

# LIGHTING IMPACTS AND OTHER DRIVERS FOR RESIDENTIAL PROGRAM INNOVATION IN 2019-2021 AND BEYOND

**Presentation to the Energy Efficiency  
Advisory Council**

► September 20, 2017

# THE MASS SAVE® RESIDENTIAL PROGRAMS ARE A TREMENDOUS SUCCESS

<b>Top Ranking</b>	<ul style="list-style-type: none"><li>• MA ranked #1 on ACEEE's State EE Scorecard since 2011</li></ul>
<b>Awards</b>	<ul style="list-style-type: none"><li>• Numerous awards for products and new homes programs from ENERGY STAR®</li></ul>
<b>Benefits</b>	<ul style="list-style-type: none"><li>• \$1 billion in benefits on \$325 million in spending for 2016</li></ul>
<b>Savings</b>	<ul style="list-style-type: none"><li>• Saved 4 million lifetime MWh and 176 million lifetime therms in 2016</li></ul>
<b>Assessments</b>	<ul style="list-style-type: none"><li>• Provided 348,572 full Home Energy Assessments/audits in 2013-2016</li></ul>
<b>Market Transformation</b>	<ul style="list-style-type: none"><li>• Major role in transforming the lighting market</li></ul>

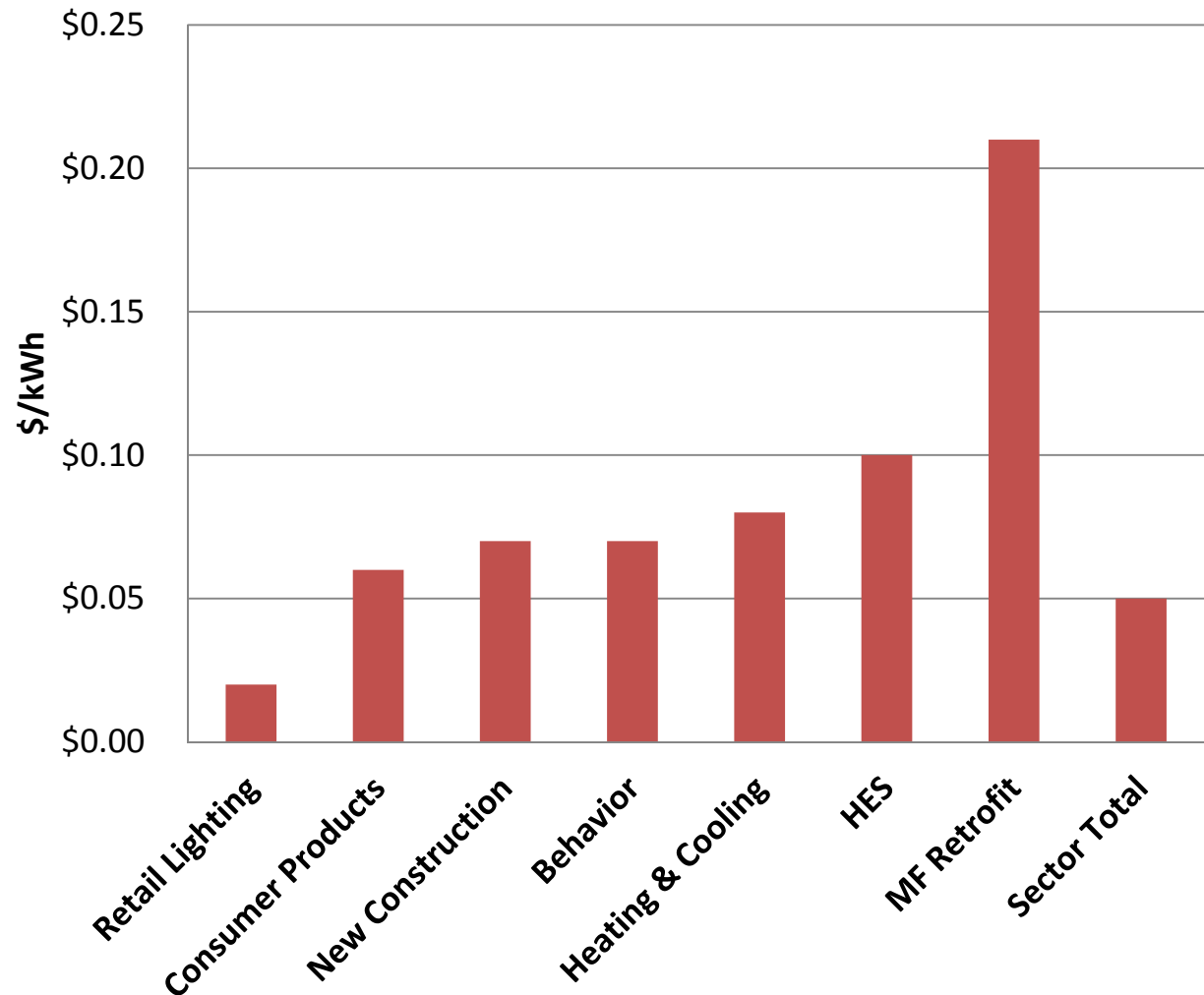
# LIGHTING HAS BEEN A KEY FACTOR IN RESIDENTIAL PROGRAM SUCCESS

- ▶ **Retail lighting program provided incentives for more than 30 million units in 2013-2016**
- ▶ **Promoted to customers in HES and multi-family marketing**
- ▶ **Comparatively inexpensive (next slide)**
- ▶ **Increasing lighting standards and introduction of LED technology dramatically accelerated transformation of lighting market**



