

# CONSULTANT RECOMMENDED PLAN TO ACHIEVE MA GHG GOALS

► July 28, 2021

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

# INTRODUCTION



- ▶ **On July 15, the Baker-Polito Administration established greenhouse gas (GHG) emissions reduction targets for the 2022-2024 Plan**
- ▶ **The April Draft plan GHG reductions will not meet the State’s targets**

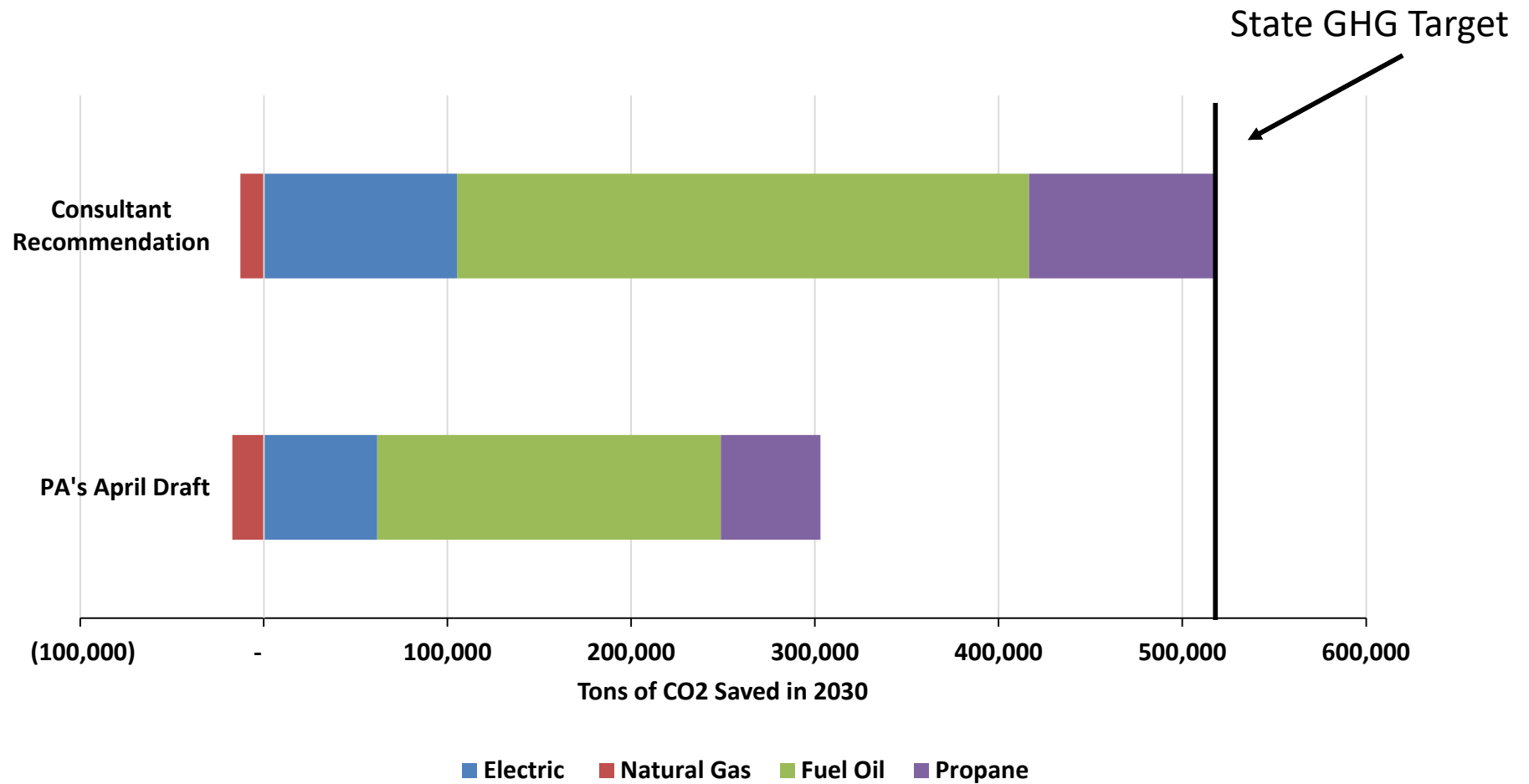
	<b>State GHG Reduction Goals (2030 metric tons of CO2e)</b>	<b>April Draft Plan GHG Reductions (2030 metric tons of CO2e)</b>	<b>April Draft Plan GHG Shortfall (2030 metric tons of CO2e)</b>
<b>Electric Programs</b>	504,000	285,937	218,063
<b>Gas Programs</b>	341,000	328,495	12,505
<b>Total</b>	<b>845,000</b>	<b>614,432</b>	<b>230,568</b>

- ▶ **Presentation identifies an alternative plan that better reflects Council priorities and the optimal plan to achieve State GHG reductions goals through efficiency**

# OVERVIEW OF METHODOLOGY AND ASSUMPTIONS

- ▶ **Key end uses were broken into more detailed “sub end uses” (HVAC, Hot Water, Custom)**
  - Allowed for better understanding of which measures provided greatest impact for GHG reductions
- ▶ **Adjustments made to April Draft Plan occurred at sub-end use or end use**
- ▶ **Majority of adjustments occurred to the electric programs**
- ▶ **Consistent with EEA methodology, GHG savings represent cumulative annual savings in 2030**
- ▶ **GHG savings are based on adjusted gross energy savings**

# ELECTRIC PORTFOLIO – GHG SAVINGS BY FUEL



# PORTFOLIO METRICS SUMMARY - ELECTRIC

April Draft Plan	2030 Emissions (metric tons of CO2e)	Electric Savings (Lifetime MWh)	Gas Savings (Lifetime Therms)	Oil Savings (Lifetime MMBTU)	Propane Savings (Lifetime MMBTU)	Benefits (\$Millions)	Incentive Costs (\$Millions)
<b>Residential</b>	222,251	894,400	15,675,211	40,648,159	12,517,528	\$2,660	\$518
<b>IES</b>	26,655	843,791	1,898,790	4,241,380	1,236,877	\$553	\$184
<b>C&amp;I</b>	37,031	9,361,180	(78,796,799)	(533,961)	230,385	\$1,759	\$567
<b>Total</b>	<b>285,937</b>	<b>11,099,371</b>	<b>(61,222,798)</b>	<b>44,355,578</b>	<b>13,984,789</b>	<b>\$4,972</b>	<b>\$1,270</b>

