- Appliance Efficiency Standards
- Commercial Advanced Lighting Controls (CALC)
- Commercial Lighting
- DesignLights Consortium
- Heat Pump Water Heaters
- Home Energy Management Systems
- Industrial Energy Efficiency
- Residential Lighting

🏢 ENERGY EFFICIENT BUILDINGS

- Energy Codes
- Energy Rating
- Multifamily Retrofits
- High Performance Communities
- High Performance Public Buildings
- High Performance Schools
- Zero Energy Buildings
- Green Real Estate Resources
- High Efficiency Street Lighting

📖 EM&V FORUM

- Forum Products
- Regional Energy Efficiency Database (REED)
- Model EM&V Methods Standardized Reporting Forms
- Repository of EM&V Studies, Reports, and Evaluations
- State EM&V Activities
- Regional & National EM&V
- EM&V Forum Leadership & Funders

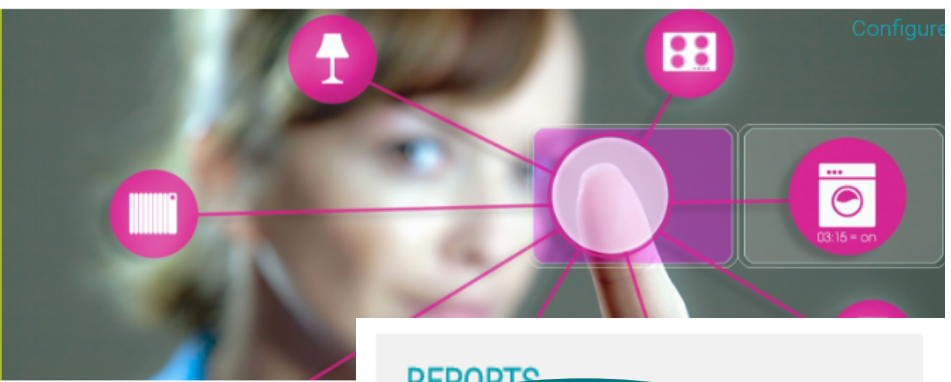
🏆 BUSINESS LEADERS

- Past Business Leaders



Northeast Energy Efficiency Partnerships

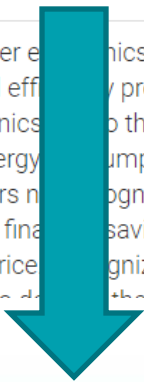
HOME ENERGY MANAGEMENT SYSTEMS



View Edit



Energy efficiency of consumer electronics creates some unique challenges. Many traditional efficiency program approaches are not easily transferable to electronics. Due to the rapidly changing technology, the shrinking energy consumption between efficiency and inefficient options, consumers are recognizing efficiency as a priority and a relatively small annual financial savings per efficient product compared to the purchase price. Recognizing the need for a solution, NEEP worked with its allies to develop the Regional Business and...



- REPORTS**
- The Smart Energy Home: Strategies to Transform the Region**
- Exploring the Nexus of E-Commerce and Energy Efficiency
- Opportunities for Home Energy Management Systems (HEMS) in Advancing Residential Energy Efficiency Programs
- [View More](#)





The Smart Energy Home: Strategies to Transform the Region

October 2016

Today's Agenda

- Technology and Market Characterization
- Key market barriers to accelerated adoption
- Market opportunities to leverage
- Long-Term Market Transformation Goal
- Strategies for success to reach the regional goal

Technology and Market Characterization: Report Highlights

Energy What is the Smart Home?