# RESIDENTIAL LIFETIME COST TO DELIVER BY ELECTRIC INITIATIVE 2016

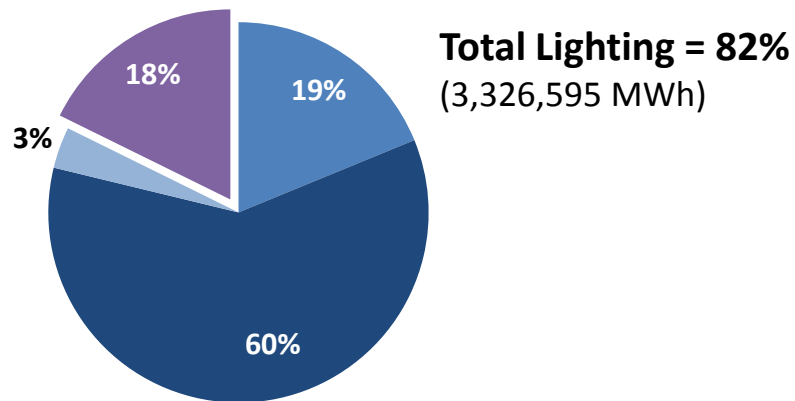
- ▶ At \$0.02/kWh, the retail lighting initiative has the lowest cost to deliver lifetime savings of any residential electric initiative
- ▶ The low delivery cost at the sector level (\$0.05/kWh) is largely the result of this



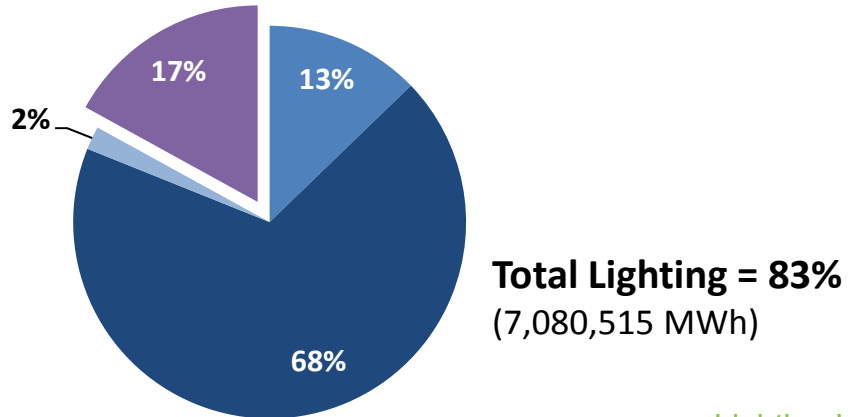
# PERCENT OF ELECTRIC SAVINGS FROM LIGHTING

## Residential Lifetime Savings (MWh)

### 2016 Evaluated



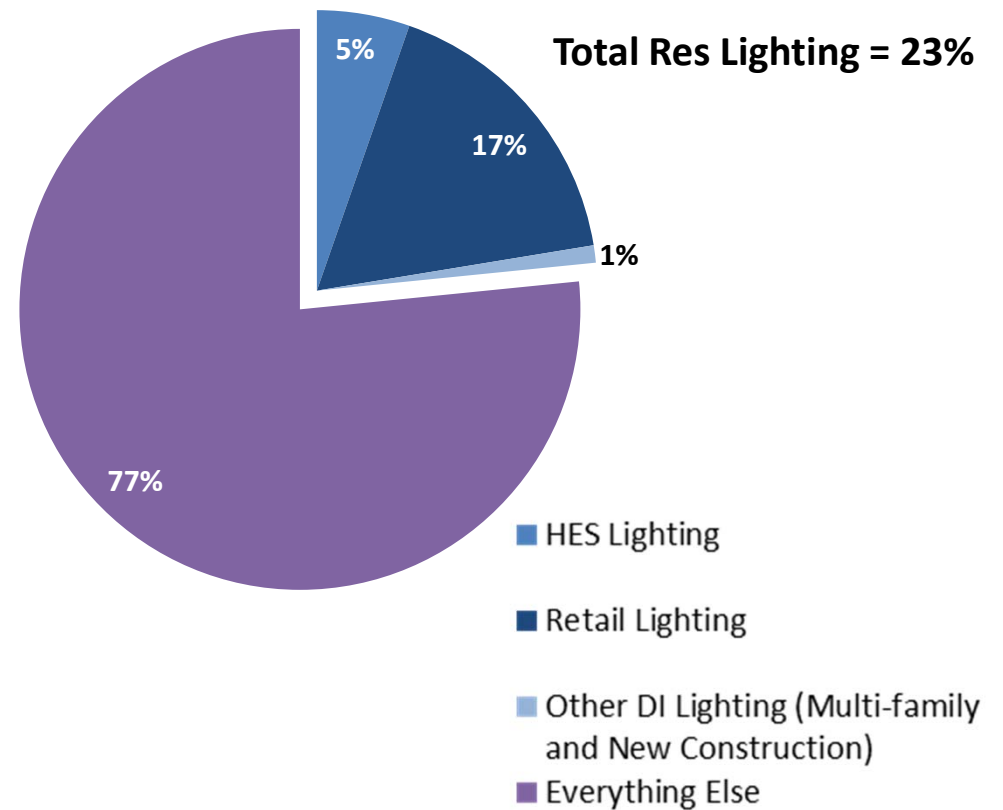
### 2017-2018 Planned



[www.ma-eeac.org](http://www.ma-eeac.org)