Consultant Estimate	2030 Emissions (metric tons of CO2e)	Electric Savings (Lifetime MWh)	Gas Savings (Lifetime Therms)	Oil Savings (Lifetime MMBTU)	Propane Savings (Lifetime MMBTU)	Benefits (\$Millions)	Incentive Costs (\$Millions)
<b>Residential</b>	318,353	382,784	15,836,303	56,048,446	19,513,451	\$3,587	\$668
<b>IES</b>	34,252	994,643	3,887,306	4,888,488	2,063,513	\$674	\$234
<b>C&amp;I</b>	153,877	11,896,363	(68,882,720)	112,590	1,294,039	\$2,400	\$760
<b>Total</b>	<b>506,483</b>	<b>13,273,790</b>	<b>(49,159,111)</b>	<b>63,049,524</b>	<b>22,871,003</b>	<b>\$6,661</b>	<b>\$1,662</b>

# PORTFOLIO METRICS SUMMARY - GAS

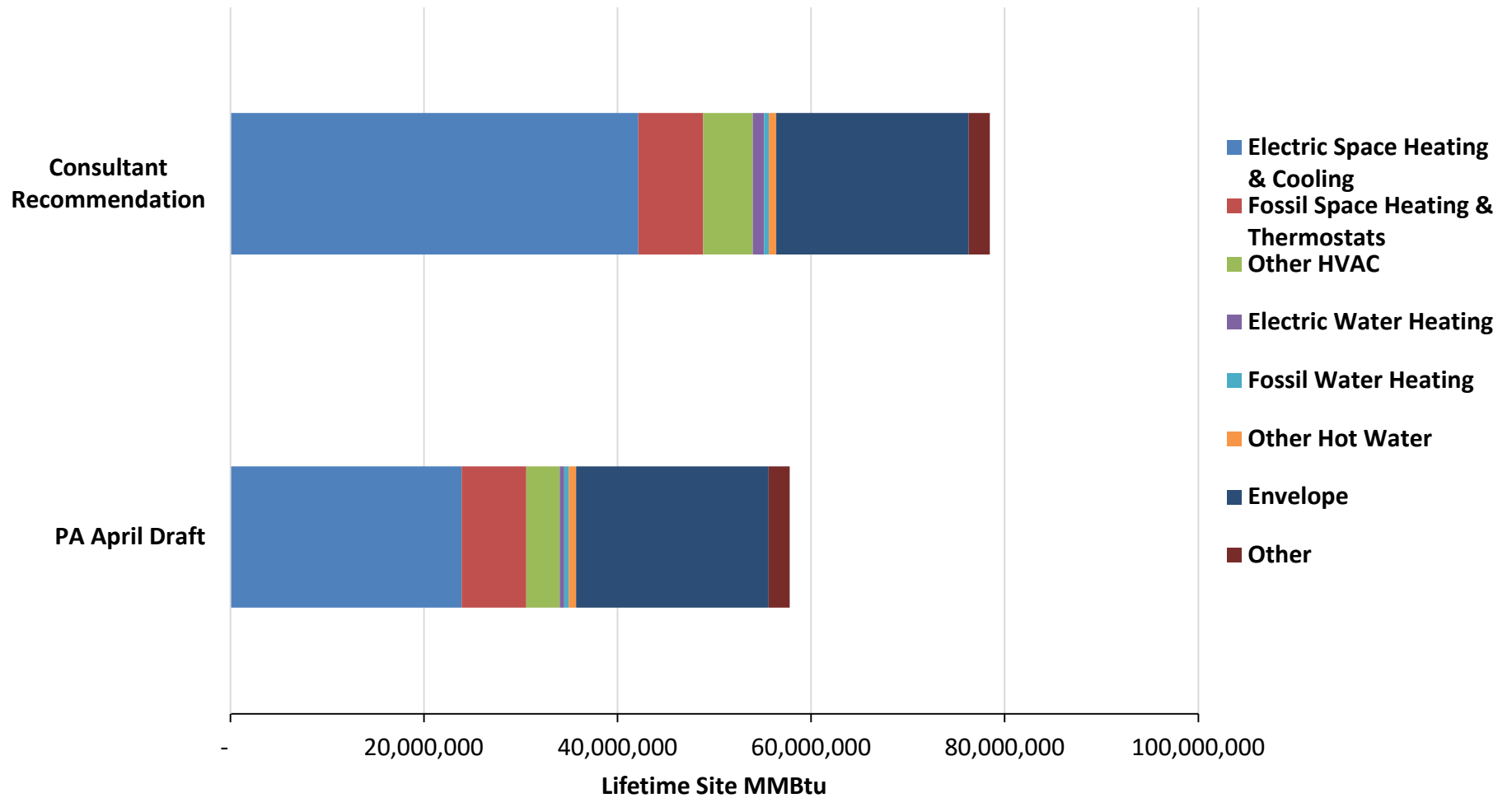
April Draft Plan	2030 Emissions (metric tons of CO2e)	Electric Savings (Lifetime MWh)	Gas Savings (Lifetime Therms)	Benefits (\$Millions)	Incentive Costs (\$Millions)
<b>Residential</b>	150,036	178,136	498,893,766	\$1,325	\$416
<b>IES</b>	40,850	69,173	135,017,335	\$489	\$150
<b>C&amp;I</b>	137,609	1,332	306,591,050	\$647	\$93
<b>Total</b>	<b>328,495</b>	<b>248,641</b>	<b>940,502,151</b>	<b>\$2,461</b>	<b>\$660</b>

Consultant Estimate	2030 Emissions (metric tons of CO2e)	Electric Savings (Lifetime MWh)	Gas Savings (Lifetime Therms)	Benefits (\$Millions)	Incentive Costs (\$Millions)
<b>Residential</b>	150,036	178,136	498,893,766	\$1,325	\$416
<b>IES</b>	40,850	69,173	135,017,335	\$489	\$150
<b>C&amp;I</b>	150,337	1,332	337,888,526	\$714	\$106
<b>Total</b>	<b>341,223</b>	<b>248,641</b>	<b>971,799,627</b>	<b>\$2,528</b>	<b>\$671</b>

