MA ENERGY EFFICIENCY ADVISORY COUNCIL

→ CONSULTANT TEAM

2022-2024 PLANNING UPDATE

▶ June 23, 2021

www.ma-eeac.org

INTRODUCTION

- New plan represents a break from plans of the past
- New focus is on addressing specific priority topics and their associated benefits
- Consultant Team working with PAs to understand assumptions arounds specific topics and priorities
- Consultant Team also reviewing 2020 Plan-Year Report (PYR) evaluated results to inform analysis
- The following slides present an update on the “key drivers” identified by the Consultants
- Additional analysis and conversations are on-going

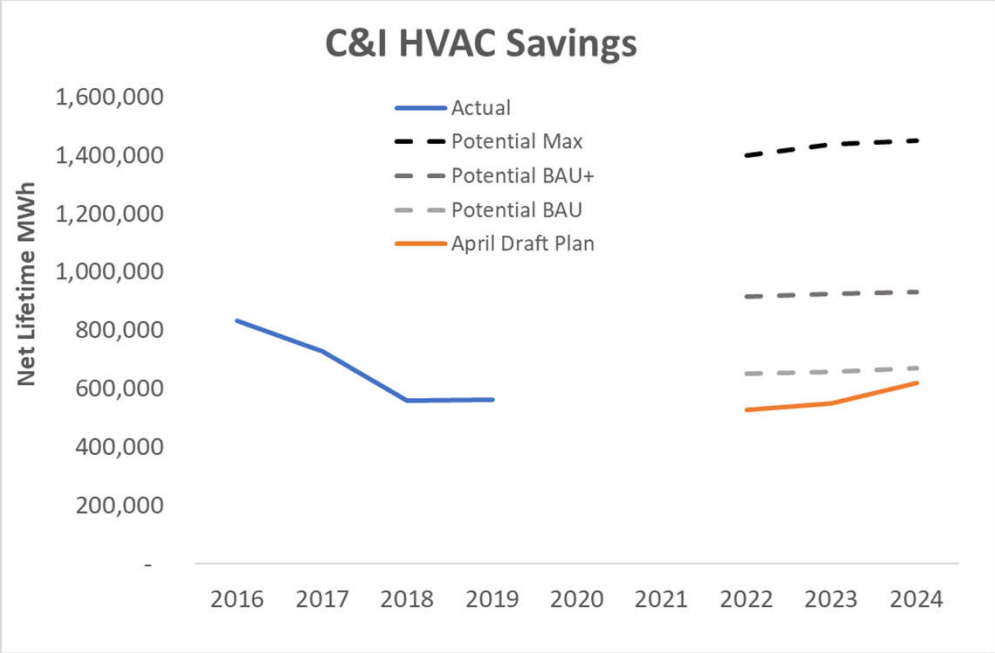
KEY DRIVERS

- **Key drivers process will:**
  - Discuss market trends and opportunities
  - Look at potential data and recent historical savings
  - Assess program costs
  - Examine the impact of evaluation changes
  - Work to arrive at consensus between PAs and Consultant Team where possible
  - Ensure Council priorities are adequately reflected in plan to the greatest extent possible

COMMERCIAL & INDUSTRIAL

REASONS FOR C&I KEY DRIVERS

- **Significant reductions to C&I programs**
  - 24% budget decrease compared to 2019-2021 plan
  - 55% benefits decrease compared to 2019-2021 plan
- **Potential studies identified 2X draft plan savings**
  - Example: C&I HVAC potential is 2.6X the draft plan



C&I CUSTOM

- **Still huge, largely untapped opportunity for non-lighting retrofit savings**
  - True retrofit baselines not impacted by rises in code/ISP
  - Custom non-lighting NTG from latest evaluation is 102%
- **Custom was single largest identified source of savings in potential studies**
- **Key Drivers process will:**
  - Closely examine gross savings and cost assumptions used for all C&I custom measures by PA
  - Identify ways to bring in more Custom projects that utilize retrofit baselines
  - Discuss opportunities to improve the Custom process from both a Program Administration and customer/contractor perspective
  - Discuss the need for a Deep Energy Retrofit initiative and/or pilot

C&I ELECTRIFICATION

- **Significantly behind on 2019-2021 plan term sheet goals for C&I heat pumps**
  - Goal = 17,980 units
  - Progress through Q4 2020 = 3,177 units (17%)
    - Most of these units were “Upstream”, not fuel switching
- **New plan includes some small C&I oil and propane fuel switching, but needs to make up for current plan underperformance**
  - $4M in planned incentives for small C&I fuel switching
  - $2M in planned incentives for custom fuel switching
- **Key Drivers process will:**
  - Identify best markets to pursue oil/propane/electric resistance conversions to heat pump systems
  - Examine opportunities for bundling electrification measures with other efficiency improvements to deliver cost-effective projects

C&I LIGHTING

- **Downward trend in claimable C&I lighting savings playing out as expected**
  - Evaluation showing the predicted reductions in NTG and AML are here and claimable savings decrease as industry moves to all LED
- **Remaining opportunities for C&I lighting**
  - Tail end of linear lighting market
  - Controllable fixtures w/ slightly higher claimable savings
  - Outdoor lighting including building-mounted and streetlights
  - Gas streetlights in some historic districts
- **Key Drivers process will:**
  - Closely examine gross savings and cost assumptions used for all categories and pathways of C&I lighting
  - Reminder: 2019-2021 plan called for more fixtures w/ controls but ultimately delivered large amounts of TLEDs

C&I COMBINED HEAT AND POWER

- **CHP historically a very large contributor to savings**
- **PAs have long lead-times on these projects due to interconnection requirements**
  - Much of the capacity added between 2022-2024 is already known
- **PAs recently added new micro-CHP incentives which we do not have much existing data on**
- **Key Drivers process will:**
  - Look at PA CHP pipeline
  - GHG impacts of new CHP systems