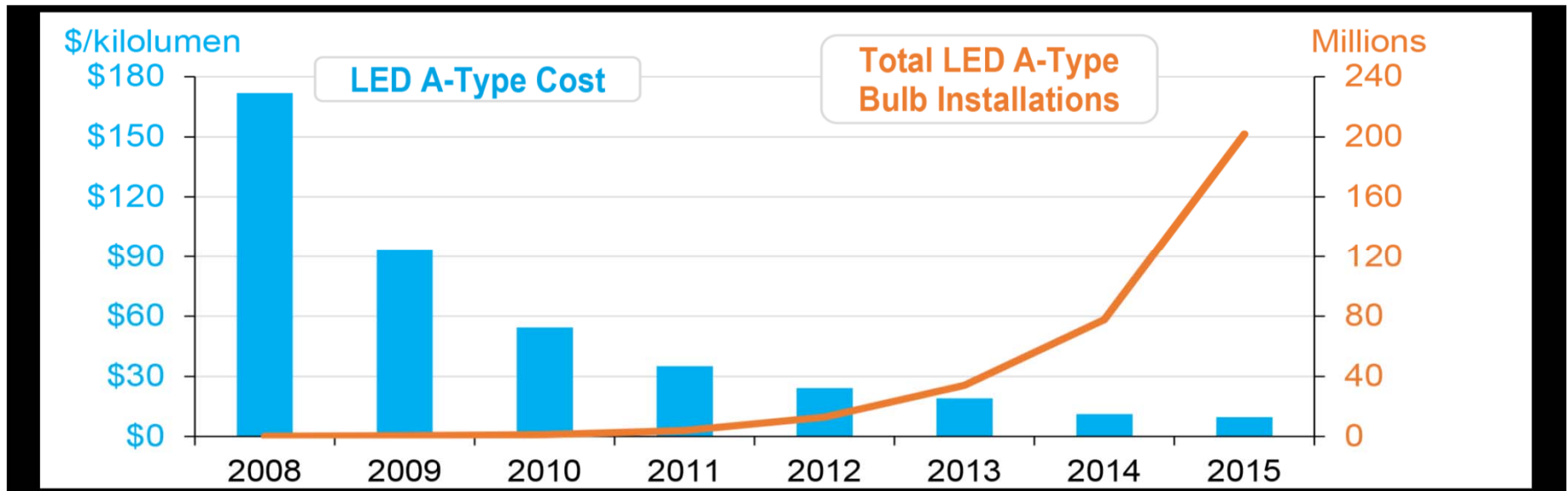
## Portfolio Lifetime Savings (MWh)

### 2016 Evaluated



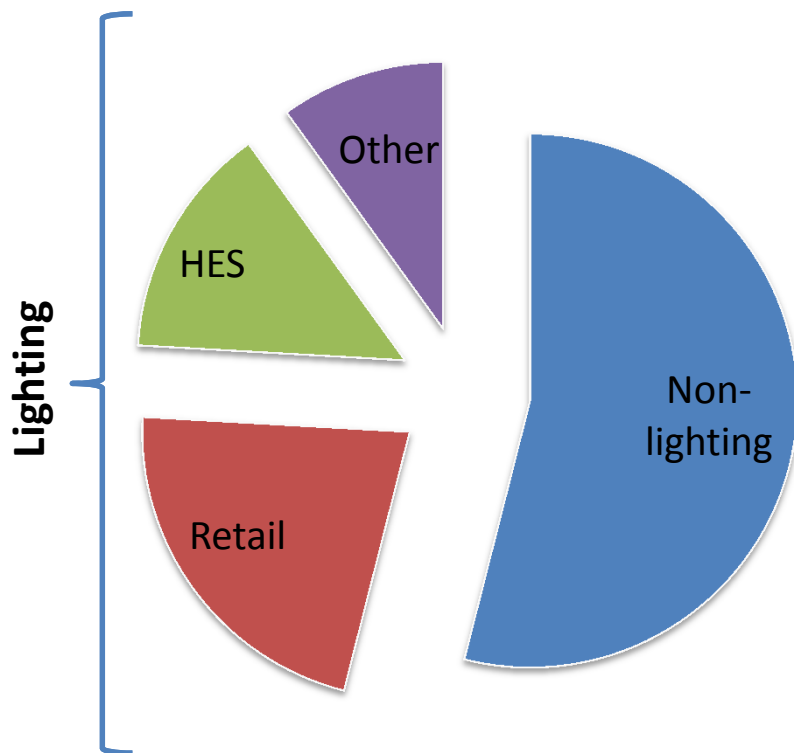
# RISING BASELINES ARE ERODING THE PAs' ABILITY TO CLAIM RESIDENTIAL LIGHTING SAVINGS

- ▶ Most of current in-place residential lighting is already efficient
  - 51% in 2016
  - 12% LED saturation
- ▶ Rapid commercialization of LED technology
- ▶ Federal standards have increased



# RESIDENTIAL SECTOR LIGHTING SPENDING IN 2016

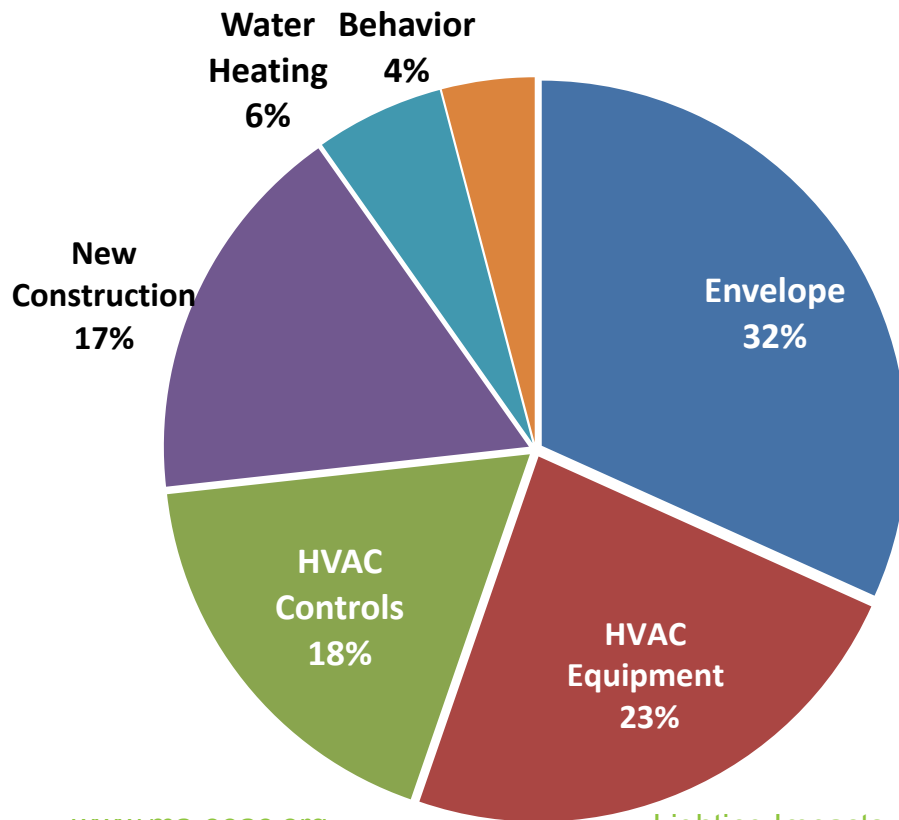
## Lighting vs. Non-lighting Residential Initiative Spending (2016)