# RESIDENTIAL SECTOR ALTERATIONS TO APRIL DRAFT PLAN

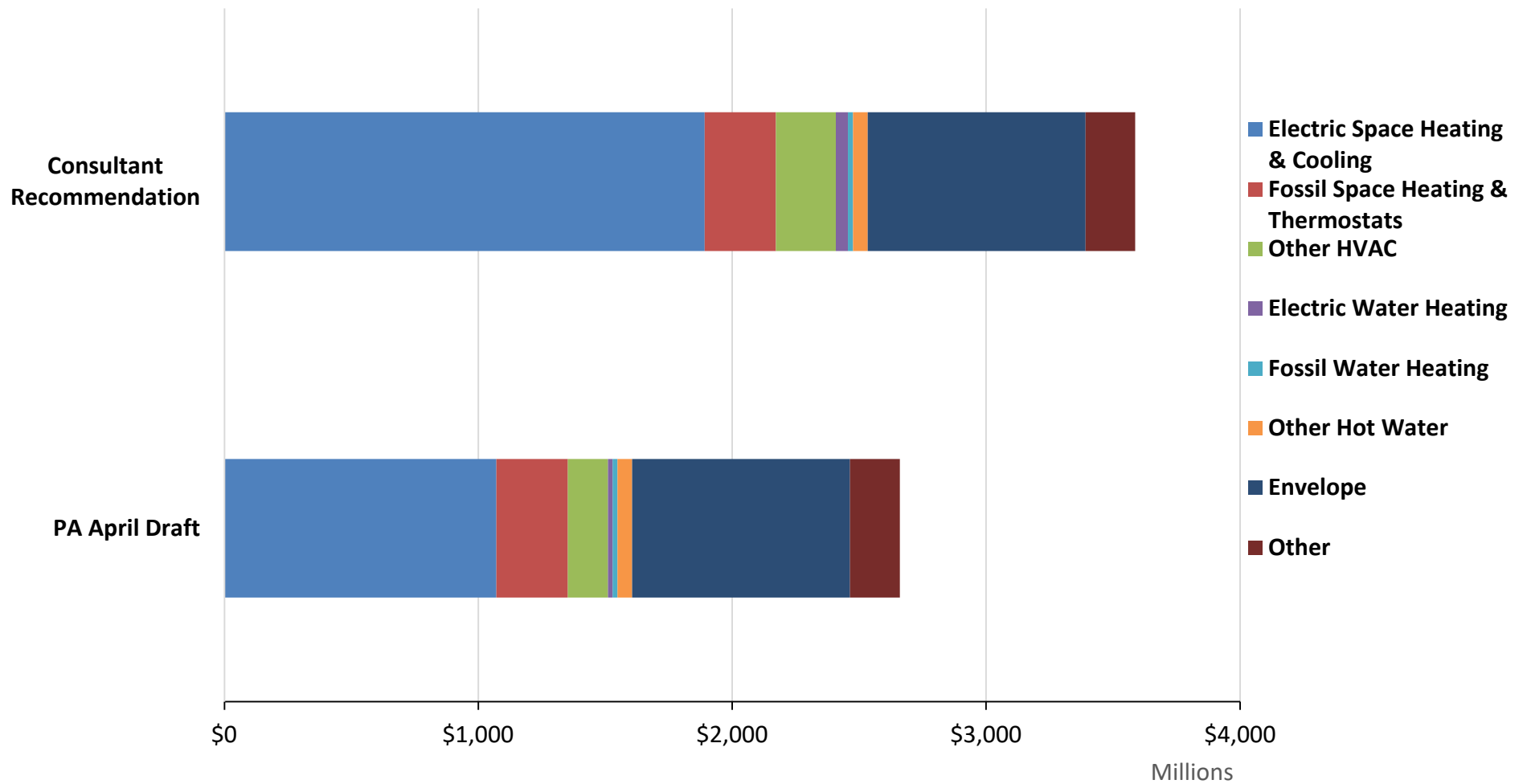
- ▶ **2030 GHG goal requires a shift to emphasize electrification and weatherization**
- ▶ **These measure offer high GHG value of fuel savings vs electric savings as grid becomes cleaner**
- ▶ **Identified additional investment in electrification needed to achieve Council priorities and GHG goals**
- ▶ **\$150 million additional incentive funding to Residential Heat Pumps (HPs) & Heat Pump Water Heaters (HPWHs)**
  - Approximately \$140 million for space heating
  - \$10 million for water heating
  - Spread out over 3 years (17%, 28%, 55%)
- ▶ **Maintained 2022-24 draft plan investment levels in envelope which are ~65% higher than previous plan**
- ▶ **Made no alterations to the Gas Plan**

