MA ENERGY EFFICIENCY ADVISORY COUNCIL

→ CONSULTANT TEAM

ADVANCING/ENHANCING EXISTING INITIATIVES, APPROACHES & MEASURES

Residential Planning Workshop #2

October 24, 2017

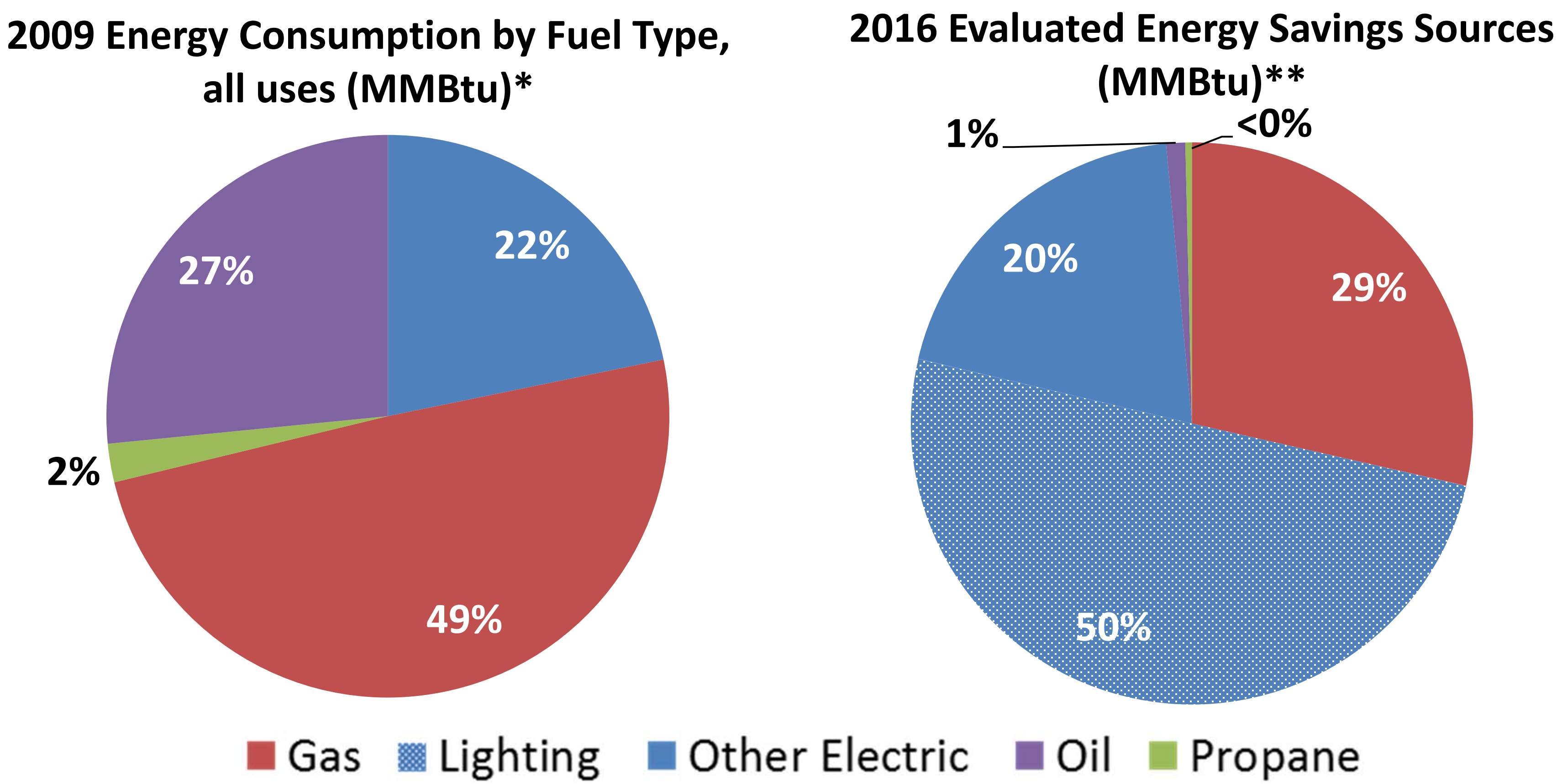
www.ma-eeac.org

MA ENERGY EFFICIENCY ADVISORY COUNCIL

→ CONSULTANT TEAM