- ▶ **Lighting spending was \$72 million in 2016 (incentive costs only--include direct labor)**
  - Unable to isolate some lighting-related costs (e.g., marketing)
- ▶ **33% of electric residential sector spending**
- ▶ **13% of total electric portfolio spending**

# RESIDENTIAL GAS PROGRAM SAVINGS WILL NEED TO BE FURTHER ASSESSED AS WELL

2018 Planned Lifetime Gas Savings  
(Eversource and National Grid)



- ▶ No single source of savings comparable to lighting
- ▶ Expect negligible market and regulatory impacts on savings in 2019-2021
- ▶ Lighting loss could also affect gas programs and savings given integrated program delivery models



# BEYOND SAVINGS: PROGRAM DESIGN IMPACTS OF NO LIGHTING



## Impact to retail supply chain?

- \$34 million in incentive costs in 2016



## Impact to customer?

- What is the significance of no cost lighting as a driver of HES customer participation?



## Impact to contractor?

- 1.4 million bulbs installed in electric audits in 2016; 40 bulbs avg. per audit
- Lighting is 73% of electric audit direct install (DI) incentive (includes labor but not audit fees) costs (\$385 electric DI/ \$527 all DI)



## Impact to multi-family retrofit?

- See Consultants' July EEAC presentation

# NOTE ON LIGHTING SAVINGS ASSUMPTIONS

- ▶ **PAs and Consultants are in agreement that impacts on lighting in 2019-2021 will be dramatic**
  - It is unlikely that claimable lighting savings will completely zero out starting in 2019
    - EM&V research indicates that certain parts of the market will likely still need support after 2018
  - For purposes of discussion related to program design only we assume that lighting savings will essentially be zero in 2019-2021 to focus discussion on program design issues and a post- (or negligible) claimable lighting savings future
- ▶ **The actual timeline and level of savings decrease will be time consuming and necessarily speculative and will need to be undertaken in coming months as savings goals are set**

# RESIDENTIAL PROGRAMS ARE AT A TURNING POINT



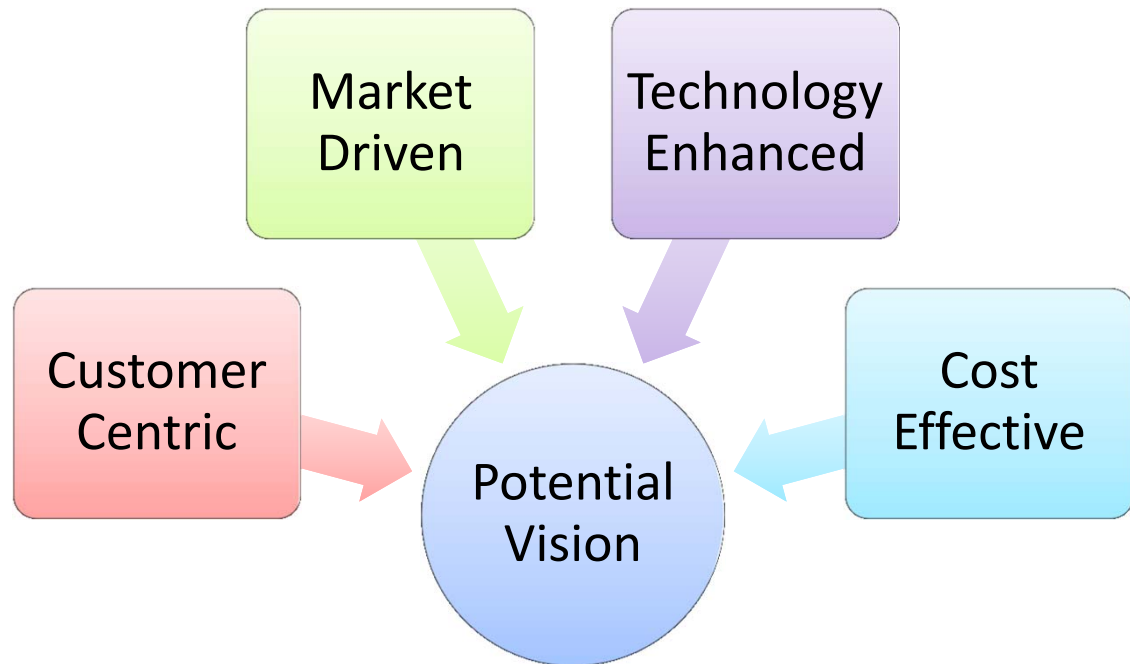
OR

?