# RESIDENTIAL ELECTRIC PROGRAM ENERGY SAVINGS COMPARISON TO APRIL DRAFT PLAN

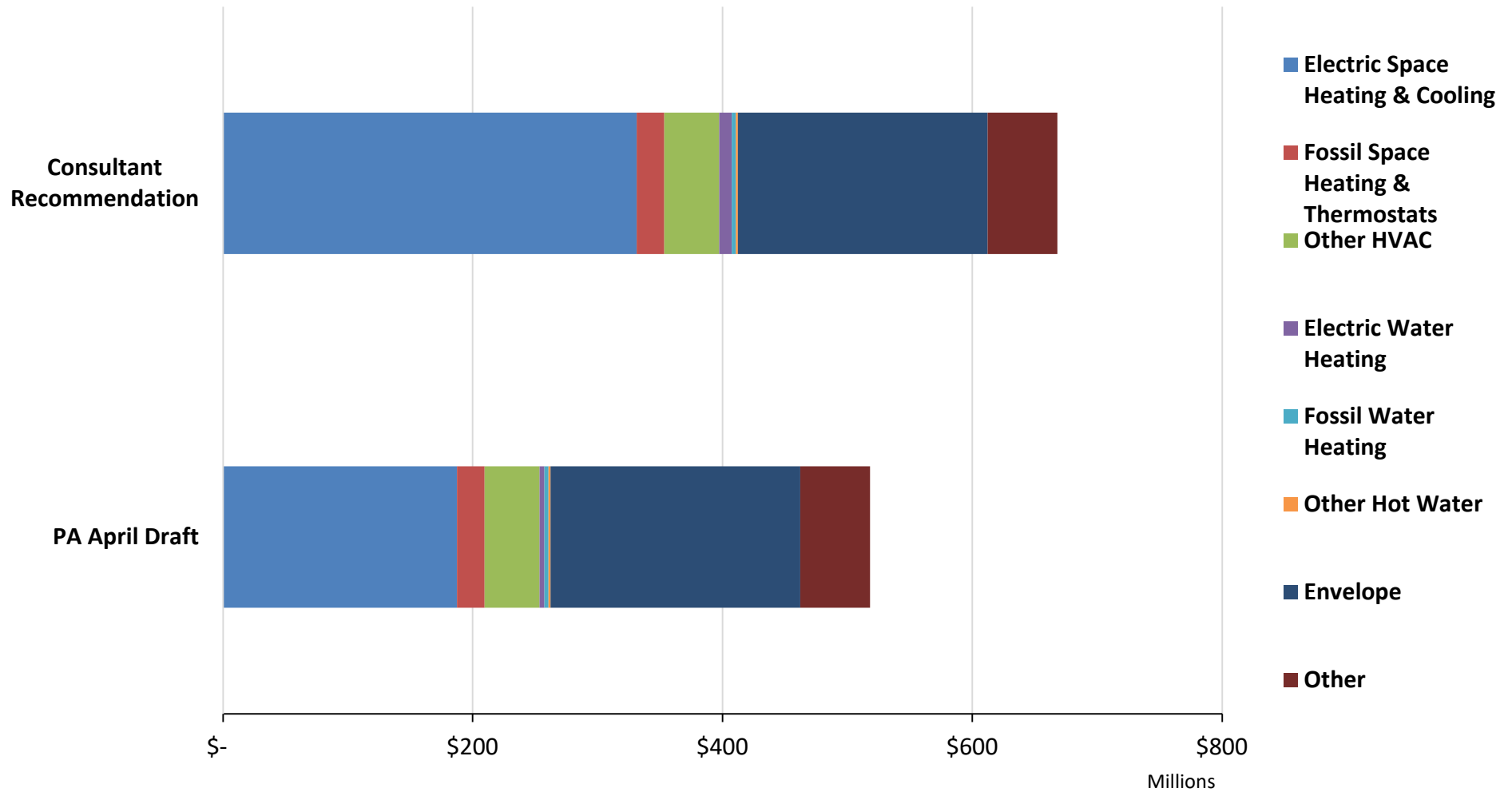




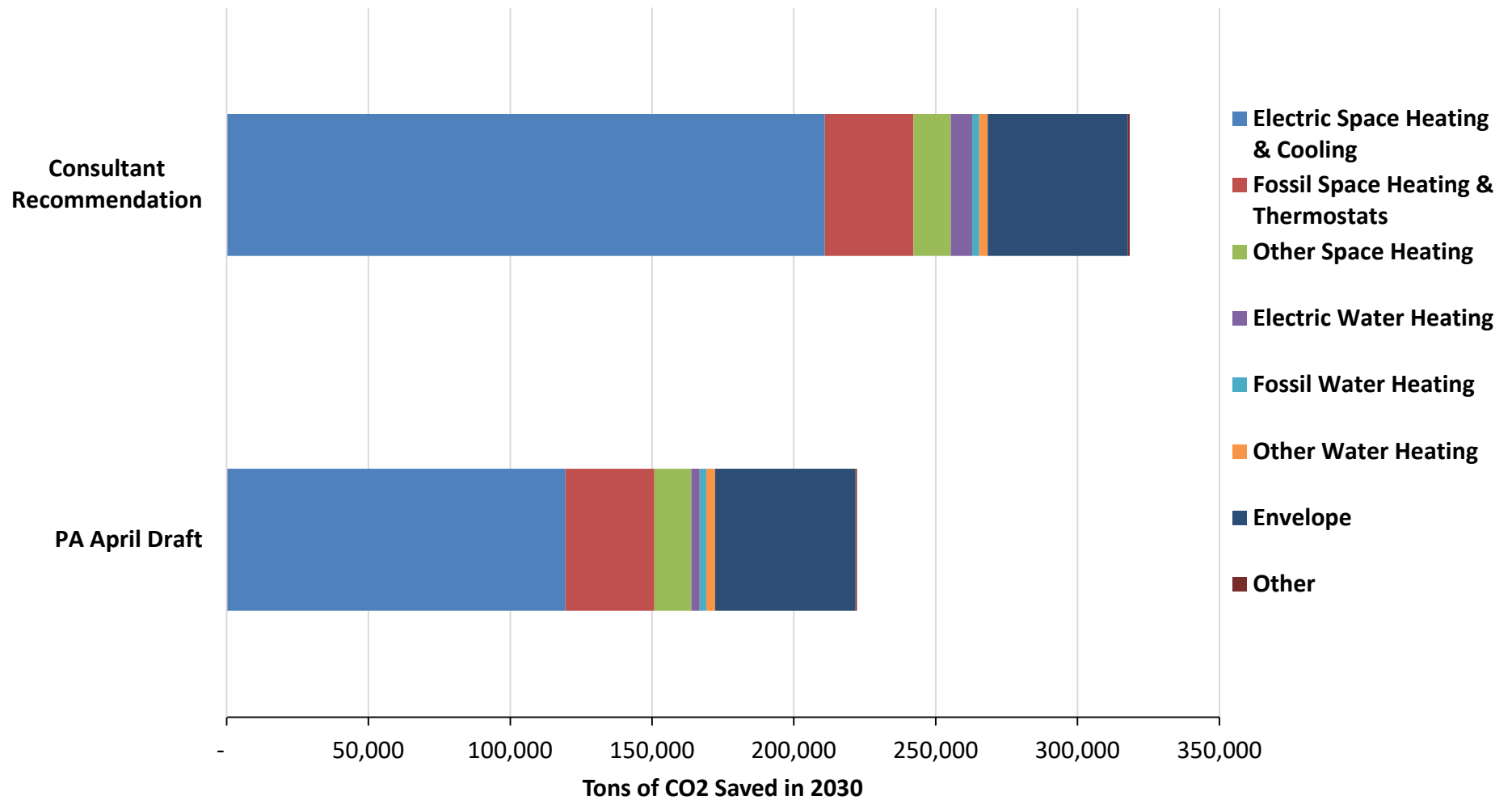
# RESIDENTIAL ELECTRIC PROGRAM BENEFITS COMPARISON TO APRIL DRAFT PLAN



# RESIDENTIAL ELECTRIC PROGRAM INCENTIVE COST COMPARISON TO APRIL DRAFT PLAN



# RESIDENTIAL ELECTRIC PROGRAM GHG SAVINGS COMPARISON TO APRIL DRAFT PLAN



# IES SECTOR ALTERATIONS TO APRIL DRAFT PLAN

- ▶ **2030 GHG goal requires increased investment in electrification, weatherization/envelope measures and technologies to support active demand for IES customers**
- ▶ **These measures will offer high GHG value of fuel savings vs electric savings as grid becomes cleaner**
- ▶ **Achieving 2030 GHG goals will require shifting funds from lighting and fossil fuel heating systems to priority measures like envelope and electrification**
- ▶ **Made no changes to the Gas Plan**