OTHER C&I KEY DRIVER TOPICS

- **Appropriateness of using of upstream/midstream (point of sale) rebates for more complex measures**
  - High free-ridership in recent HVAC upstream/midstream evaluations show approaches that worked for lighting are less suitable for other end-uses/markets
- **PA differences**
  - Cost assumptions for various measures/end-uses
  - Approaches/pathways to achieving savings
  - Geographic and customer segment differences service territories leading to different savings opportunities

INFORMATION REQUESTS MADE TO PAS TO DATE

- **Information on why significant cost-effective non-lighting savings potential is not being pursued**
- **Examples of screening Deep Energy Retrofits and Custom Fuel Switching/Electrification projects**
  - Some PAs state that gas to electric cannot screen
  - Other PAs have successfully screened projects w/ gas to electric fuel switching as part of a bundle of measures
- **CHP greenhouse gas impacts**
  - Some PAs draft BCR models showing net GHG increases
- **Participation, spending and savings for small businesses outside of the turnkey pathway**
  - Part of Equity Working Group requests, but also relevant to overall C&I goals

COUNCIL DISCUSSION

- **Commercial and Industrial**

EQUITY

VARIATION OF KEY DRIVERS DISCUSSION

- Focus is on compiling budget, participation, and savings information for equity-focused topics
- Equity Working Group has made information requests to PAs
- Equity goals/metrics/targets are actively being discussed

Equity Focus Population	 Budget	 Participants	 Savings
Moderate income	[✓]	✓	✓
Renters and landlords	X	X	X
Small business	[✓]	[✓]	[✓]
Workforce	[✓]	[✓]	[✓]
English isolated	X	X	X
Partnerships	✓	✓	N/A

✓: information provided [✓]: partial information X: no specific information

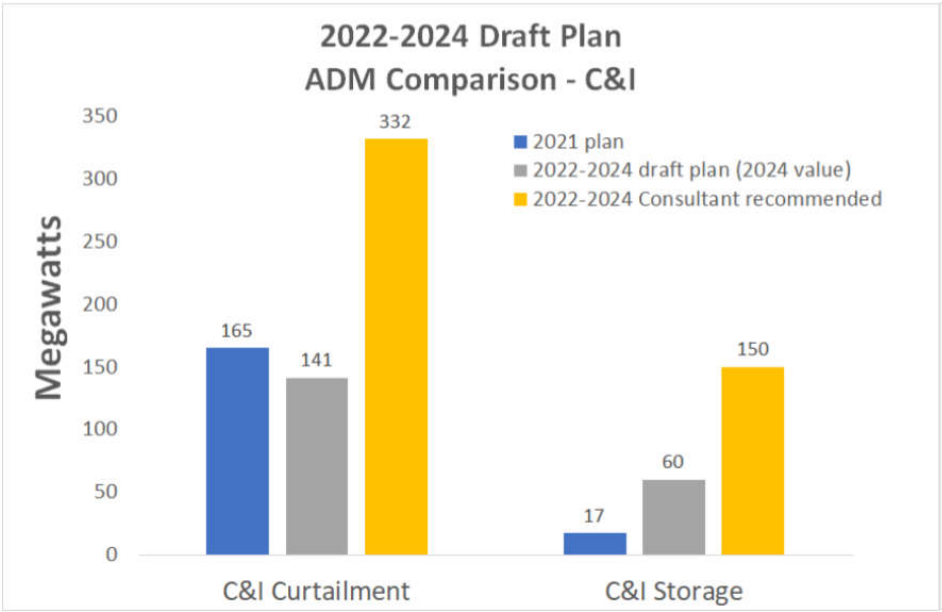
COUNCIL DISCUSSION

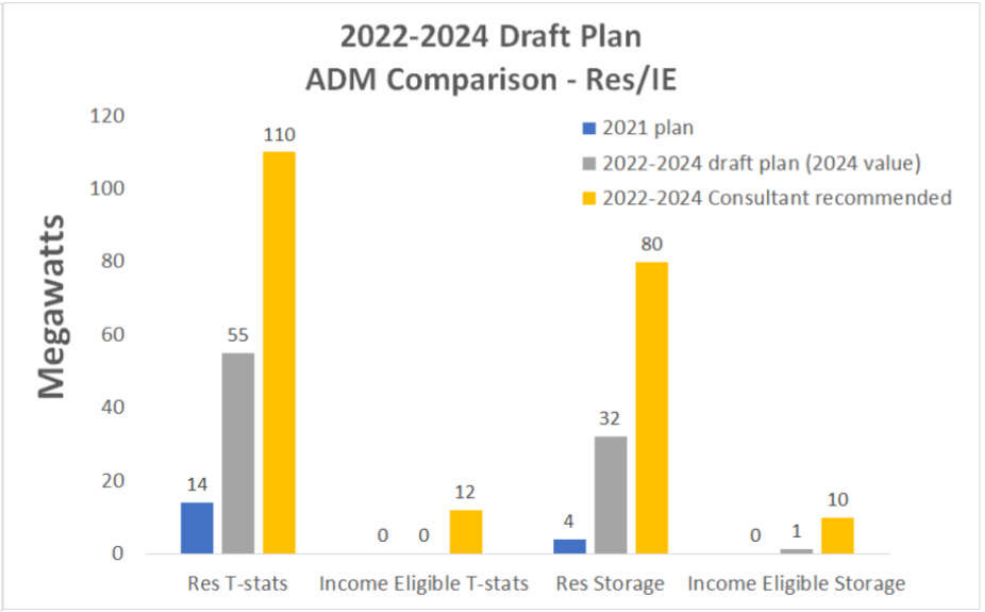
- **Workforce development**
- **Residential**

ACTIVE DEMAND

REASONS FOR ADM KEY DRIVERS

- More opportunity for active demand, especially when integrated with EE program delivery
- Cape Light's CVEO still the only income eligible active demand proposed
- No small C&I active demand proposed