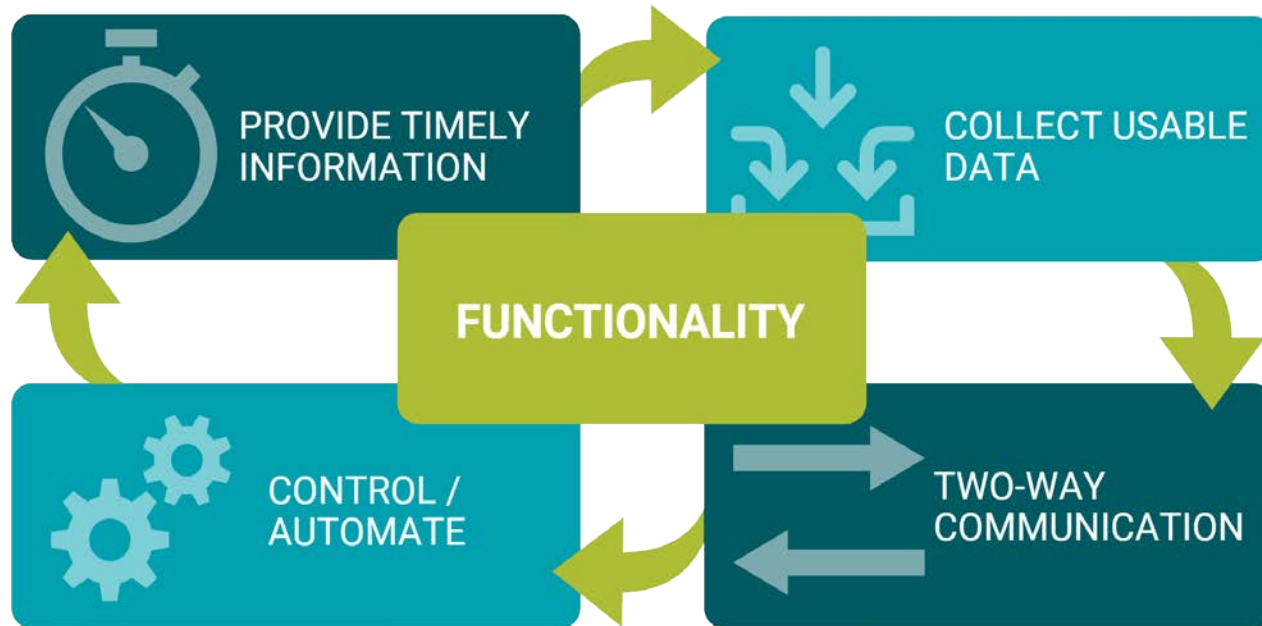


Home Energy Management Systems (HEMS):

- 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

Definitions: HEMS vs. Smart?

Going a step further, “smart” 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**