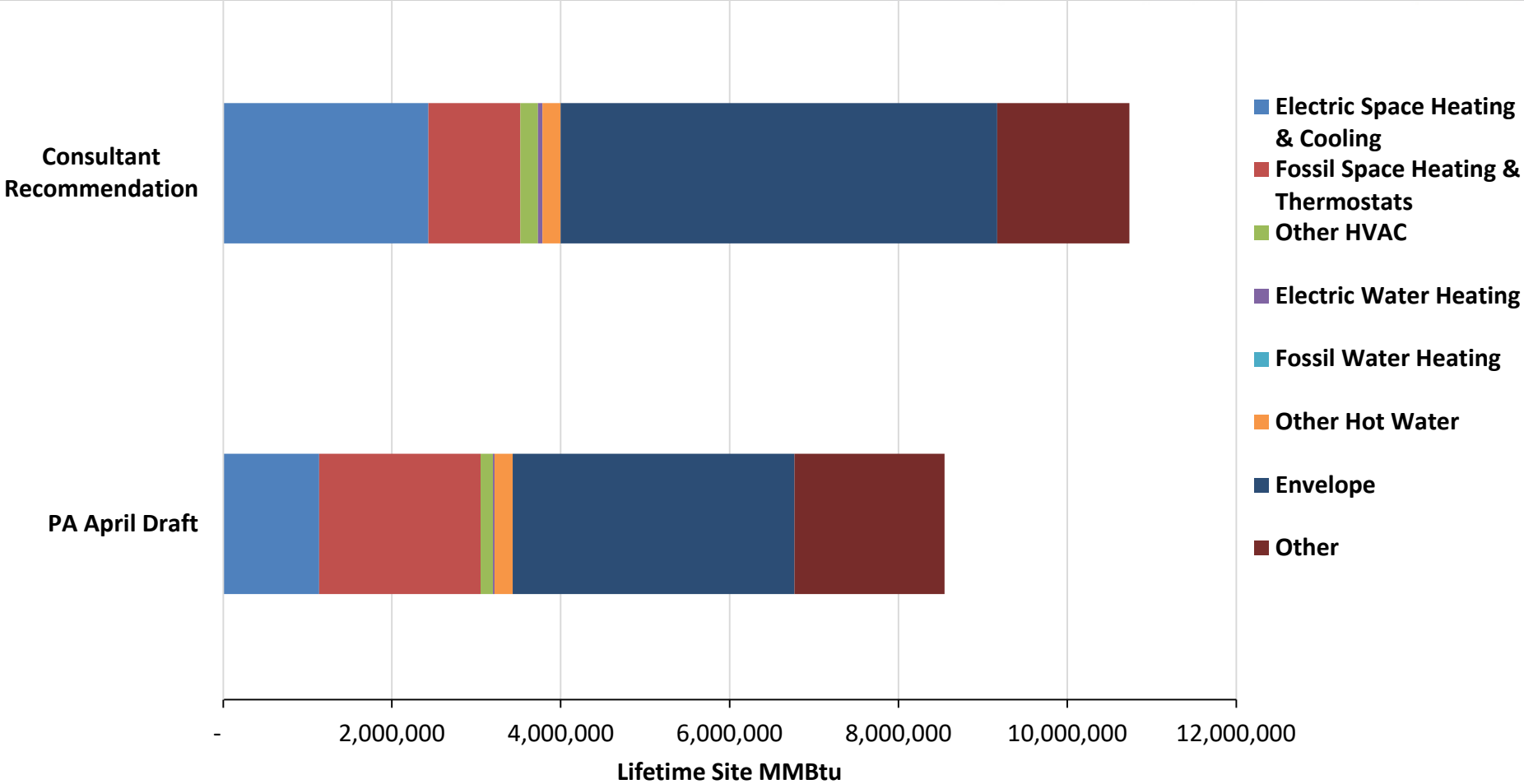
## Funding Decreases

- \$8 million reduction in funding to lighting
- \$15 million reduction in funding to fossil fuel heating systems

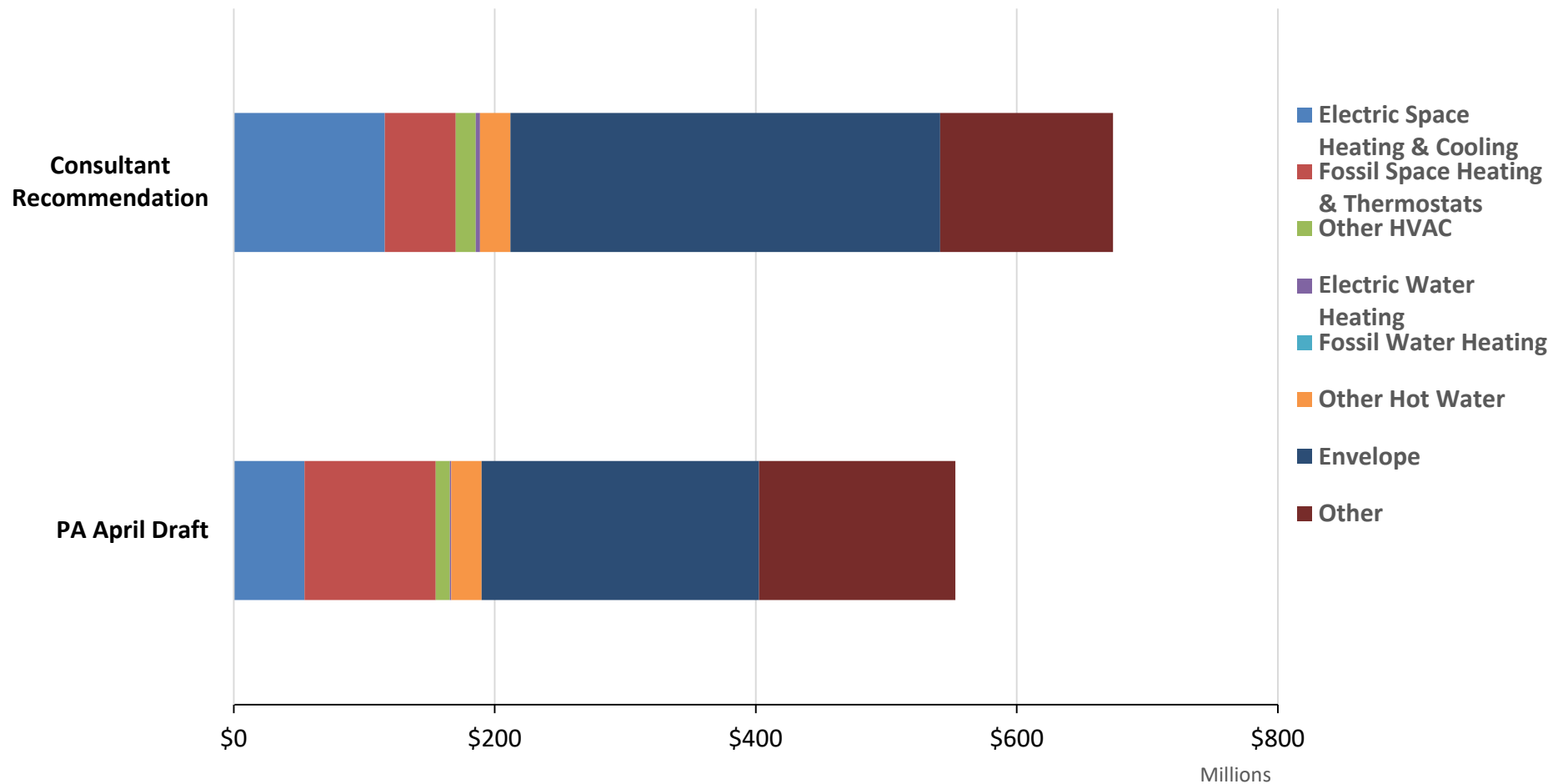
## Funding Increases (Including a \$50 million increase in incentives)

- \$15 million to additional envelope funding
- \$1.6 million to additional thermostats
- \$56.4 million to IES HPs & HPWH
  - ~\$51.4 million to space heating
  - ~ \$5 million to hot water