# OTHER FACTORS (BEYOND LIGHTING) DRIVING TIMELINESS FOR INNOVATION

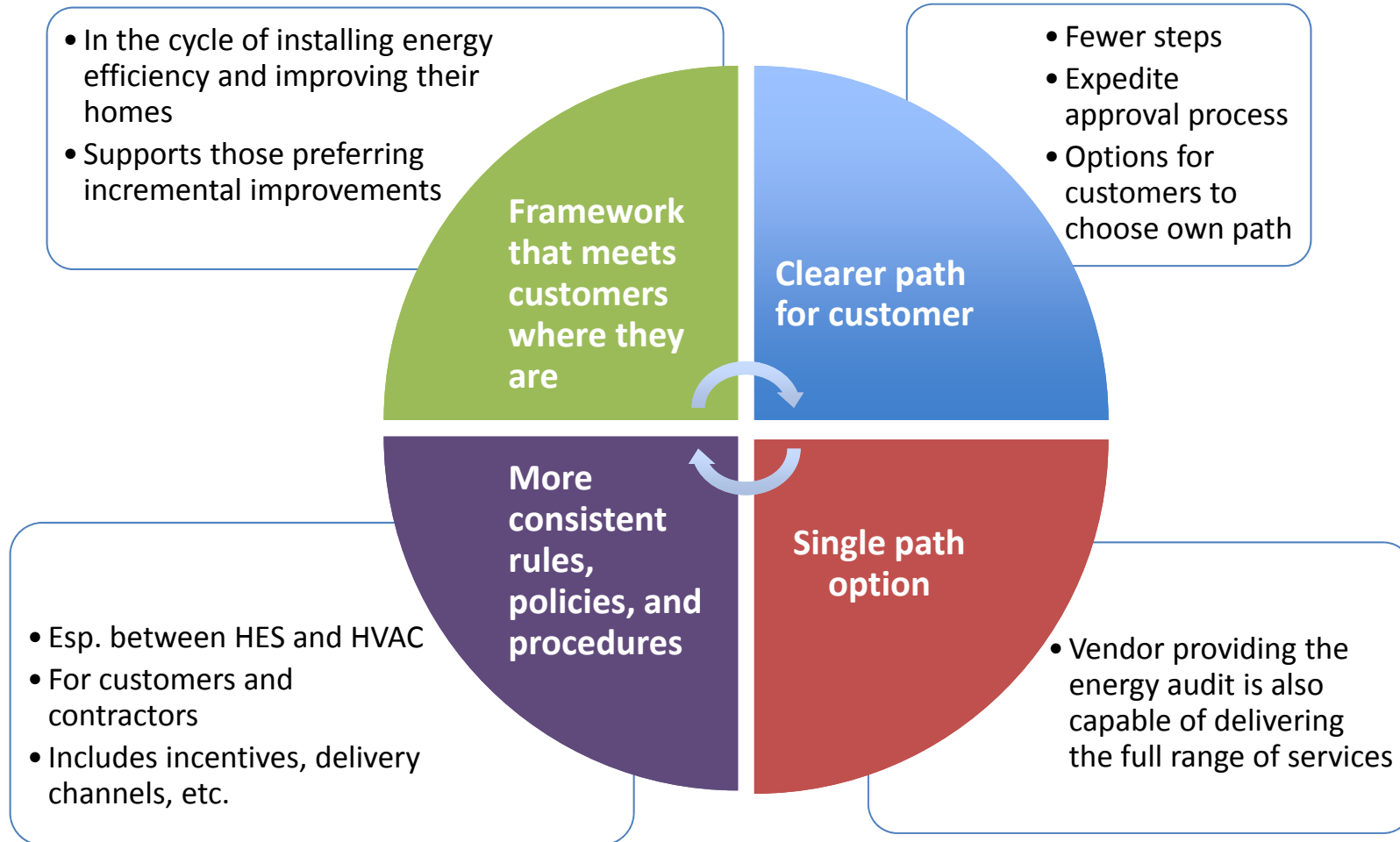
- ▶ **Need for broader approaches to energy conservation and management**
- ▶ **Evolving customer approaches to capture energy efficiency in whole buildings**
- ▶ **Emergence of a technology-driven consumer marketplace**



# JOINT GOALS/DESIRED OUTCOMES FOR MA RESIDENTIAL PROGRAMS

- ▶ ***While meeting the Green Communities Act mandates to achieve all cost effective energy efficiency and demand reduction:***
  - Build off existing infrastructure of service providers where possible
  - Engage businesses and service providers across the supply chain in ways that address their value proposition, combining direct delivery of services with business to business relationships
  - Engage customers via multiple channels and across all home energy related transactions and be responsive to their desires and value proposition
  - Enable customers to understand, take control, and optimize their own energy use
  - Create a technology-enhanced engagement experience for customers and business partners
  - Maintain Massachusetts' #1 ACEEE ranking for energy efficiency

# EVOLUTION OF WHOLE BUILDING APPROACHES



# NEW MEASURES/STRATEGIES: FUEL SWITCHING

- ▶ Broadly defined, and subject to DPU approval, could include switching from unregulated to regulated fuels:
  - Strategic electrification
  - Oil and propane conversions to natural gas
  - Replacement and displacement opportunities



## Heat pumps

- Displace propane and maybe fuel oil
- Possible full replacement opportunities for furnaces
- Need to consider summer and winter peak impacts for both electric and gas



## Heat pump water heaters

- Replace propane and oil domestic hot water



## All electric package option for new construction



# NEW MEASURES/STRATEGIES: ACTIVE DEMAND MANAGEMENT

## ▶ Wi-Fi thermostats

- Focus on cooling: Central AC and heat pumps
- Apply lessons learned to date from in-field PA demos and in-field programs across the country



## ▶ Control of other loads

- Water heating, pool pumps, dehumidifiers and dryers
- Promotion of demand enabled HVAC and appliances



## ▶ Storage and electric vehicles

- Significant public and private investment in development of battery storage for active demand management purposes
- Electric vehicles represent a new load that is growing quickly



# TECHNOLOGY PLATFORMS AND INTERFACE MODERNIZATION

## ► Potential benefits:

- improve consistency in project and pipeline tracking
- ease customer access by to user-specific data and information
- supply more self-service options to all end users
- support targeted marketing and outreach
- reduce administrative burden and costs

## ► Development already underway at Eversource and National Grid

- How can all customers benefit?
- How can experience be consistent?