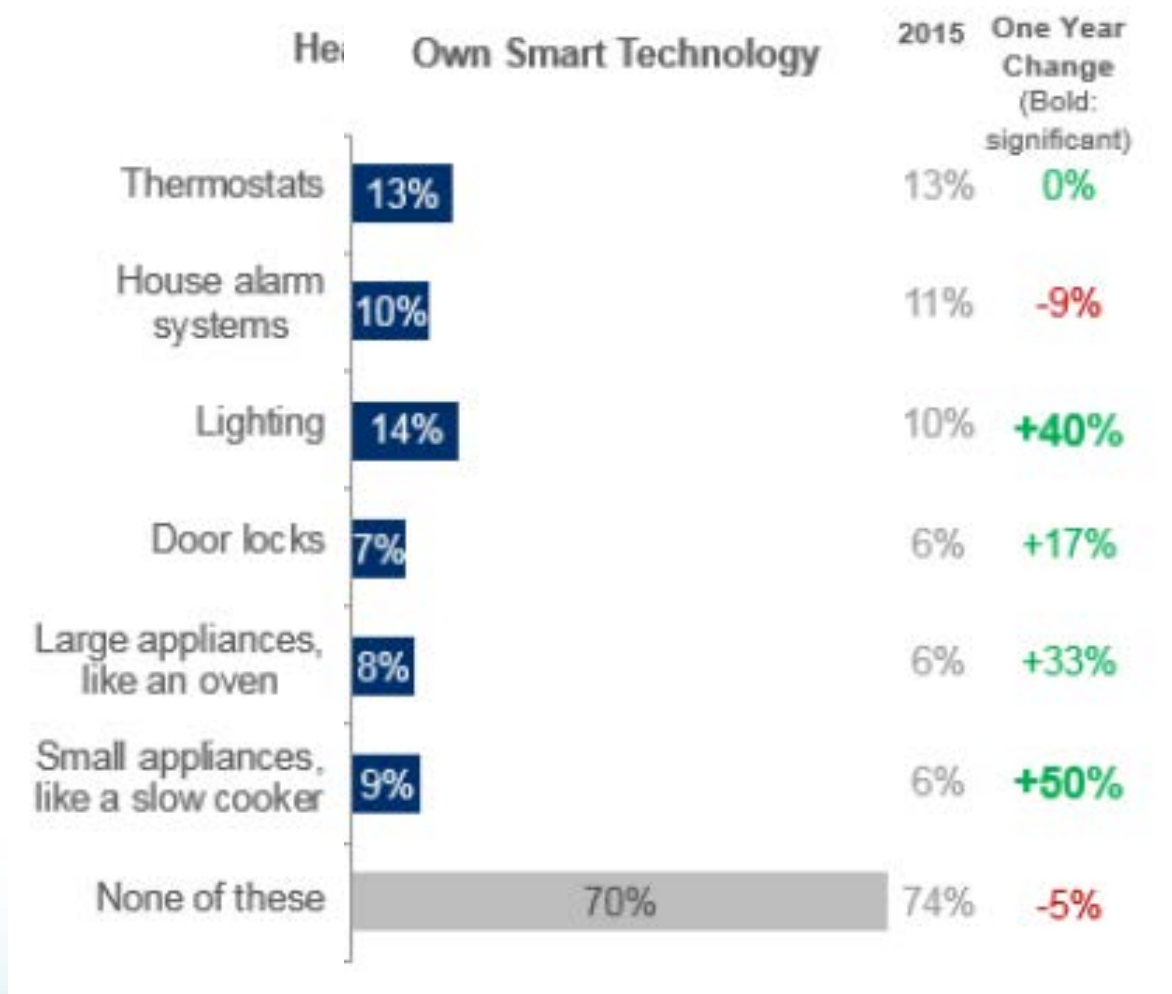
Standby Power



- Most smart products operate in an “always on” mode
 - ready to receive or send a signal
- .1-2W range on average
 - can be larger for major equipment
- The more energy intensive the equipment, the relative significance of standby load decreases
- BUT standby load for small wattage devices can be hard. Smart lamps may be a significant challenge:
 - For an 8.5W LED (60W equivalent), .5W is 47% energy increase, 1W is 94% energy increase, and 2W is 188% energy increase

Energy benefit from smart device > Standby power

Size and Scope of Smart Home Market

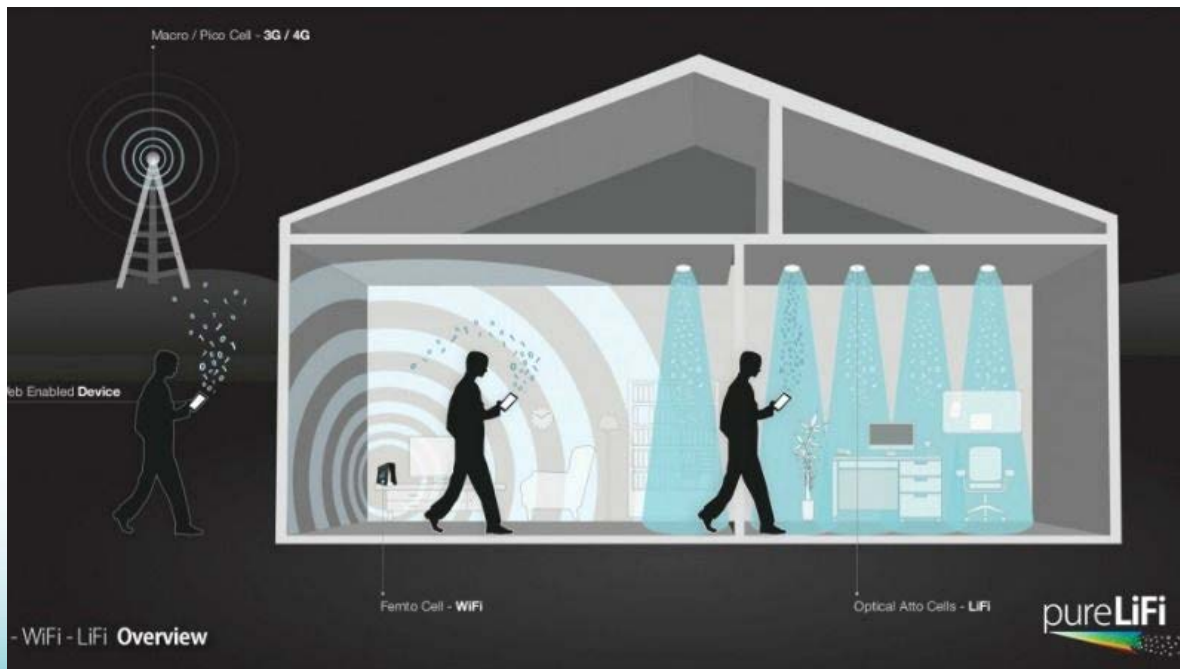


From: Sylvania Socket Survey

Recent Trends and Market Disruptors



- Touch-control devices
- Li-fi
- Hub-less smart lightbulbs, connect directly with a smart phone app
- Voice Recognition devices