OVERVIEW

MA ANNUAL RESIDENTIAL SITE ENERGY CONSUMPTION AND SAVINGS SOURCES

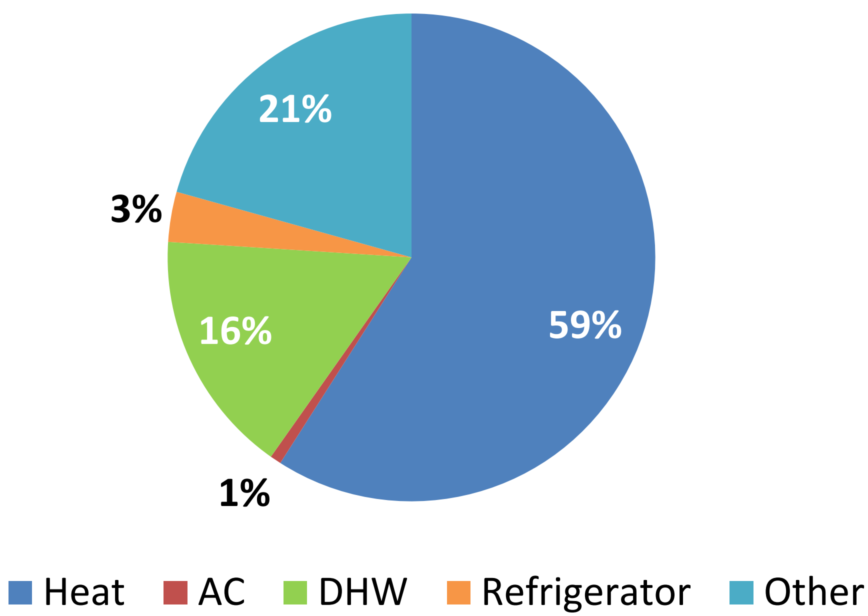


*Source: 2009 Residential Energy Consumption Survey

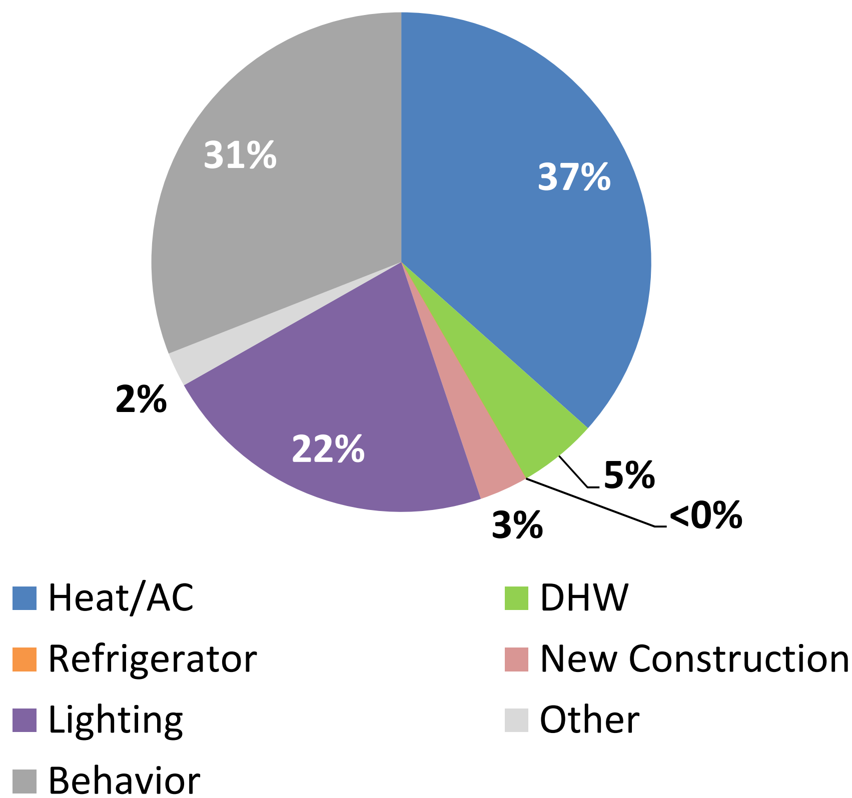
**Note: All fuels data includes savings and interactive effects