### **Tennessee Valley Authority Results in 1<sup>st</sup> Year:**

83% decrease in time spent on call center intake

80% decrease in incomplete applications received

25% decrease in time spent on assessments in the home

76% decrease in admin processing time

# MEASURE AND END USE-SPECIFIC IMPROVEMENT OPPORTUNITIES

- ▶ **What challenges and opportunities exist within each that could be addressed in a revised program model? What innovations could go farther to remove silos?**
  - Heating and cooling equipment
  - New construction
  - Consumer products/appliances
  - Lighting
  - Behavior
  - Underserved customers (renter, moderate income, other including HEAT Loans)
- ▶ **To be addressed more fully at 10/24 workshop and in supporting briefing materials**

# SCHEDULE OF RES RELATED WORKSHOPS

Workshop Sector/#	Residential #1	Residential #2	Residential #3	Cross-Cutting Issues
Workshop Date	<u>26-Sep</u>	<u>24-Oct</u>	<u>5-Dec</u>	<u>January/February</u>
Main Topic	<b>New Approaches in the Face of Rising Baselines and Other Trends: Challenge and Innovative Options</b>	<b>Advancing/Enhancing Existing Initiatives, Approaches, &amp; Measures</b>	<b>New Approaches in the Face of Rising Baselines and Other Trends: Challenge and Innovative Options</b>	<b>Drill Down on Cross-Cutting Issues</b>
Subtopic	<b>Potential Innovative Options to Explore in Residential:</b>	<b>Potential Enhancement Opportunities in Products and Service Delivery:</b>	<b>Potential Innovative Options to Explore in Residential:</b>	<b>Potential Cross-Cutting Topics</b>
Discussion	Whole Home/Building Approaches	Heating & Cooling Equipment	Whole Home/Building Approaches	Data Collection & Management
	New Measures/Strategies: Renewable Heating/Fuel Switching	Serving Underserved Populations	New Measures/Strategies: Renewable Heating/Fuel Switching	Active Demand Management
	New Measures/Strategies: Active Demand Management, Storage, Electric Vehicles, & Solar	Retail Lighting & Consumer Products	New Measures/Strategies: Active Demand Management, Storage, Electric Vehicles, & Solar	Multifamily
	Data-Driven Customer Acquisition and Engagement Strategies	Behavior Programs	Data-Driven Customer Acquisition and Engagement Strategies	
		New Construction		
			Low Income Programs	