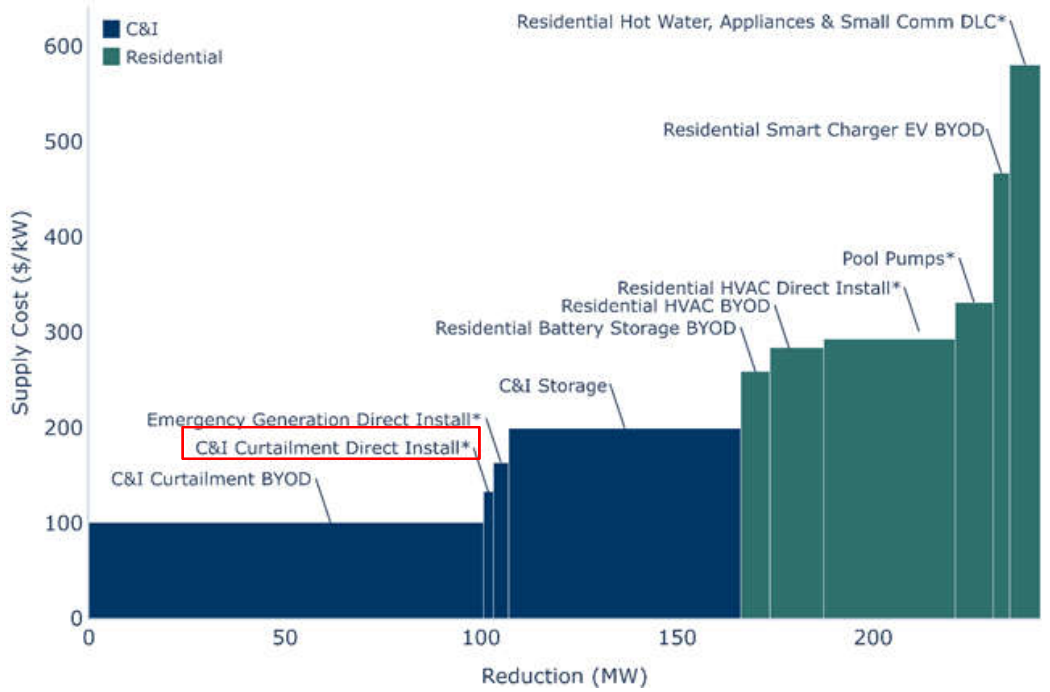


RESIDENTIAL DIRECT LOAD CONTROL (DLC) - WIFI T-STATS

- **PA perceive potential for Res ADM as customers who already have central cooling and Wifi T-stats**
- **Consultants see potential as all customers w/ central cooling because adding Wifi T-stats is a cost-effective EE measure**
  - ~1/3 of MA households have central cooling
  - ~5% of these households enrolled in Connected Solutions
- **Key Drivers process will:**
  - Look closely at opportunity for pairing EE incentives for Wifi T-stats w/ Connected Solutions incentives
  - Discuss best way to increase adoption of Wifi T-stats to capture more of the central cooling market

SMALL C&I DIRECT LOAD CONTROL (DLC) – WIFI T-STATS

- **Small commercial Wifi T-stats identified as one of the more cost-effective options but is not being offered**



- **Key Drivers process will:**
  - Look at opportunity for adding small biz ADM offering

LARGE C&I CURTAILMENT

- **PAs proposing less C&I curtailment in this plan cycle than in 2019-2021**
  - Evaluation results (realization rate) applied to C&I curtailment did reduce claimed demand savings, but programs should improve over time
- **Key Drivers process will:**
  - Look at structural reasons for lower realization rates and opportunities to improve
  - Identify additional market segments and controls strategies to deliver more C&I curtailment
  - Discuss the GHG impacts of active demand depending on the time of dispatch (being studied currently) and the source of demand reductions (curtailment or on-site generators)

STORAGE (ALL SECTORS)

- **Various PAs proposing vastly different amounts of storage for Res vs. C&I**
  - Some geographic/economic reasons for this
- **Income eligible storage only proposed by CLC**
- **Key Drivers process will:**
  - Look at PA differences for ADM from storage
  - Examine cost assumptions
  - EV load management opportunities for Residential and C&I including fleet-based systems
  - Assess how multifamily housing fits into ADM/storage opportunities

INFORMATION REQUESTS MADE TO PAS TO DATE

- **Explanation on PA differences**
  - Characterize charging and discharging of battery storage systems
  - Differences in $/kW used by different PAs for C&I curtailment
- **Data on # of IES customers currently enrolled in Connected Solutions**
- **Non-Cape Light PA interest in *CVEO-like* offerings**
- **PA plans for adding income eligible storage offerings**
- **Inquiry about policy-related issues**
  - 5-year incentive lock for storage
  - Interaction with Clean Peak Standard

COUNCIL DISCUSSION

- **Active Demand**

INCOME ELIGIBLE

REASONS FOR KEY DRIVER SELECTION

- **Sector significantly affected by Covid**
  - 2020 evaluated results: 61% under planned electric lifetime savings and 39% under planned gas lifetime savings
- **Draft Plan shows inadequate commitment to electrification**
  - Low numbers of heats pumps for space and water heating
  - High numbers of fossil fuel burning units
- **Negligible increase in envelope incentives over 2019-2021**
  - Multifamily envelope savings decreased by approx. 1/3
- **Increase in lighting incentives (+32%) at a time when lighting market is largely transformed**
- **No active demand savings except for CVEO**

WATER HEATING ELECTRIFICATION

- **Draft Plan includes 279 heat pump water heaters for 2022-2024 term**
  - Consultants believe potential is in the vicinity of 18,000 units for replacement of existing electric, oil, and propane systems
- **Key Drivers process will:**
  - Examine respective assumptions about potential
  - Discuss considerations related to replace on failure vs. early replacement
  - Discuss considerations related to single family vs. multifamily
  - Discuss budget implications