MA RESIDENTIAL ANNUAL ENERGY CONSUMPTION AND SAVINGS BY END USE

2009 Energy Consumption by End Use, all fuels (MMBtu)*



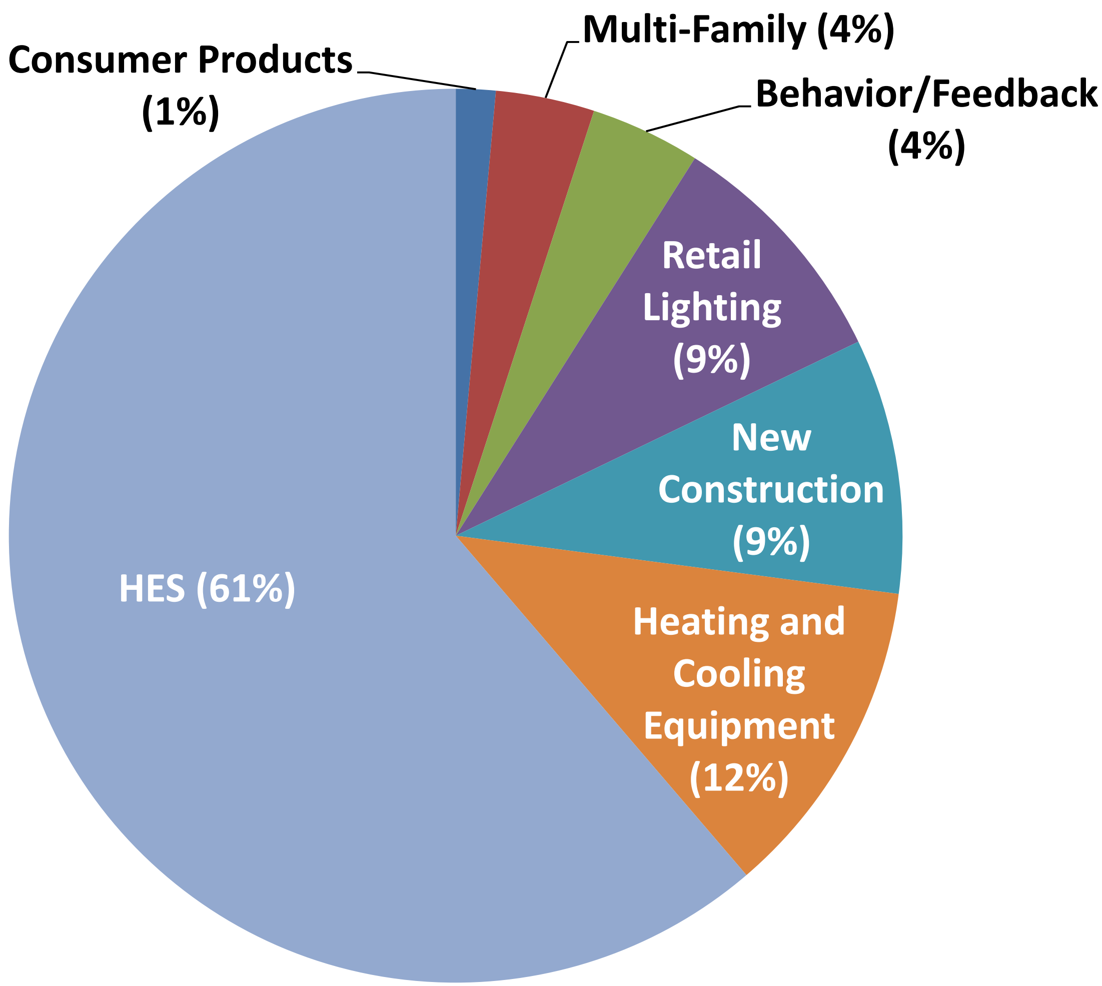
2016 Evaluated Savings by End Use, all fuels (MMBtu)