Smart Energy Potential

Smart Product	Energy savings	Demand response	Load shifting	DER integration
Smart Thermostat	High	Medium	Medium	Low
Smart Water Heater	High	Medium	High	High
Smart Appliances: Inflexible timing (refrigerators, stoves, ovens, small appliances)	Medium	Medium	Medium	Medium
Smart Appliances: Flexible timing (clothes dryers, clothes washers, dishwashers)	Medium	High	High	Medium
Smart TV	Medium	Medium	Medium	Medium
Smart plug, outlet, or switch	Medium	Medium	Medium	Medium
Smart Hub	Medium	Medium	Medium	Medium
In-Home Display	Medium	Medium	Medium	Medium
Energy Portal	Medium	Medium	Medium	Medium
Smart Home Platform	Medium	Medium	High	High
Smart Lighting	Medium	Medium	Medium	Medium

Market Barriers and Opportunities

Programs

Barriers:

- Limited energy savings potential for all products except smart thermostats, which has unreliable individual savings
- Smart energy products are difficult to evaluate
- Equity challenges—these are expensive, non-critical devices

Opportunity:

- Program administrators already have appliance, lighting, and water heater rebates



Customer

Barriers:

- Low awareness
- Security concerns
- Device set up and ease-of use may not be ready for the mainstream
- Wi-Fi is a common protocol, but imperfect in application.



Opportunity:

- 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



Technology

Barriers:

- Interoperability

Opportunity:

- R&D continues, new and interesting devices entering the market



Grid

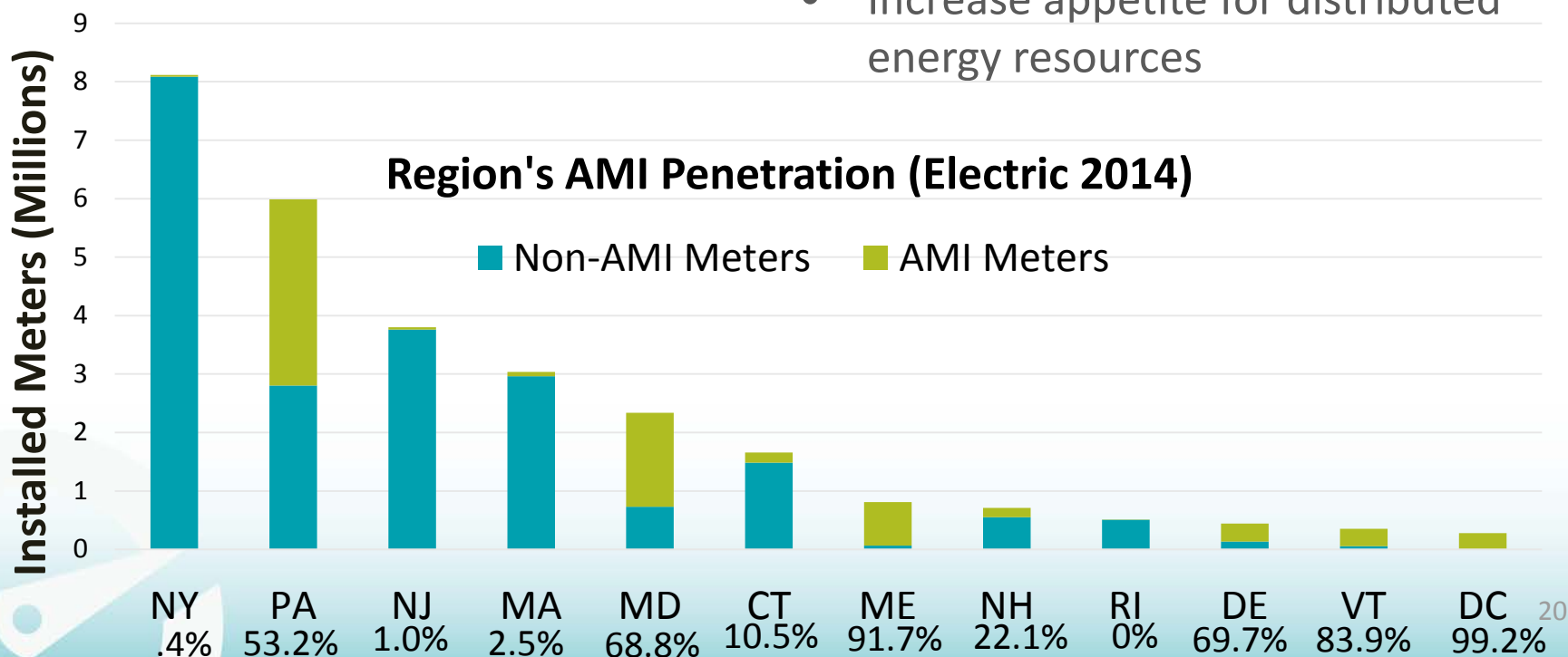


Barriers:

- AMI infrastructure is inconsistent throughout region

Opportunity:

- Increased need to manage peak electricity use/residential demand response
- Increase appetite for distributed energy resources



Market Transformation Goal

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% of new construction) in the Northeast and Mid-Atlantic have at least two “energy smart” major systems (HVAC, water heating, plug load). This means they:



Optimize major system energy savings



Can optimize distributed energy resources



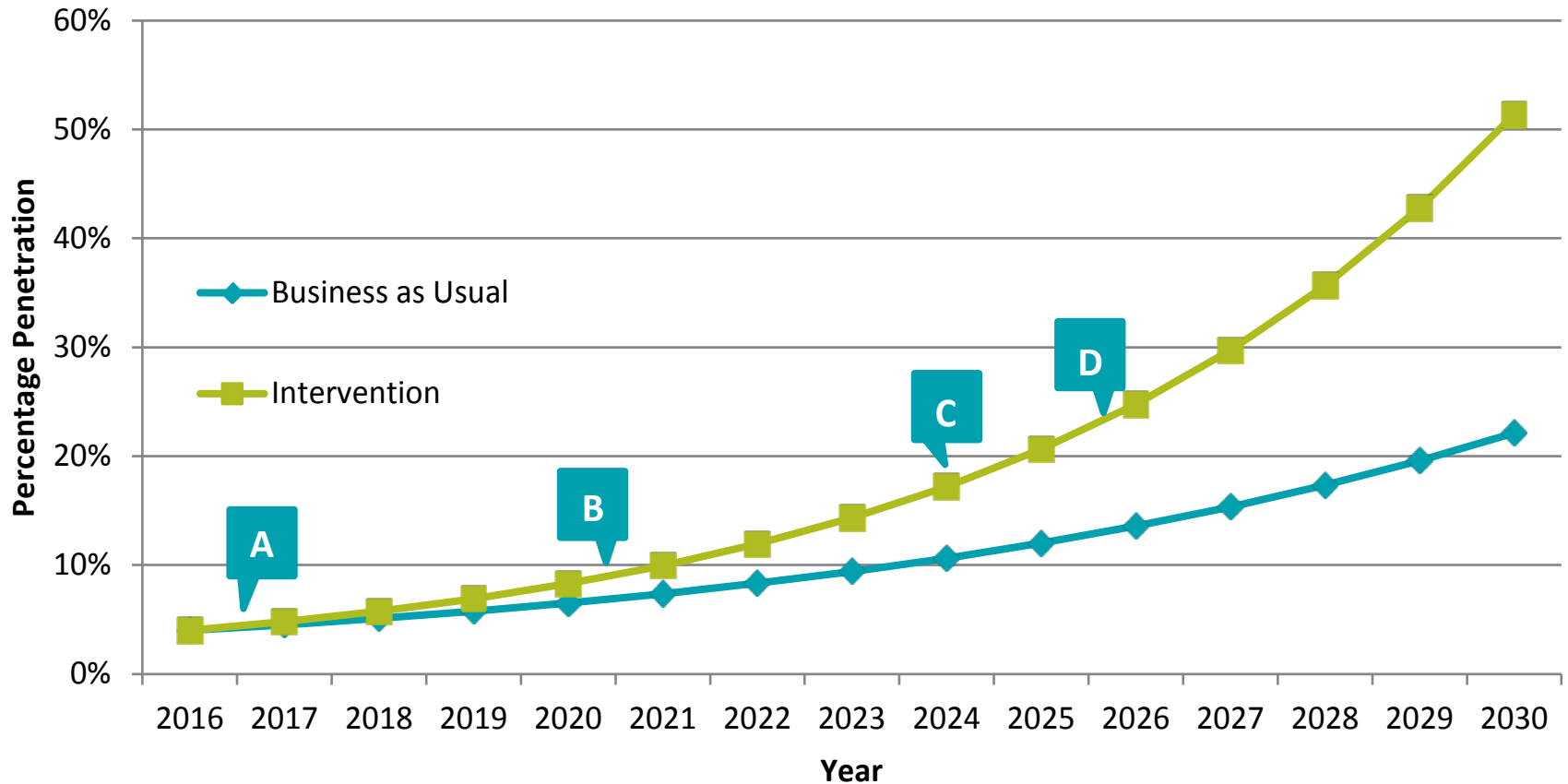
Can optimize devices for the grid (through time-of-use pricing, load shifting, demand response)