SPACE HEATING ELECTRIFICATION

- **Draft Plan includes 6,000 heat pumps for 2022-2024 term**
  - Consultants believe potential is significantly higher for replacement of existing electric, oil, and propane systems
- **Key Drivers process will:**
  - Examine respective assumptions about potential
  - Discuss considerations related to replace on failure vs. early replacement
  - Discuss considerations related to single family vs. multifamily
  - Discuss consideration of partial displacement vs. full replacement
  - Discuss application of market rate baseline decisions for residential sector to income eligible sector
  - Discuss budget implications

ENVELOPE

- **Income eligible envelope incentives are flat in the Draft 2022-2024 Plan as compared to the 2019-2021 Plan**
  - Multifamily envelope incentives decrease by more than 1/3 ($21 million to $13 million)
- **Key Drivers process will:**
  - Discuss considerations related to single family vs. multifamily
  - Discuss saturation and potential, especially for multifamily segment
  - Finding useful data has been challenging
  - Discuss possible addition of window measures
    - Connecticut has made some progress with them

LIGHTING

- **Lighting incentives increase 32% in the Draft 2022-24 Plan vs. the 2019-2021 Plan, but savings decrease 0.2%**
  - Primary investment is in multifamily
- **Key Drivers process will:**
  - Confirm measure types (e.g., phase out of screw-in bulbs), discuss costs and measure lives
  - Advance inclusion of lighting controls, consistent with approach in C&I sector

WIFI THERMOSTATS

- **891 WiFi thermostats included in Draft 2022-2024**
  - Consultants believe potential is at least 10x
- **Main benefit over programmable thermostats is in cooling applications and for active demand management**
- **Key Drivers process will:**
  - Examine respective assumptions about potential
  - Discuss considerations related to single family vs. multifamily

OTHER IES KEY DRIVER TOPICS

- **Allocation of resources between single family (1-4 units) and multifamily (5+ units) households**
  - 54% of IES incentives are planned for single family
- **PA differences**
  - Determine appropriate metric(s)

INFORMATION REQUESTS MADE TO PAS TO DATE

- **Information specific to income eligible potential from PA potential studies**
  - Most of the PAs' potential studies combine residential and IES potential in most regards
- **Number of participants planned for 2022-2024 term**

OTHER IES KEY DRIVER TOPICS

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INFORMATION REQUESTS MADE TO PAS TO DATE

- **Information specific to income eligible potential from PA potential studies**
  - Most of the PAs' potential studies combine residential and IES potential
- **Number of participants planned for 2022-2024 term**
- **Clarification on what measures are included in IES vs. C&I sectors for master metered multifamily buildings**

NEXT STEPS

- PAs and Consultant Team will exchange information on key drivers topics as necessary
- Key drivers and other discussions of the plan will continue through June
- Outcomes of the process will be used to inform drafting of the Council Resolution on the draft plan
- Consultant Team will present on results at the July 14 EEAC Meeting

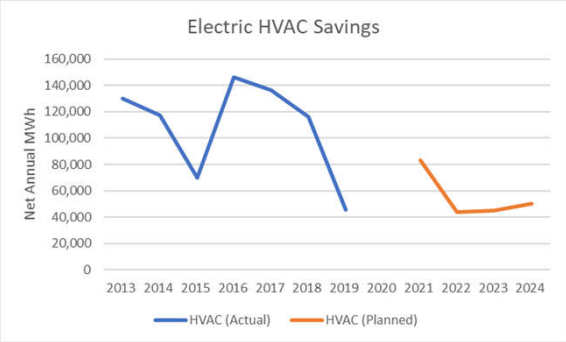
THANK YOU

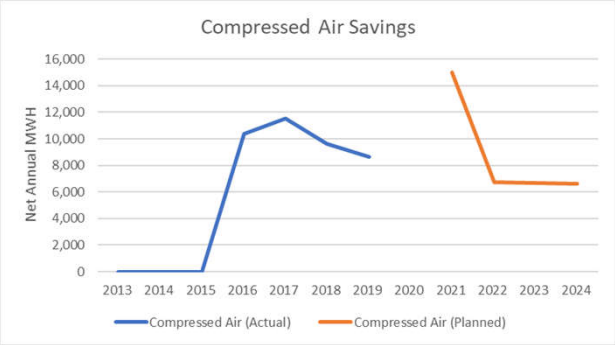
QUESTIONS?

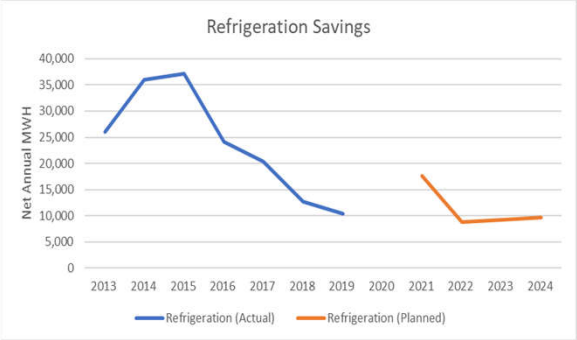
RESOURCE SLIDES

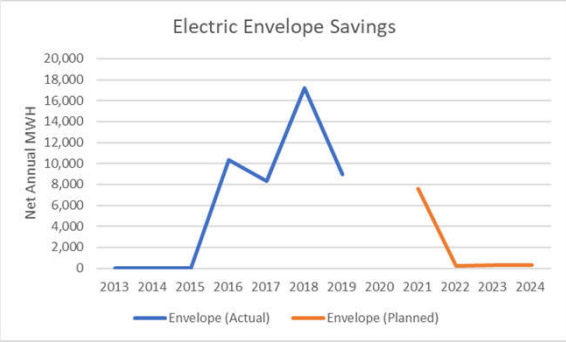
C&I SAVINGS BY END USE (ELEC)