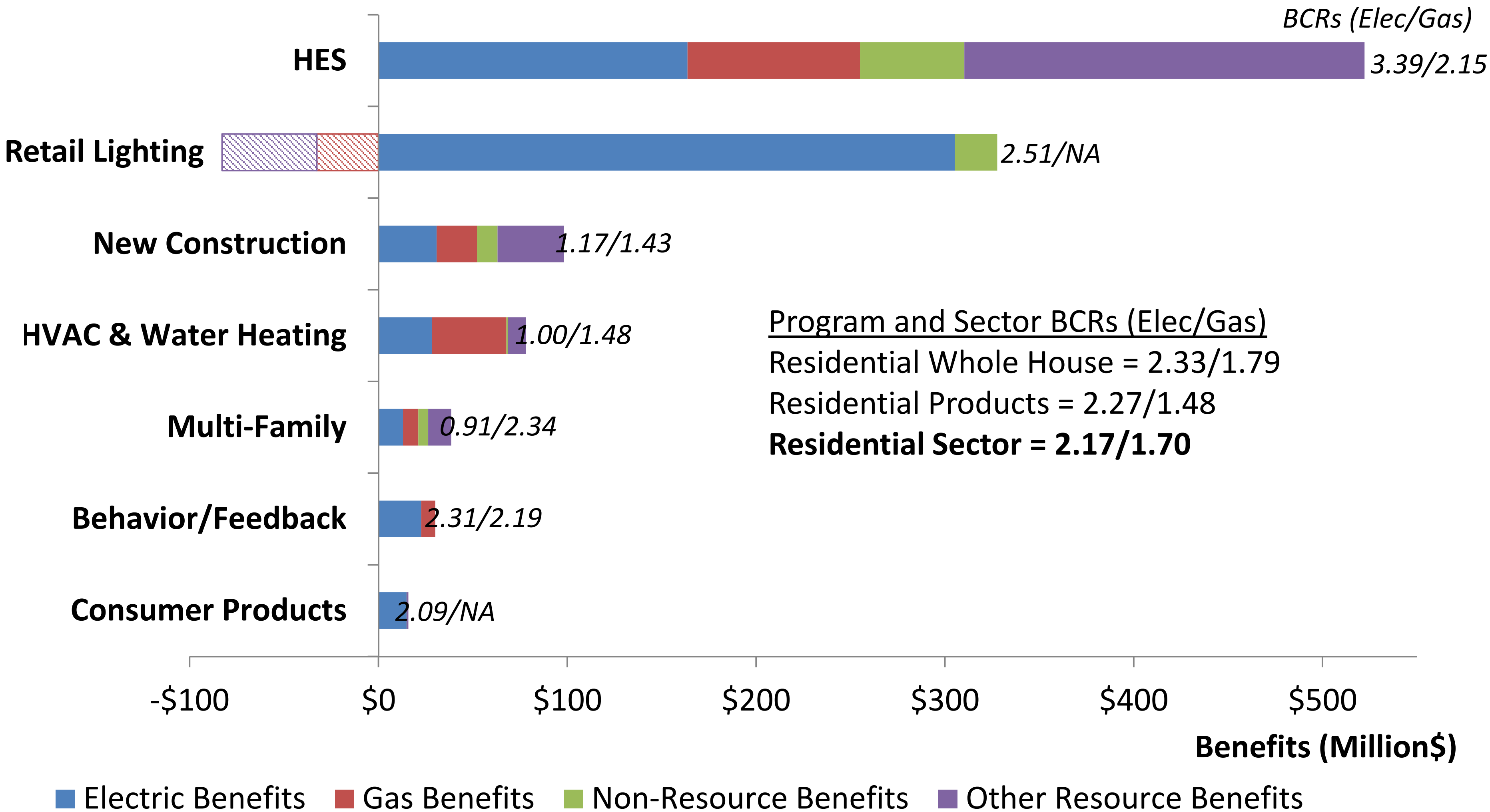
*Source: 2009 Residential Energy Consumption Survey

**Includes HVAC and Envelope End Uses. Heat and AC are not included as distinct end uses in PA BCR models

2016 LIFETIME EVALUATED SAVINGS BY INITIATIVE ALL FUELS (MMBTU)



2016 EVALUATED BENEFITS AND BENEFIT COST RATIOS



HEATING AND COOLING EQUIPMENT

OVERVIEW

- **The PAs' electric and gas HVAC and water heating efforts support the installation of efficient equipment and controls through incentives and contractor training offered though multiple initiatives. Both replacement at failure and early retirement incentives are offered.**
  - Electric initiative also supports quality installation
  - Most incentives are downstream (rebates to contractor or customer)
  - Focus has been on energy efficiency

2016 PERFORMANCE SUMMARY

Initiative	% of sector annual savings	% of sector lifetime savings	% of sector total benefits	Cost to deliver (lifetime)
Electric Heating and Cooling	2%	4%	2%	$0.08/kWh
Gas Heating and Cooling	17%	25%	20%	$0.48/therm

HVAC INCENTIVES AND SERVICES ARE OFFERED THROUGH MULTIPLE INITIATIVES

2016 HVAC and Water Heating Measures	Home Energy Services Initiative	Electric Heating and Cooling Initiative	Gas Heating and Cooling Initiative
Gas Boilers and Furnaces – Replace on failure			x
Gas Boilers and Furnaces – Early retirement	x		
Gas Water Heaters			x
Central AC and Heat Pumps - Replace on failure		x	
Central AC and Heat Pumps - Early retirement		x	
Heat Pump Water Heaters		x	
Oil and Propane Boilers and Furnaces - Replace on failure	x		
Oil and Propane Boilers and Furnaces - Early retirement	x		
Oil and Propane water heaters	x		
Wifi thermostats - gas and gas + electric	x		x
Wifi thermostats - electric only	x		
Wifi thermostats - oil/propane	x		
AC Check		x	
Duct sealing	x	x	
Circulator Pumps (Upstream)		x	
Efficient Furnace Fans		x	