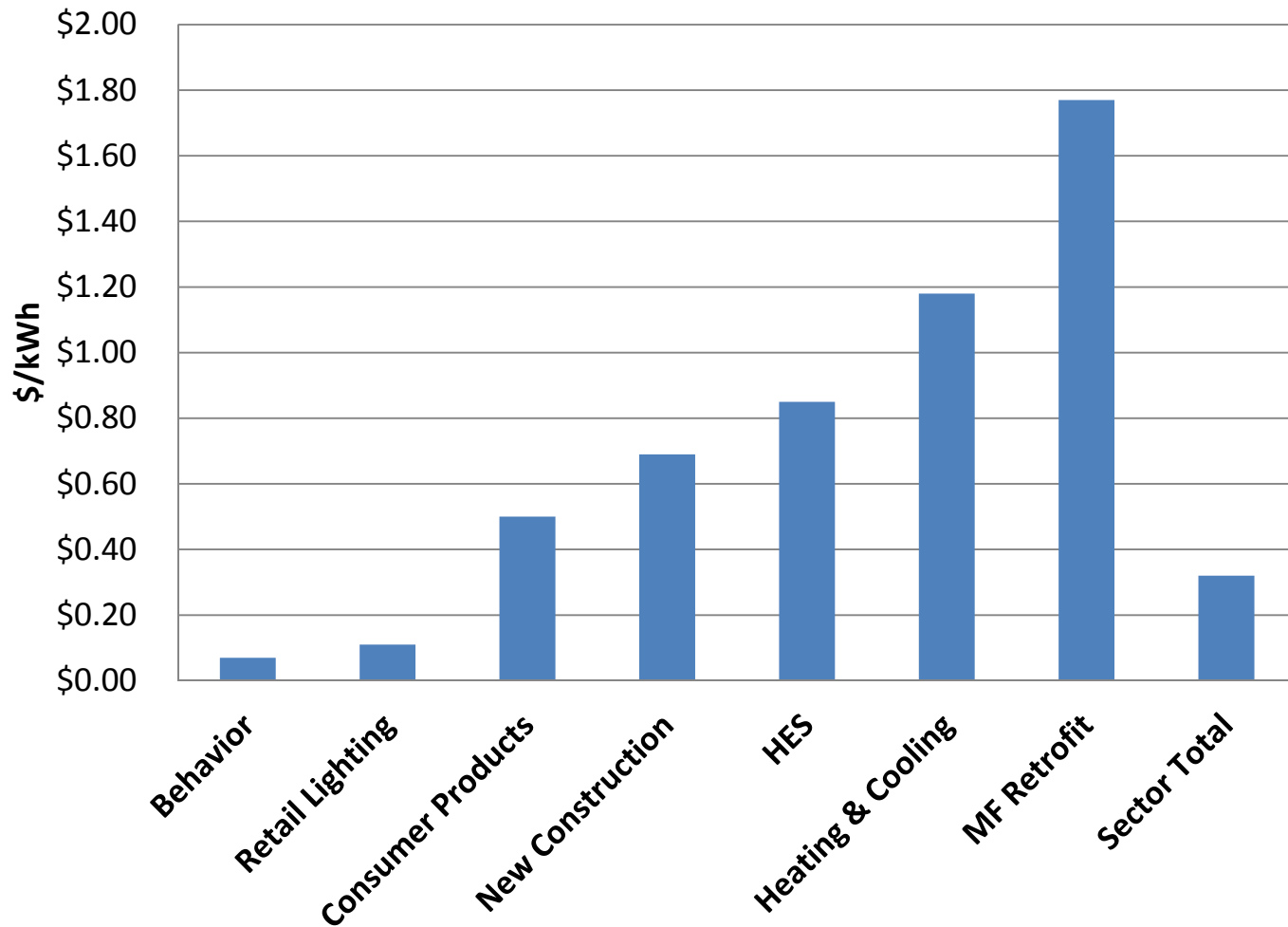
# QUESTIONS AND DISCUSSION



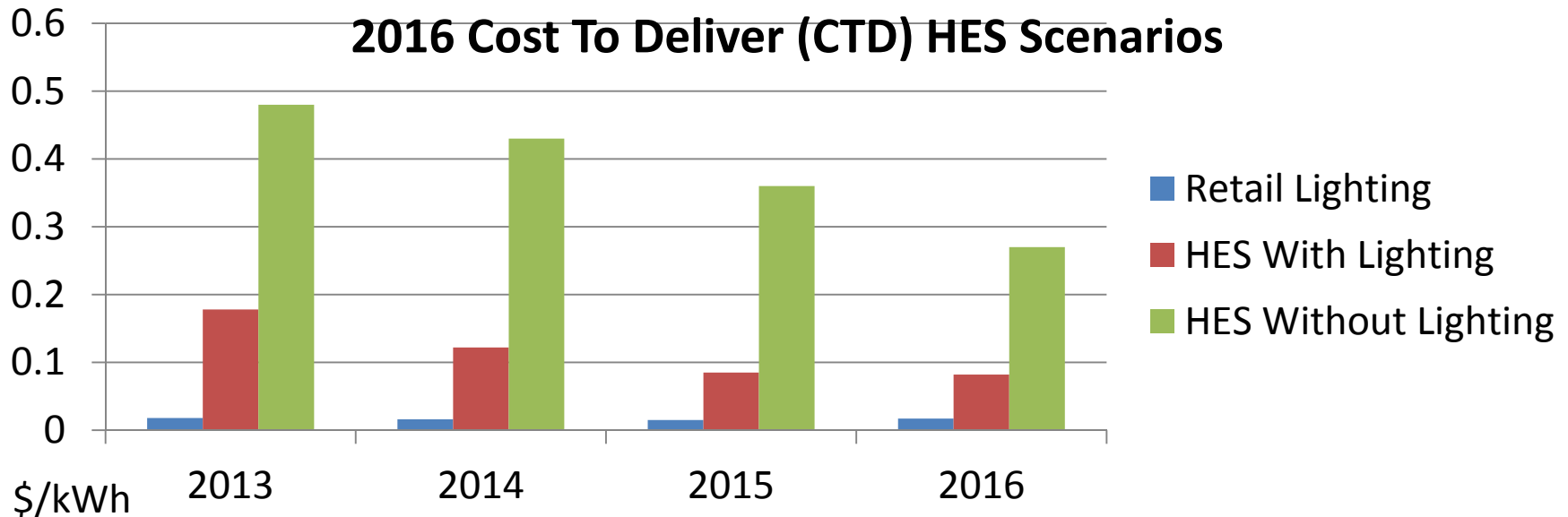
# EXTRA RESOURCE SLIDES



# RESIDENTIAL ANNUAL COST TO DELIVER BY ELECTRIC INITIATIVE 2016



# LIGHTING IMPACT ON COST TO DELIVER KWH SAVINGS



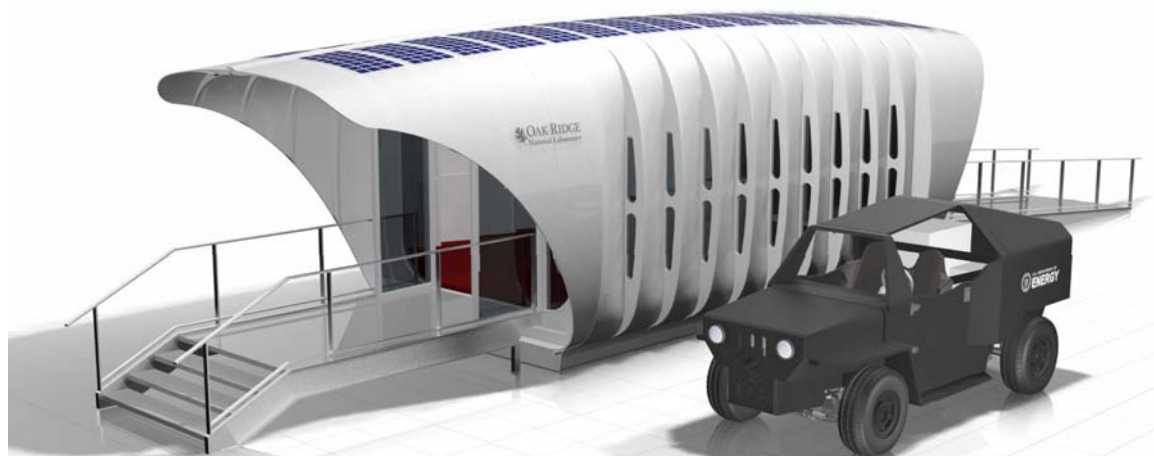
- The HES CTD electric savings would increase 317% from \$0.082/kWh to \$0.27/kWh if lighting were eliminated from 2016 results
- Residential sector CTD would increase from \$0.05/kWh to \$0.17/kWh
- Portfolio impacts are much less increasing CTD by less \$0.005/kWh
- HES cost to deliver could increase further if other direct install measures were eliminated

# BROADER APPROACHES TO ENERGY EFFICIENCY

- **Policymaker and consumer attitudes, supported by new products and services, are driving new ways to address energy management**

## DELIVERING INNOVATION

Additive Manufacturing Integrated Energy (AMIE) Demonstration Project  
Integrating how we generate, use, and store energy.