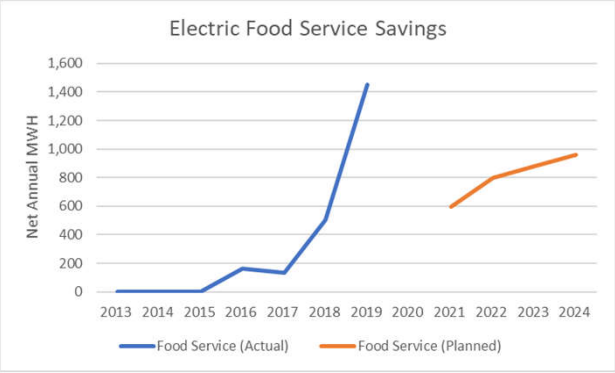
- **Flattening or falling planned savings for most non-lighting C&I end uses**

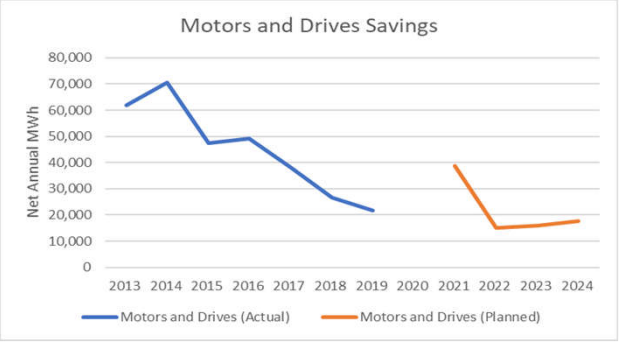












C&I HEAT PUMPS

- **Progress towards 2019-2021 term sheet goal of 17,980 units**

Measure	2019	2020	2021
Fuel Switching - Retrofit	4	6	
Total Fuel Switching (# of Projects)	**4**	**6**	
Mini Split HP - Upstream	92	385	
Central HP - Upstream	1,179	1,517	
Total Other (# of units)	**1,271**	**1,902**	