BARRIERS AND OPPORTUNITIES

Barrier

Equipment-only focus may fail to achieve full benefits

Opportunities

- PA efforts to promote efficient HVAC and water heating measures should be done at a systems and/or whole house level whenever possible
- More fully address distribution systems, controls and control integration, and reducing overall building heating and cooling loads

Barrier

Varying contractor skill sets within and between initiatives

Opportunities

- Improve integration and alignment of HVAC and whole house program offers to enable better cross-promotion and appropriate delivery channel referrals

BARRIERS AND OPPORTUNITIES

Barrier	Opportunities
Downstream program design may limit program participation	▪ Leverage PA success with circulator pumps and C&I Retrofit upstream water heater engagement to move more technologies upstream
Barrier	Opportunities
Current efficiency focus doesn't address active demand management and fuel switching opportunities	▪ Co-promotion of Wifi thermostats for both their energy and demand savings capabilities; assess promotion of connected equipment for same ▪ Pursue fuel switching opportunities where cost-effective, provided that the program impacts are consistent with Global Warming Solutions Act compliance

RECOMMENDATIONS

- Emphasize an integrated, systems-based approach to HVAC equipment promotion and installation, particularly for heat pumps and condensing boilers
- Expand HVAC efforts by providing new active demand management and fuel switching measures
- Expand water heating and HVAC upstream offerings, leveraging best practices and lessons learned from the C&I sector
- Enhance connections between HVAC and whole house offerings, enabling customers to engage in more holistic improvements in a single transaction or over time

MA ENERGY EFFICIENCY ADVISORY COUNCIL

→ CONSULTANT TEAM

SERVING HARD TO REACH POPULATIONS

OVERVIEW

- **2017 EEAC priority**
  - The Council will work with the PAs to ensure that programs continue to prioritize equitable access among customers, including but not limited to:
    - Initiatives targeting renters and moderate income homeowners
    - Potential new strategies for reaching and incentivizing the hard-to-reach segments

RENTER INITIATIVE UPDATE

	Apr 2016 - Sep 2016	Oct 2016 - Mar 2017	Apr 2017- Sep 2017	18 month total
# of renter visits provided	433	373	424	1,230
# of full Home Energy Assessments provided to landlords	1,783	2,139	2,752	6,674
# of whole building incentives completed/processed for rental units	58	94	257	409
% of renter visits that convert to a full HEA with a landlord	1.2%	3%	3%	2.4%
% of full landlord HEAs that result in weatherization jobs	12%	14%	14%	13.3%
Avg # of Instant Savings Measures installed per rental visit	12.1	12.9	16.7	13.9
# of enhanced renter rebates processed	14	41	22	77
Refrigerator	14	23	8	45
Clothes Washer	0	18	14	32
# of rental units getting weatherization	215	296	384	895
Avg. non-whole building measure incentives to landlords (e.g., air sealing) per landlord HEA	0.1	0.1	0.1	0.1

MODERATE INCOME INITIATIVE UPDATE

	Apr 2016 - Sep 2016	Oct 2016 - Mar 2017	Apr 2017- Sep 2017	18 month total
# approved moderate income applicants	76	171	144	391
% of approved moderate income applicants resulting in weatherization jobs	50%	60%	67%	60%
Avg. Instant Savings Measure installation per approved moderate income household	21.8	20.3	20.4	20.9
# of approved enhanced moderate income rebates processed (i.e., refrigerators and clothes washers)	0	3	3	6
Refrigerator	0	0	0	0
Clothes Washer	0	3	3	6
# of approved moderate income weatherization incentives	38	102	96	236

FINANCING

HEAT Loans (PAs)

Measures

- Heating system replacement
- Water heaters (including solar options)
- Central AC and heat pumps
- Insulation and replacement windows

Summary stats (2015)

- 0% loan up to $25k for up to 7 yrs with PA interest rate buydown
- $17 million in PA expenditures leveraged $100 million in lending with 10,000+ loans
- 87% of loans approved

Expanded HEAT Loans (DOER)