Example: ORNL's AMIE demonstration project

<http://web.ornl.gov/sci/eere/amie/>

## Trending Ideas

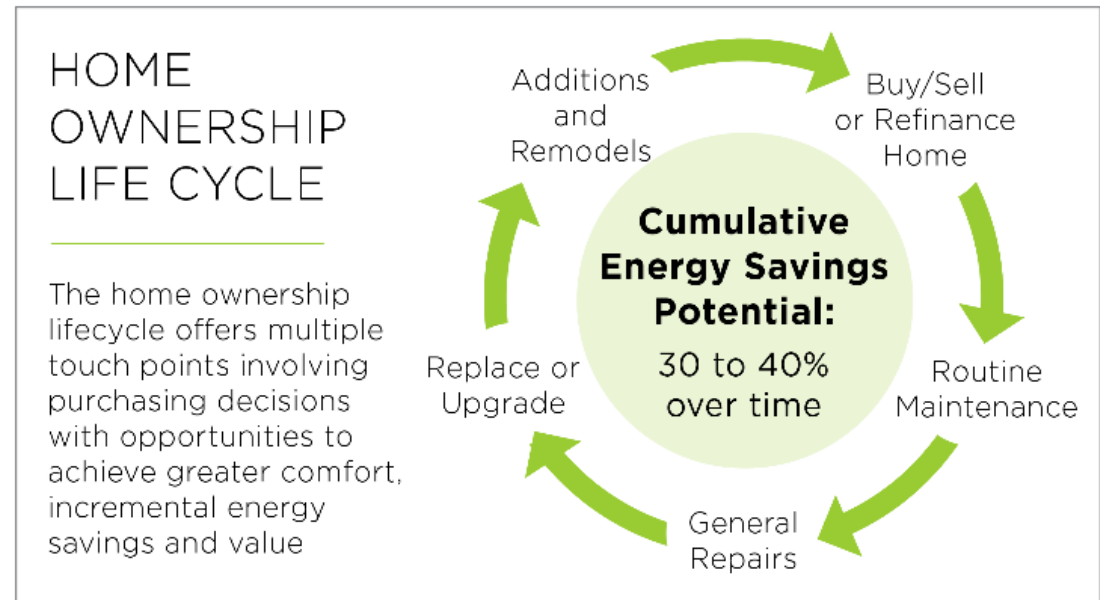
- ◆ Beneficial Fuel Switching ◆ Active Demand Management ◆ Energy Storage ◆ Renewable Generation ◆ Integrated Electric Vehicles ◆ Strategic Electrification ◆ Resiliency ◆



# EVOLVING CUSTOMER APPROACHES

## ▶ Customer approaches and engagement strategies are evolving

- Performance-based options (California, DOER)
- Enhanced market engagement over entire supply chain (Tennessee Valley Authority)
- Incremental and staged energy improvements

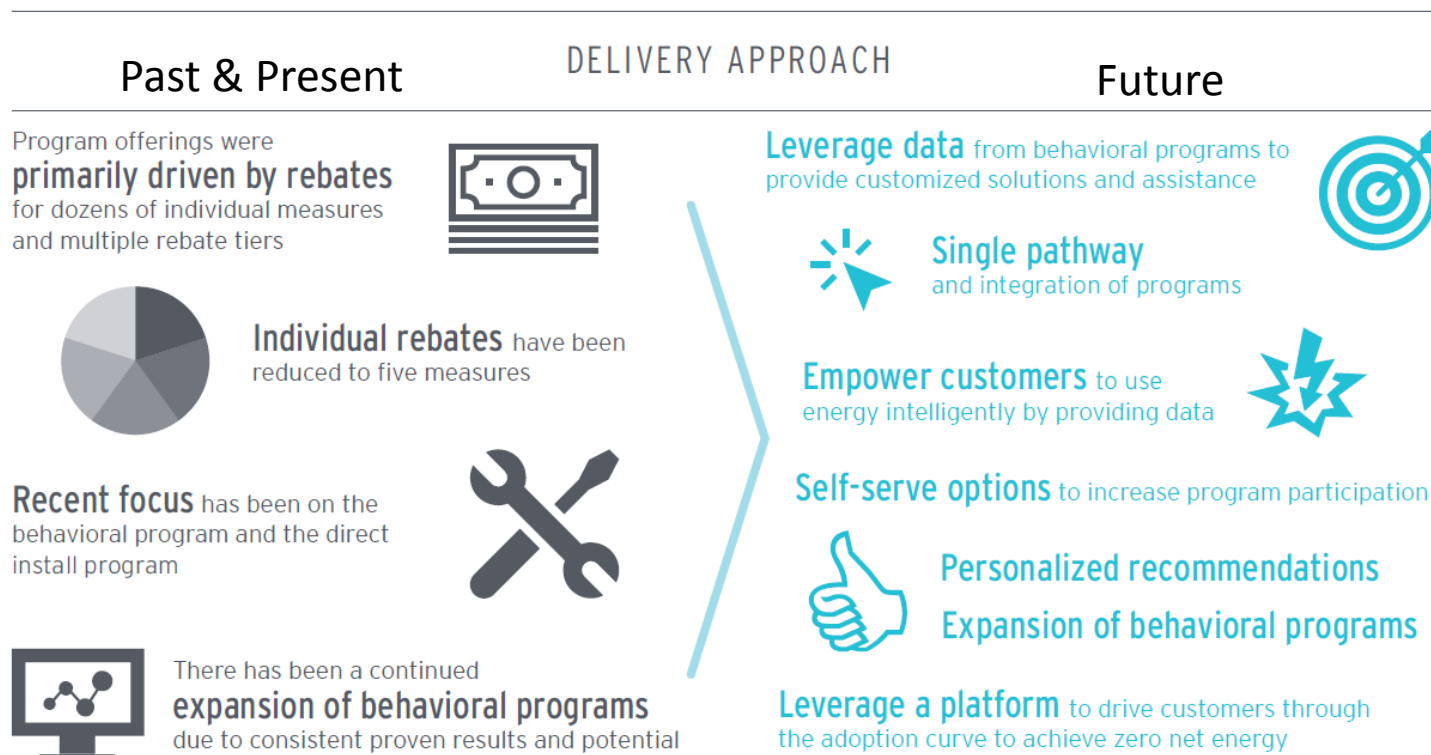


Example: U.S. DOE's Home Improvement Catalyst

[www.energy.gov/hicat](http://www.energy.gov/hicat)

# TECHNOLOGY DRIVEN MARKET

- ▶ In today's marketplace, technology supports a culture where consumers count on 24/7, on-demand, self-service options



Example: SDG&E's Energy Efficiency Business Plan 2018-2025

[https://docs.wixstatic.com/ugd/0c9650\\_52c02da4469c4213b0974b412b3f85ad.pdf](https://docs.wixstatic.com/ugd/0c9650_52c02da4469c4213b0974b412b3f85ad.pdf)