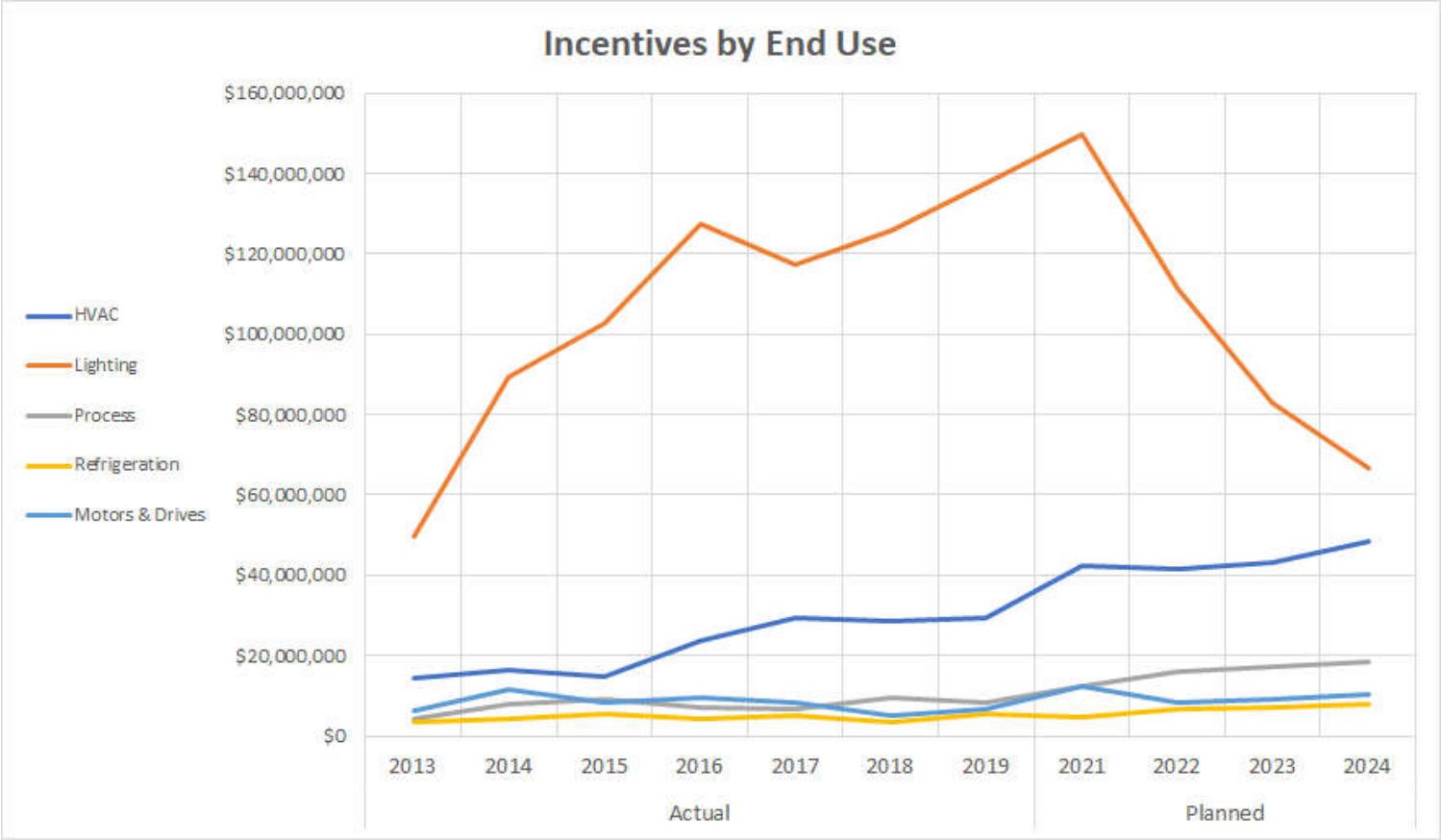
- **2022-2024 Plan**

Measure	2022	2023	2024
Custom - HVAC Fuel Switching	TBD*	TBD*	TBD*
Ducted Heat Pump displacing Oil Heating	42	56	73
Ductless Heat Pump displacing Oil Heating	29	40	55
Ducted Heat Pump displacing Propane Heating	26	34	46
Ductless Heat Pump displacing Propane Heating	26	34	46
Total Fuel Switching (# of units)	**123**	**163**	**221**
Ductless Heat Pump, <5.4 Tons	90	112	153
Ductless Heat Pump displacing Electric Resistance	149	195	273
HVAC Midstream - Heat Pump Systems	30	37	47
HVAC Midstream - Water Source Heat Pump Systems	1,043	1,516	2,244
HVAC Midstream - DMSHP Systems	1,128	1,156	1,212
HVAC Midstream - VRF	105	155	230
Total Other (# of units)	**2,545**	**3,170**	**4,159**
Total C&I Heat Pumps	**2,668**	**3,333**	**4,380**

*Custom Fuel Switching projects not denoted in # of units; total planned incentives for these are ~$2M

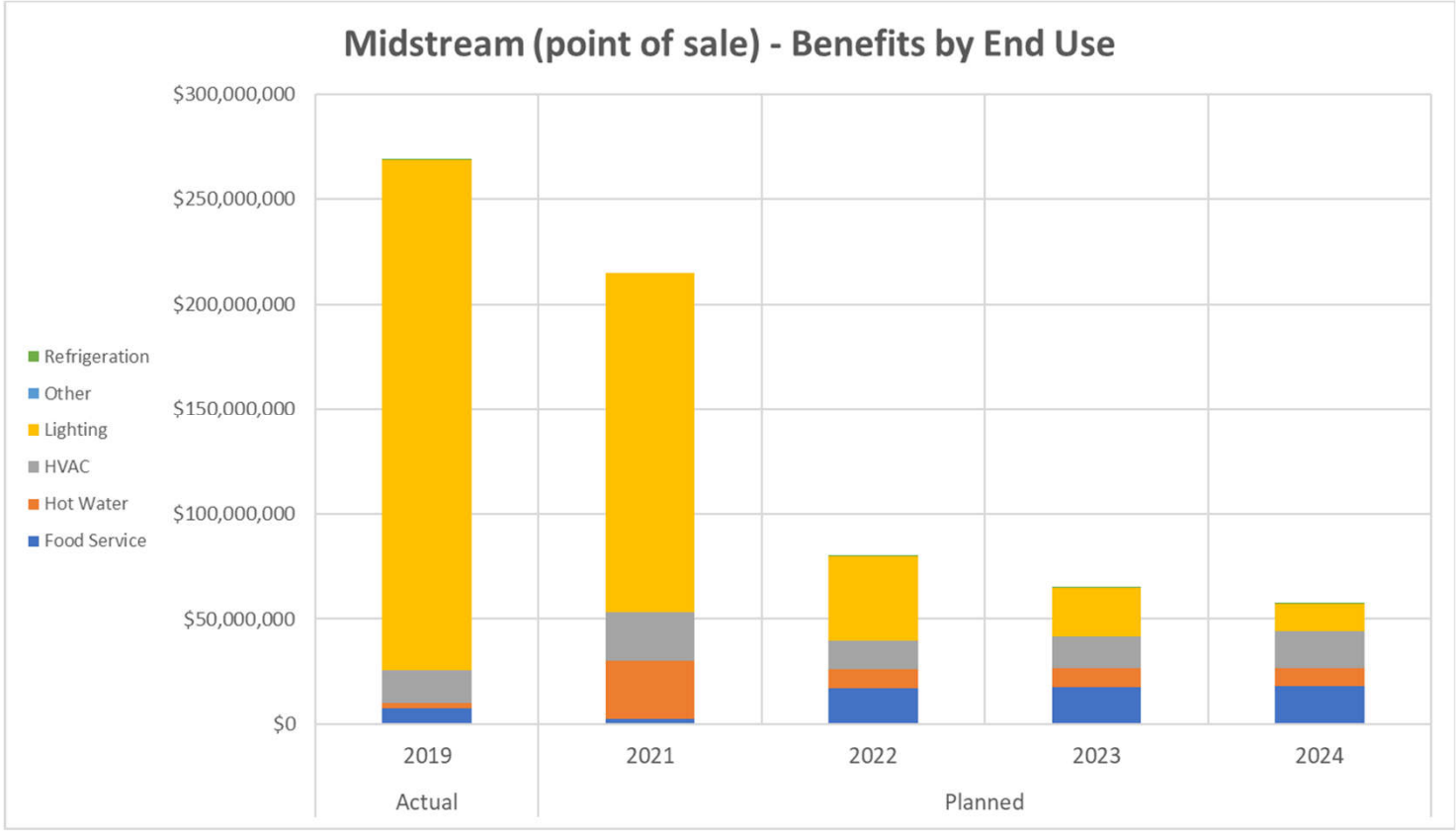
C&I EXISTING BUILDINGS

- **Incentives for lighting fall faster than rise in non-lighting**



C&I EXISTING BUILDING - NEW AND REPLACEMENT EQUIPMENT

- **Most benefits of "Midstream" point-of-sale offering (formerly Upstream) drop off with loss of lighting**



INCOME ELIGIBLE INCENTIVES BY END USE

	Planned Incentives			
End Use	2019-2021	2022-2024	$ change	% change
Behavior	$1,417,680	$1,664,385	$246,705	17%
Envelope	$81,508,306	$81,653,190	$144,884	0%
Hot Water	$16,628,618	$31,007,480	$14,378,862	86%
HVAC	$138,410,622	$149,109,959	$10,699,337	8%
Lighting	$24,979,427	$33,030,305	$8,050,878	32%
Motors/Drives	$1,200,000	$6,640,457	$5,440,457	453%
Process (Appliances)	$18,924,725	$21,848,117	$2,923,392	15%
Solar	$1,845,600	$3,220,000	$1,374,400	74%
TOTAL	$284,917,228	$328,176,144	$43,258,916	15%