Pre-weatherization barriers grant

- $3k max
- Knob and tube wiring
- Asbestos abatement

Loans

- 0%, up to $50k (depending on measure)
- 2-4 unit buildings
- Wood pellet furnaces and boilers

MARKET CHARACTERIZATION

Population group	Number of Massachusetts residents
Renters (1-4 unit buildings, above 60% of State Median Income)	347,000
Moderate income customers (homeowners at 61-80% of State Median Income)	235,000
Age 65+	985,000*
Speak language other than English or Spanish at home	893,000*
Speak Spanish at home	534,000*
Disabled residents	750,000*

Source: 2015 American Community Survey, US Census
*Some number of these residents may be eligible for and/or receiving low income energy efficiency program services

BARRIERS AND OPPORTUNITIES

Barrier

Program awareness and actual or perceived participation requirements

Opportunities

- **Assess revisions to offers to increase appeal to and uptake by target populations**
  - Consider changes prompted by decline in claimable lighting savings
- **Continue to boost promotion specifically to renters**
- **Fully assess and address income verification process as a potential barrier**
- **Implement forthcoming EM&V recommendations**
- **Address additional market segments**
- **Expand and target outreach to all hard to reach populations**
  - Bolster partnerships with community based organizations, municipalities, and other organizations

BARRIERS AND OPPORTUNITIES

Barrier

Access to financing

Opportunities

- **Simplify the application process and automate where possible**
- **Examine loan activity by geography/demography to assess opportunities to increase participation**
- **Develop additional financing strategies**
  - Further assess need
  - Especially for 13% of customers whose HEAT Loans were not approved: loan loss reserves, revised lending criteria by banks, other?
  - Address situations like replacement on failure, multi-stage projects, measure packages, etc.
- Consider making HEAT loan a sliding-scale interest product

RECOMMENDATIONS

- **Increase participation and savings for hard to reach populations by:**
  - implementing stakeholder engagement process to reassess program design and improve participation in renter and moderate income customer initiatives,
  - identifying underserved demographic groups and developing new segmented approaches to serve them, and
  - increasing outreach and partnerships with community based organizations, municipalities, and other organizations
- **Implement methods to increase access to and use of financing across all customer segments**

MA ENERGY EFFICIENCY ADVISORY COUNCIL

→ CONSULTANT TEAM

LIGHTING AND CONSUMER PRODUCTS

OVERVIEW

Lighting Initiative

Promote ~12 million LEDs annually through a wide variety of retail and other market channels

- Mostly upstream incentives, including hard to reach populations and market channels
- Largest source of sector annual and lifetime savings
- Increasing market penetration, declining prices, and standards will reduce claimable savings in 2019-2021 Plan