Can drive other home improvements through a feedback mechanism

Market Transformation Curve

HEMS Market Transformation Curve



Strategies for Success

Two Schools of Thought

1. Push: This is a great opportunity that we need to push, likely won't succeed without us
2. Pull: This market is moving and there are benefits that we don't want to let pass us by, pull ourselves onto it



1. Leverage any HEMS infrastructure to drive home efficiency improvements.



- Use the user interface to include information about home performance offerings and upgrades. Use comparative norms to motivate action.
- Market the right decision maker—smart device owners are not necessarily home improvement centric. Gender dynamics.
- HELMS = Home Energy Labeling Management Systems



2. Smarten water heating.

- Retrofits, incorporate into on-site visit program, turn existing water heaters into DR ready, smart water heaters.
- Integrate smart water heaters with other HEMS to optimize performance. HEMS could send price signals or follow an expected demand curve to optimize WH schedule, “vacation mode,” occupancy information
- Promote connected functionality in new water heating equipment, especially heat pump water heaters.



3. Adjust savings expectations for smart thermostats, then put into permanent programs

- The DR potential of smart thermostats is clear, but for energy savings, PAs and regulators should shift to an aggregated savings approach across a service territory to realistically evaluate savings
- Lean heavily on the ENERGY STAR process to get state-wide savings estimates



4. Smart appliances, water heaters, and lighting should be promoted in existing programs

- These smart products have smart energy home potential.
- PA should not lose the opportunity to promote the smart versions of these products in existing programs
- Look towards pilots to prove both energy and grid benefits



5. Develop strategies to seriously engage with service providers in the IoT space, especially home security.



- These “nontraditional” market actors are moving a lot of products,
- efficiency stakeholders need to strategically build partnerships with them, not try to compete.



6. PAs diversify support of HEMS from strictly monetary incentives to other support features and roles.

- Smart Energy Audit program: on-site visit to help with the installation and set-up of any hardware or software within the home.
- Programs play the role of ongoing energy advisor for smart systems and HEMS, could include a call support center.
- Partner! Retailers, HEMS vendors , help advance the development of some of the less obvious smart products, such as water heating and appliances. Shifting program intervention upstream?
- Add it to realtor engagement for efficiency
- PAs pilot new products and opportunities.



7. Investigate user friendly technologies, such as voice control.



- Huge opportunity exist to increase persistence of scenes and energy efficient settings through more fool-proof technologies. Efficiency stakeholders should partner with players such as Amazon, Google, Apple.

8. Promote dynamic energy pricing to help make all other strategies more impactful.



- Dynamic pricing will amplify the return on investment for most HEMS, and policymakers, regulators, and utilities should work to promote the adoption on dynamic pricing rate structures.

Call to action

- NEEP is actively seeking project funding to advance several of these strategies, specifically:
 - Smart Water Heating Initiative
 - HEMS to drive Home Performance
 - HEMS Working Group
- To get involved or talk further, contact Claire Miziolek, cmiziolek@neep.org



Conclusion

- Thank you to all LAC members and report reviewers!
- Read the report! Report, this slideshow, recorded webinar:
 - <http://neep.org/smart-energy-home-strategies-transform-region>
- Any Questions?





THANK YOU!

This is an ongoing initiative and we welcome your participation. To get involved, contact:

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Read the full Report: <http://neep.org/smart-energy-home-strategies-transform-region>