End uses with negligible values have been omitted

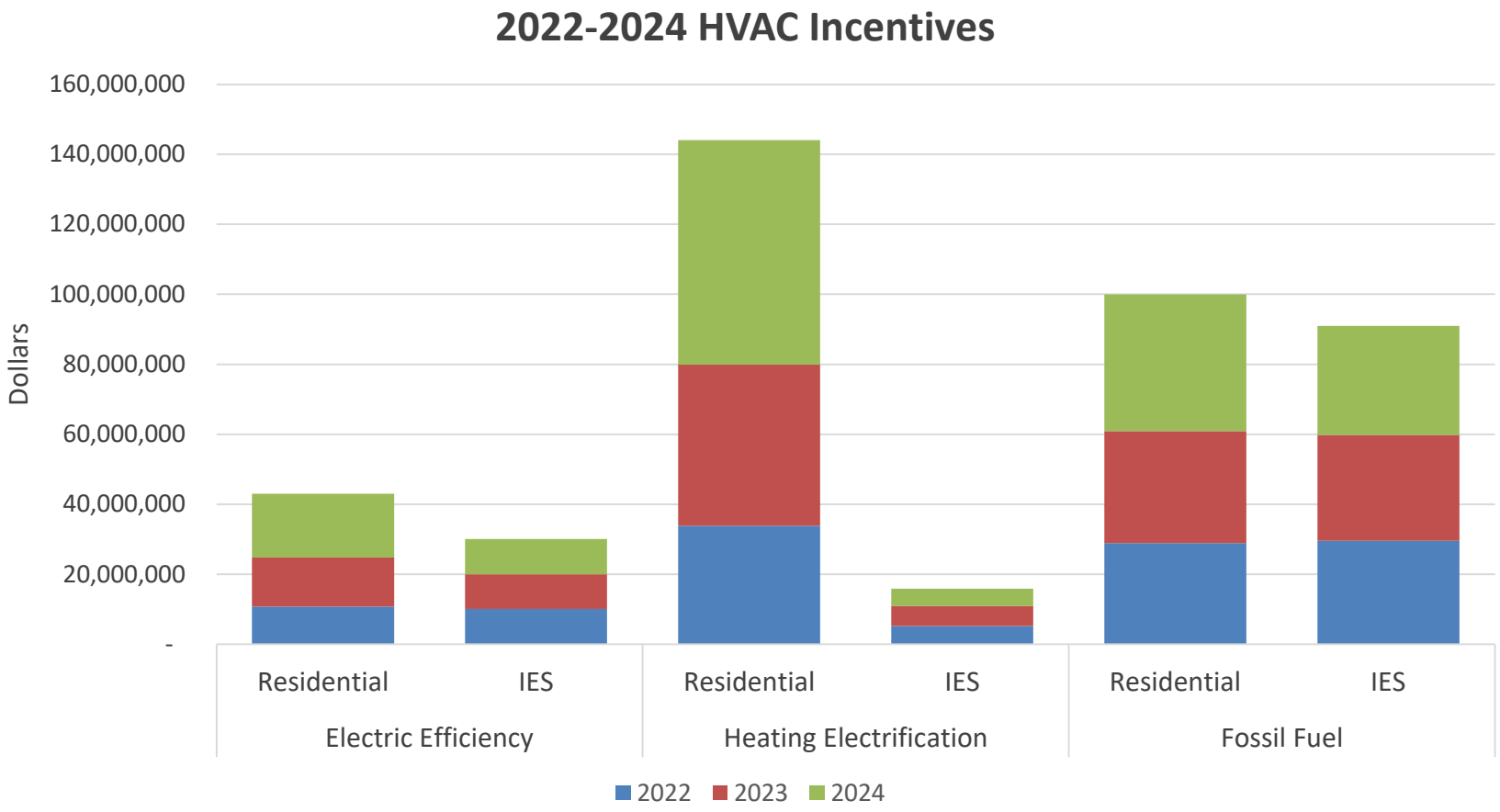
- Smallest incentive budget increases for envelope (flat) and for HVAC (8%)
- Lighting incentives increase 32%, but savings decrease 0.2%