Consumer Products

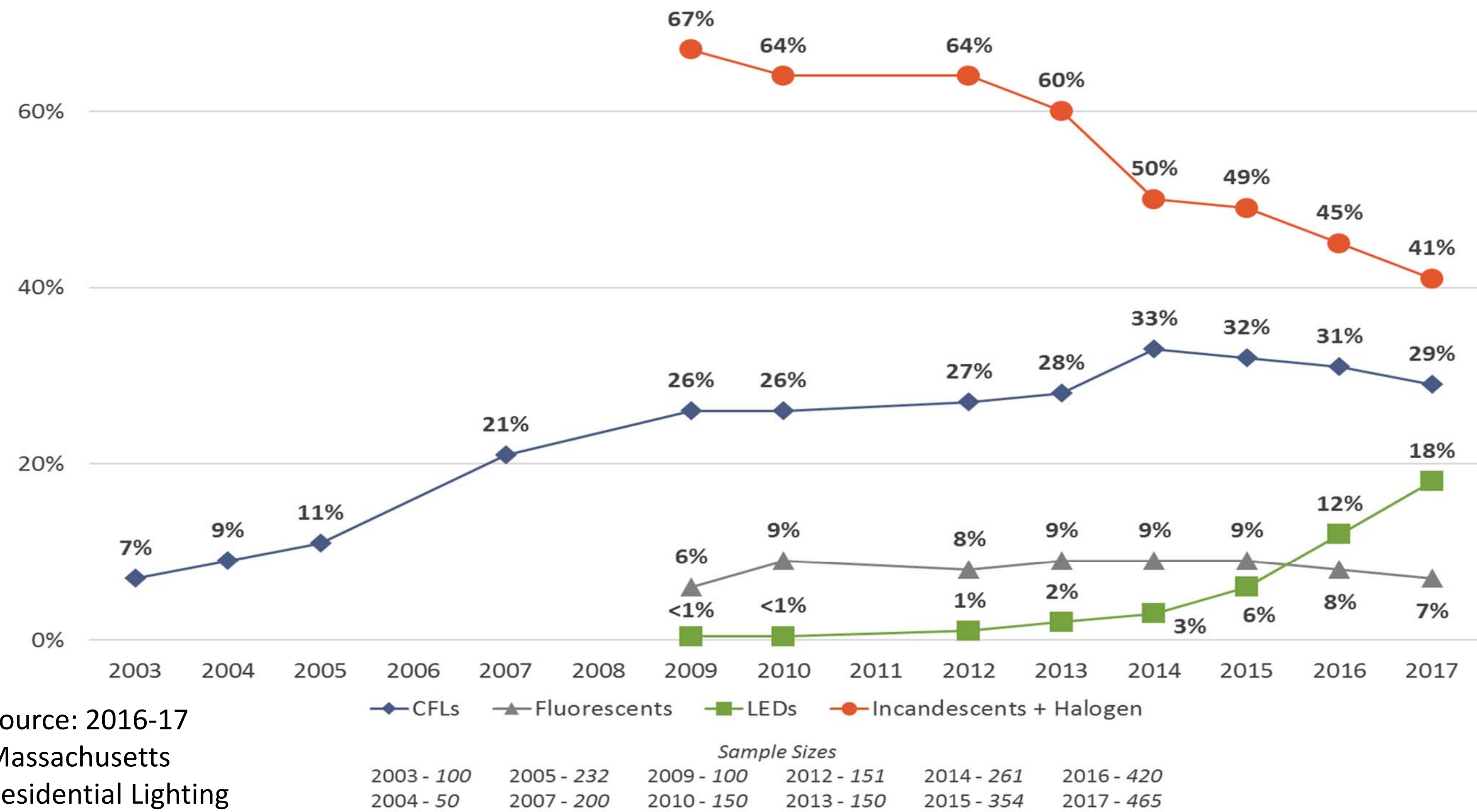
Promote the sale of efficient appliances and consumer electronics and the recycling of older appliances

- Savings principally from appliance recycling, dehumidifiers, advanced power strips, and pool pumps
- Decreasing focus on traditional “white goods”
  - Small per unit savings (largely due to standards)

2016 PERFORMANCE SUMMARY

Initiative	% of sector annual savings	% of sector lifetime savings	% of sector total benefits	Cost to deliver
Lighting	56%	60%	34%	$0.02/kWh
Consumer Products	2%	3%	2%	$0.06/kWh

A MAJORITY OF RESIDENTIAL LIGHTING IS ALREADY EFFICIENT



Source: 2016-17 Massachusetts Residential Lighting Market Assessment

UNCERTAINTY IN LIGHTING SAVINGS FORECAST

- ► **Declining savings, particularly in 2020-2021 timeframe**
- ► **Possible remaining opportunities are likely to be small, but still may be significant at the sector level**
  - Hard to Reach market channels
  - High lumen and specialty products
- ► **End of PA support by end of 2019 is possible; likely by end of 2020**

Don't want to exit market prematurely, but don't want to support already transformed markets and technologies

BARRIERS AND OPPORTUNITIES

Barrier	Opportunities
Rapid transformation of the retail lighting market will limit savings in most markets and for most technologies	▪ Continue to closely monitor the market to ensure that support is maintained for those technologies and markets still requiring PA intervention

BARRIERS AND OPPORTUNITIES

Barrier

Declining per unit net savings for many appliances and consumer electronic measures limits PA support

Opportunities

- **Examine upstream engagement strategies to determine if it would be possible to deliver greater savings more cost efficiently**
- **Explore whether participating retailers would be willing to engage customers to promote other PA efficiency efforts**

RECOMMENDATIONS

- Clearly articulate an exit strategy for residential lighting, while pursuing remaining savings opportunities for lighting technologies and markets that merit continued program intervention
- Identify and support new and enhanced measures and further leverage retail relationships to bring more customers into the Mass Save program

MA ENERGY EFFICIENCY ADVISORY COUNCIL

→ CONSULTANT TEAM

BEHAVIOR PROGRAMS

OVERVIEW

- ▶ **Rather than providing financial incentives for customers to choose and purchase energy efficient equipment or measures, behavior programs provide customers with information and other incentives to prompt them to take actions that save energy**

Ways to Save

Shave a minute off shower time
The average American spends about 8 minutes showering a day. Reducing average shower time by 1 minute can result in 13% savings in shower water use and lower your energy and water bills.
Save up to $20 per year