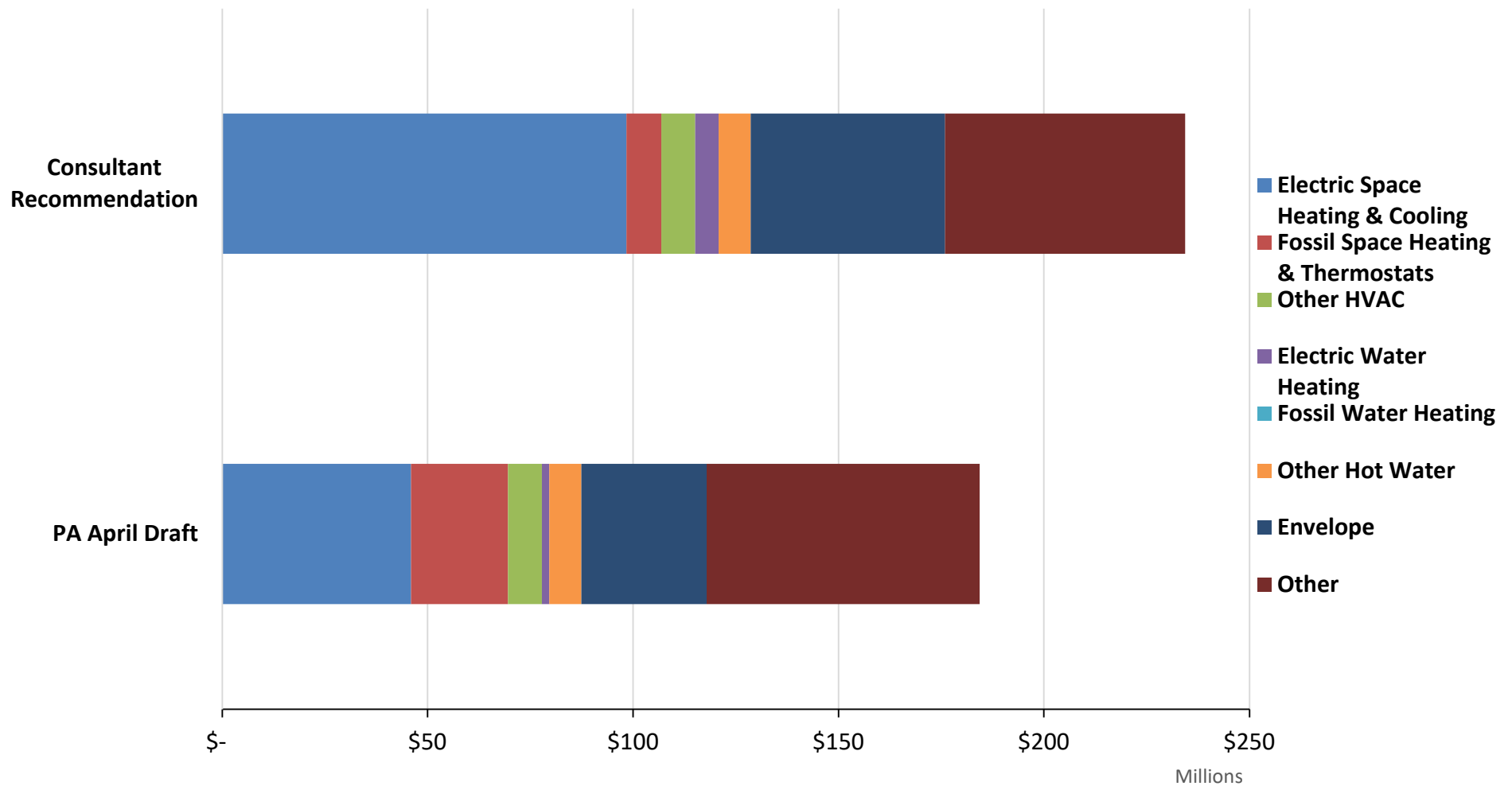
# IES ELECTRIC PROGRAM ENERGY SAVINGS COMPARISON TO APRIL DRAFT PLAN



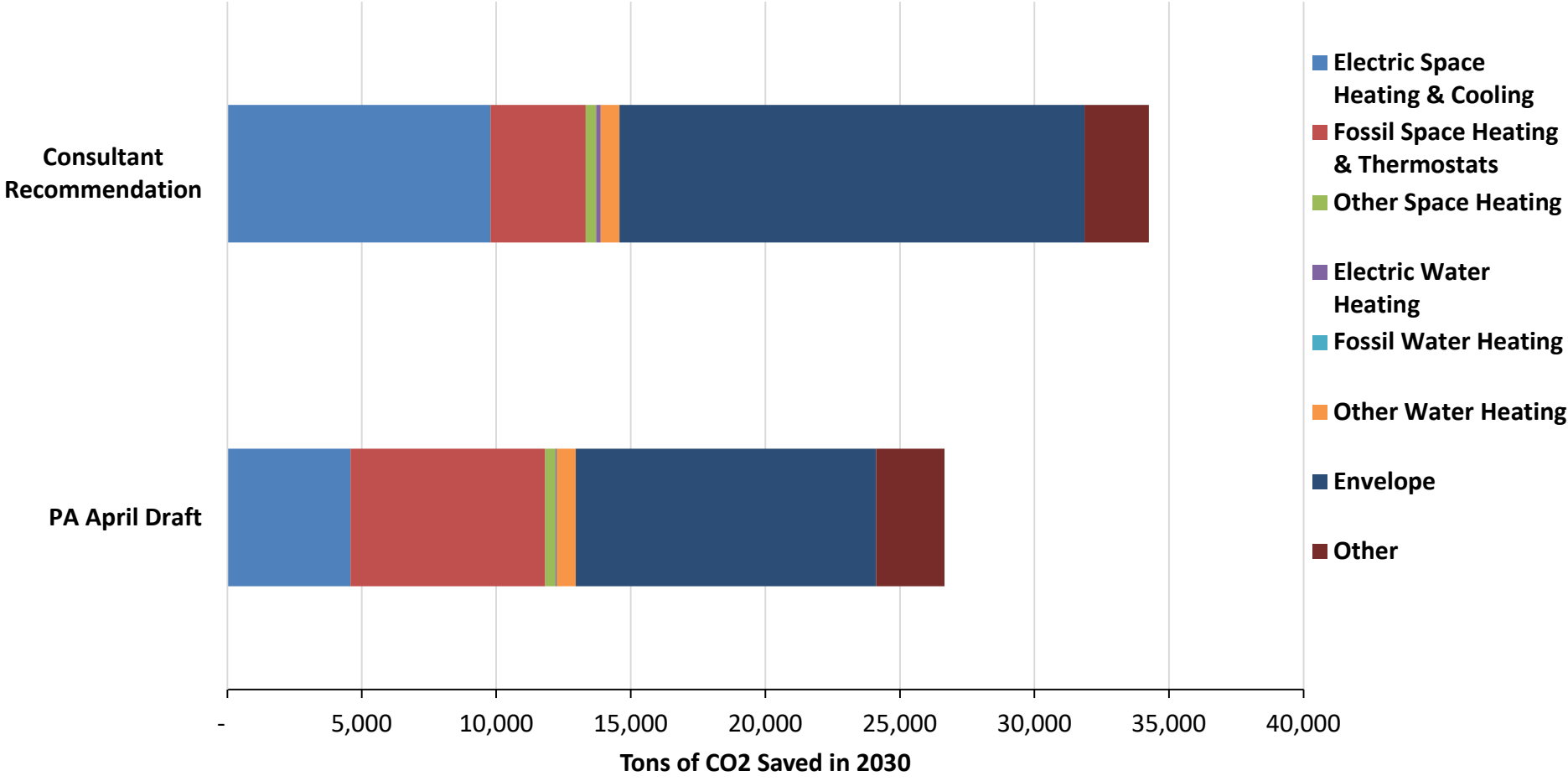
# IES ELECTRIC PROGRAM BENEFITS COMPARISON TO APRIL DRAFT PLAN



# IES ELECTRIC PROGRAM INCENTIVE COST COMPARISON TO APRIL DRAFT PLAN



# IES ELECTRIC PROGRAM GHG SAVINGS COMPARISON TO APRIL DRAFT PLAN

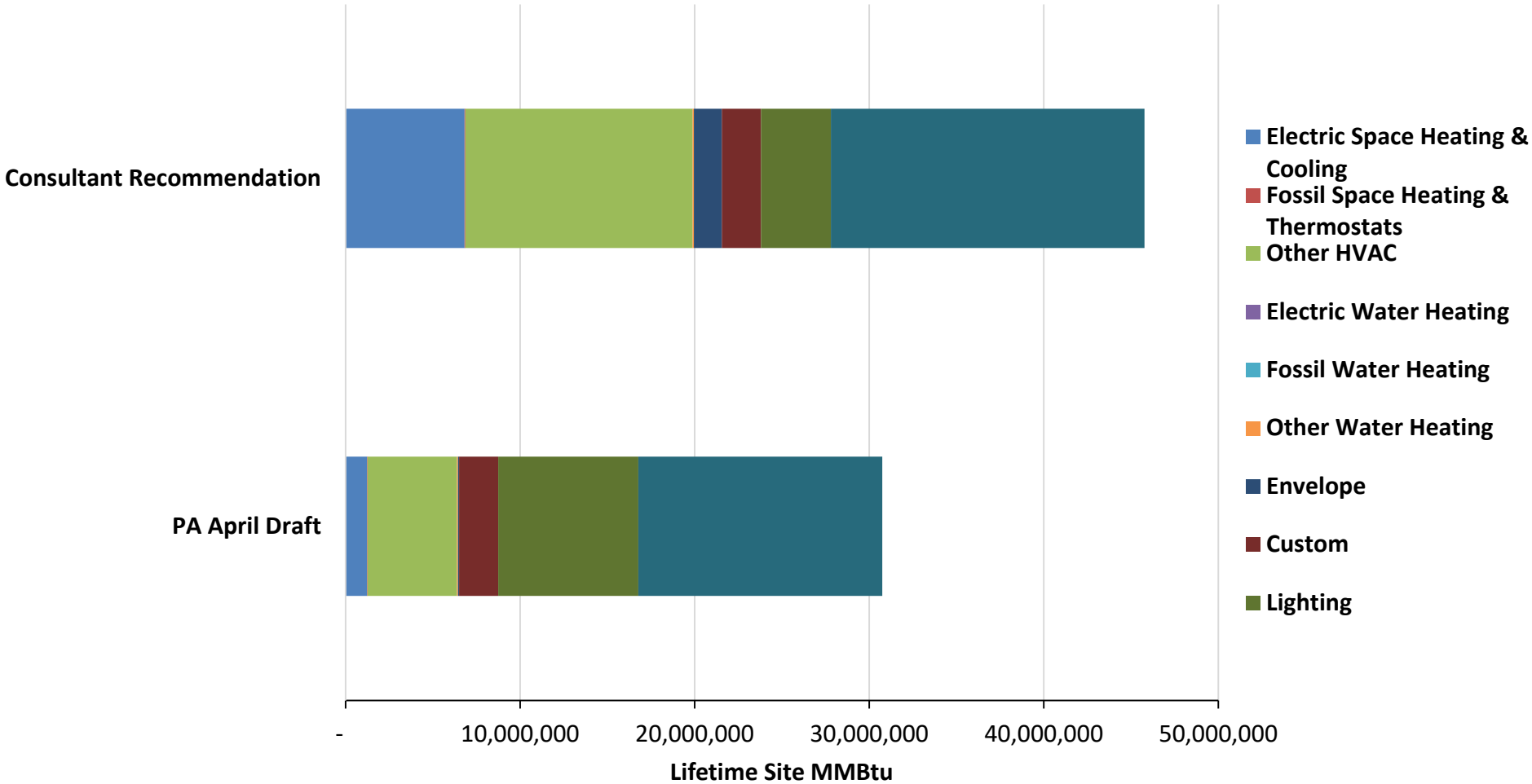




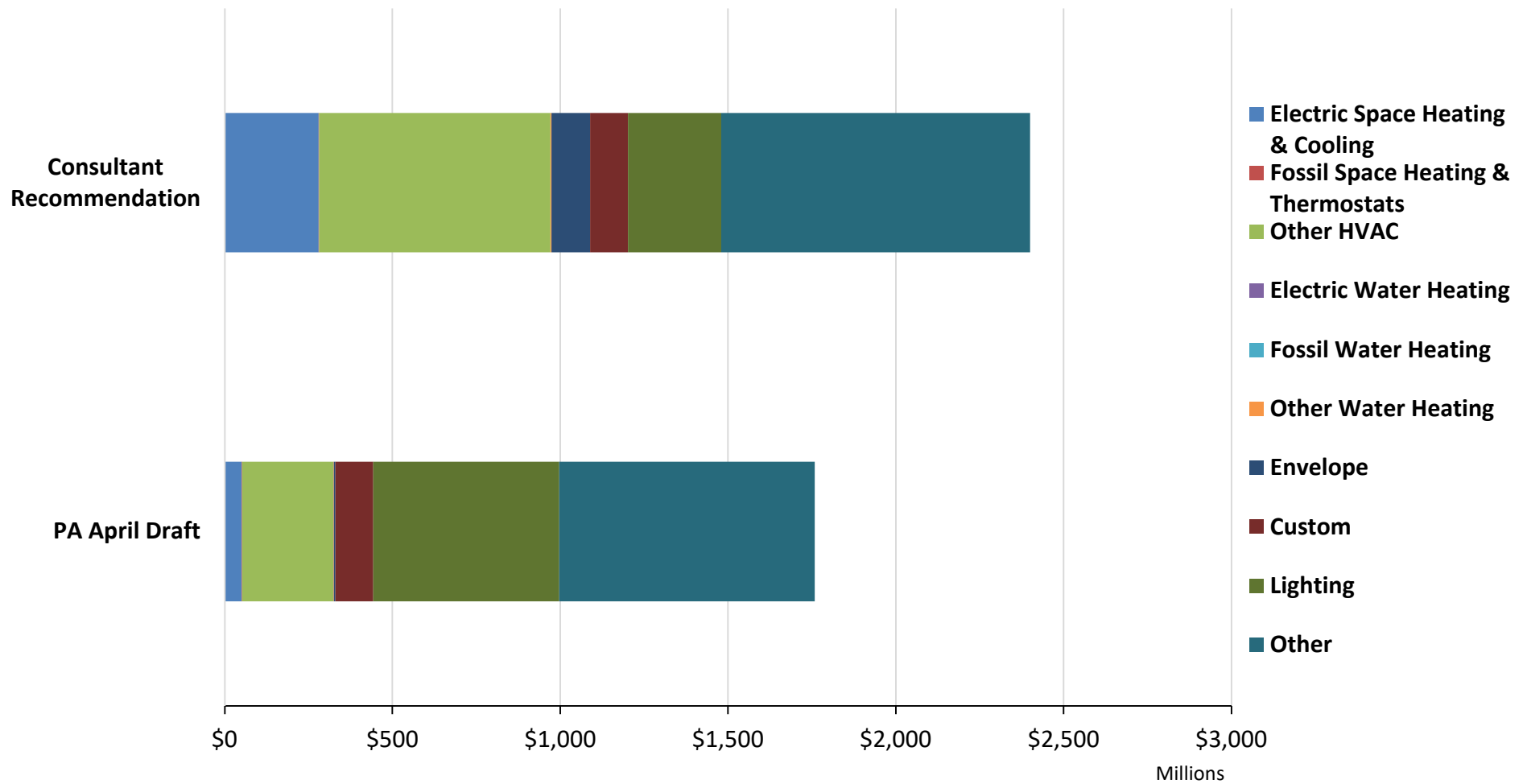