COMPARING INCOME ELIGIBLE SINGLE- AND MULTIFAMILY INCENTIVES BY END USE

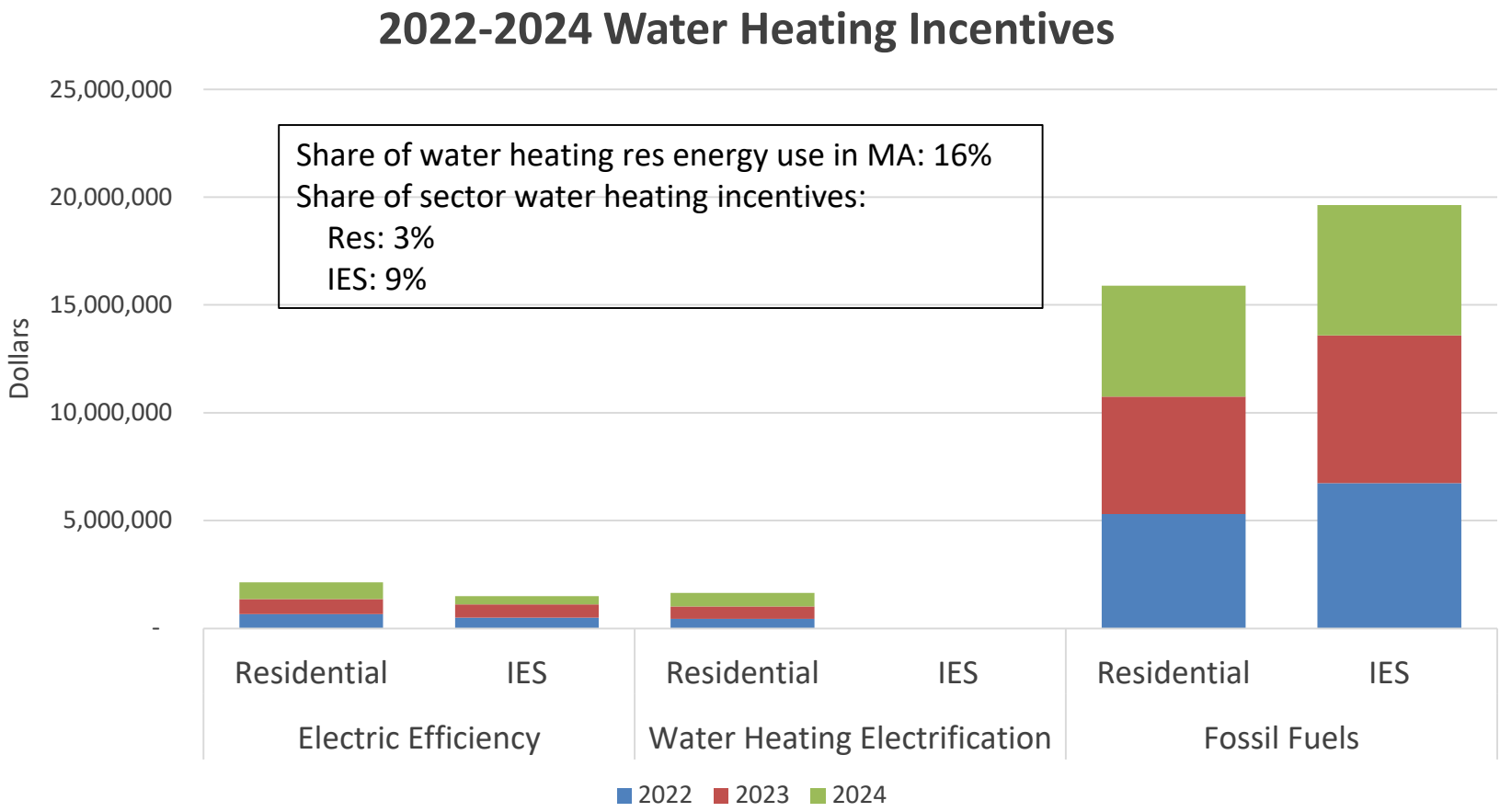
- 54% of incentive budget to single family
- Multifamily envelope decreases in new term in dollar and percentage terms
- Multifamily lighting increases in new term in dollar and percentage terms
- HVAC incentives increase for single family, decrease for

	2019-2022 Plan				2022-2024 Draft Plan			
	Single Family (1-4 units)		Multifamily (5 or more)		Single Family (1-4 units)		Multifamily (5 or more)	
End Use	Incentives	% of Incentives	Incentives	% of Incentives	Incentives	% of Incentives	Incentives	% of Incentives
Behavior	$604,680	0.4%	$813,000	0.6%	$ 986,154	0.6%	$ 678,231	0.5%
Envelope	$60,150,016	42.0%	$21,358,291	15.3%	$ 68,515,824	38.9%	$ 13,137,366	8.8%
Hot Water	$3,135,742	2.2%	$13,492,876	9.7%	$8,653,995	4.9%	$ 22,353,486	15.0%
HVAC	$60,794,492	42.4%	$77,616,130	55.5%	$75,456,170	42.8%	$ 73,653,789	49.5%
Lighting	$3,678,370	2.6%	$21,301,057	15.2%	$3,163,108	1.8%	$29,867,197	20.1%
Motors/Drives	$ -	0.0%	$1,200,000	0.9%	$ -	0.0%	$ 6,640,457	4.5%
Process (Appliances)	$14,912,225	10.4%	$4,012,500	2.9%	$19,322,474	11.0%	$ 2,525,643	1.7%
Total	$143,275,525		$139,793,853		$ 176,097,724		$ 148,856,169	

SHIFT TO ELECTRIFICATION IS UNDERWAY BUT SIGNIFICANT POTENTIAL REMAINS, ESP. FOR IES



WATER HEATING INVESTMENTS STILL DOMINATED BY GAS



PLANNED INCOME ELIGIBLE HEAT PUMP NUMBERS 2022-2024

		2022	2023	2024
Income Eligible	DMSHP SEER 18.0 HSPF 10, Displacing Electric Heat (Single Family)	80	91	93
	DMSHP SEER 20.0 HSPF 12, Displacing Electric Heat (Single Family)	105	126	128
	Central Ducted Heat Pump Partially Displacing Existing Furnace, Oil (Single Family)	25	26	28
	Central Ducted Heat Pump Partially Displacing Existing Furnace, Propane (Single Family)	22	32	32
	Central Ducted Heat Pump Fully Displacing Existing Furnace, Oil (Single Family)	32	42	42
	Central Ducted Heat Pump Fully Displacing Existing Furnace, Propane (Single Family)	27	37	37
	DMSHP with Integrated Controls Partially Displacing Existing Boiler, Oil (Single Family)	22	32	32
	DMSHP with Integrated Controls Partially Displacing Existing Boiler, Propane (Single Family)	27	37	37
	Custom - Heat Pumps displacing Electric Heat (Multifamily)	748	721	746
	Custom - Heat Pumps displacing Oil (Multifamily)	30	31	33
	Custom - Heat Pumps displacing Propane (Multifamily)	35	36	38
	Custom - Heat Pumps displacing Electric Heat (High Rise Multifamily)	748	721	746
	Custom - Heat Pumps displacing Oil (High Rise Multifamily)	30	31	33
	Custom - Heat Pumps displacing Propane (High Rise Multifamily)	35	36	38
	TOTAL INCOME ELIGIBLE	**1,966**	**2,002**	**2,060**