Install efficient showerheads
Showering accounts for about 40% of your home's hot water use, but you can cut costs without sacrificing comfort. Energy-efficient showerheads can reduce hot water use without compromising water pressure.
Save up to $60 per year

Choose an efficient television
Some features on today's TVs can raise your energy bills significantly. When shopping for a new TV, look for the ENERGY STAR® label. These efficient TVs use 25% less energy than similar non-labeled models.
Save up to $60 per year

2016 PERFORMANCE SUMMARY

Initiative	% of sector annual savings	% of sector lifetime savings	% of sector total benefits	Cost to deliver (lifetime)
Electric behavior	21%	3%	10%	$0.07/kWh
Gas behavior	39%	3%	6%	$0.58/therm

CONSULTANTS' ESTIMATE OF ADDITIONAL SAVINGS POTENTIAL

PA	Est. Residential Treatment Customers	Potential Savings (annual and lifetime)
Eversource	39,000 electric 10,000 gas	4,800 MWh 113,000 therms
Columbia Gas	173,000	1,955,000 therms
Cape Light	87,500	10,850 MWh
Unitil	18,750 electric 10,500 gas	2,300 MWh 119,000 therms
Liberty	25,000	282,500 therms
TOTAL		**17,950 MWh** **2.5 million therms**

BARRIERS AND OPPORTUNITIES

Barrier

Smaller PAs find behavior programs cost prohibitive

Opportunities

- Examine alternative program models
- Pursue procurement opportunities through PA parent companies
- Statewide behavioral program procurement
- Extend current one-year measure life

BARRIERS AND OPPORTUNITIES

Barrier

It is challenging to innovate a well established proven behavioral savings model

Opportunities

- Increase utilization of technologies including real-time feedback devices, web portals, mobile devices and apps, and Wifi thermostats
- Link recommendations more strongly to identified customer-specific opportunities (e.g., through a Home Energy Assessment)
- Use behavioral messaging to bolster cross promotion of PA offers
- Use behavioral strategies for active demand management

RECOMMENDATION

- **Broaden current behavioral program strategies to include cost-efficient new approaches for customers of all Massachusetts PAs**

NEW CONSTRUCTION

OVERVIEW

- **The statewide electric/gas Residential New Construction Program provides incentives, training, and technical assistance to builders, contractors and code officials to promote efficient construction, code compliance, and the adoption of the Massachusetts Stretch Code**
  - New incentive structure rewards both absolute and % savings reductions
  - Current focus has been on energy efficiency

2016 PERFORMANCE SUMMARY

Initiative	% of sector annual savings	% of sector lifetime savings	% of sector total benefits	Cost to deliver (lifetime)
Electric New Construction	2%	4%	7%	$0.08/kWh
Gas New Construction	7%	13%	15%	$0.74/therm

LEADING EDGE LOW ENERGY NEW CONSTRUCTION EFFORTS

- **Connecticut**
  - Net Zero Energy tier
  - 2018 All-Electric package
  - Possible 2018 EV-readiness criteria
  - Zero Energy Challenge home competition
- **Efficiency Vermont**
  - High Performance Certification
  - Zero Energy Modular Home program
- **California**
  - Residential New Construction Zero Net Energy Action Plan
    - Operationalizes goal of having 100% of new homes achieve zero net energy beginning in 2020

BARRIERS AND OPPORTUNITIES

Barrier

Rising baselines have eroded savings

Opportunities

- **Develop a plan to get the majority of RNC participants to net zero energy by 2021**
- **Assess PA code savings and attribution from accelerating adoption of residential net zero energy code requirements**

Barrier

HVAC system designs have not kept pace with low load home's needs

Opportunities

- **Provide technical assistance and guidance for HVAC systems in low load homes**
- **Develop an all-electric new home package to capture interest in cold climate heat pumps and heat pump water heaters**

BARRIERS AND OPPORTUNITIES

Barrier

Current efficiency focus doesn't address other savings and policy opportunities

Opportunities

- **Leverage new code PV-readiness requirements to better engage solar industry**
- **Assess and implement as appropriate Wifi thermostat requirements to facilitate active demand management**
- **Develop and implement EV-readiness criteria in anticipation of projected growth of electric vehicles in Massachusetts**

RECOMMENDATIONS

- ► **Offer specific low energy path(s) such as net zero energy and Passive House (multi-family) to drive construction of low energy buildings and eventual market transformation of building energy codes**
- ► **Integrate active demand management measures that promote load shifting opportunities of solar photovoltaics, electric vehicles, and storage**