# C&I ELECTRIC PROGRAM ALTERATIONS TO APRIL DRAFT PLAN

- ▶ **April draft plan well below available electric savings identified in PA potential studies**
- ▶ **To achieve 2030 GHG goal, need to move away from low impact measures like lighting and focus on higher impact measures like envelope**
- ▶ **Increased electric program incentive spending to 2019-21 Planned levels (an additional ~\$192 Million)**
  - Reallocated half of incentive spending on lighting (\$133 million) to longer-lived, and more GHG reducing measures like HVAC, envelope and fuel switching
  - Envelope spending increased to \$50 million to capture most of identified statewide potential
  - HVAC spending increased (+\$150 million) to capture more of identified statewide potential
  - Remaining additional funding (\$98 million) spread out among remaining end uses ( i.e. refrigeration and process)
    - consistent with savings identified in potential studies

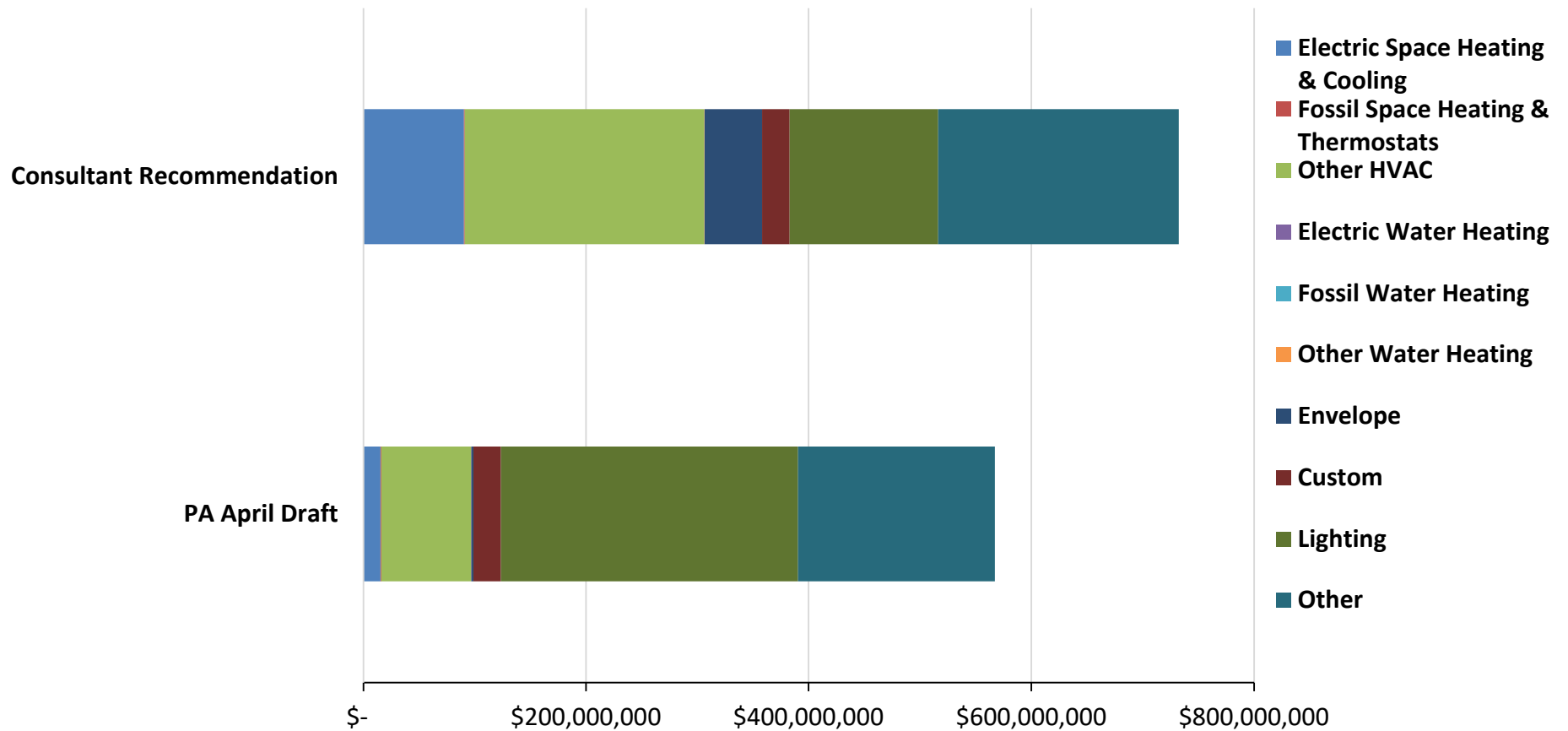
# C&I ELECTRIC PROGRAM ENERGY SAVINGS COMPARISON TO APRIL DRAFT PLAN



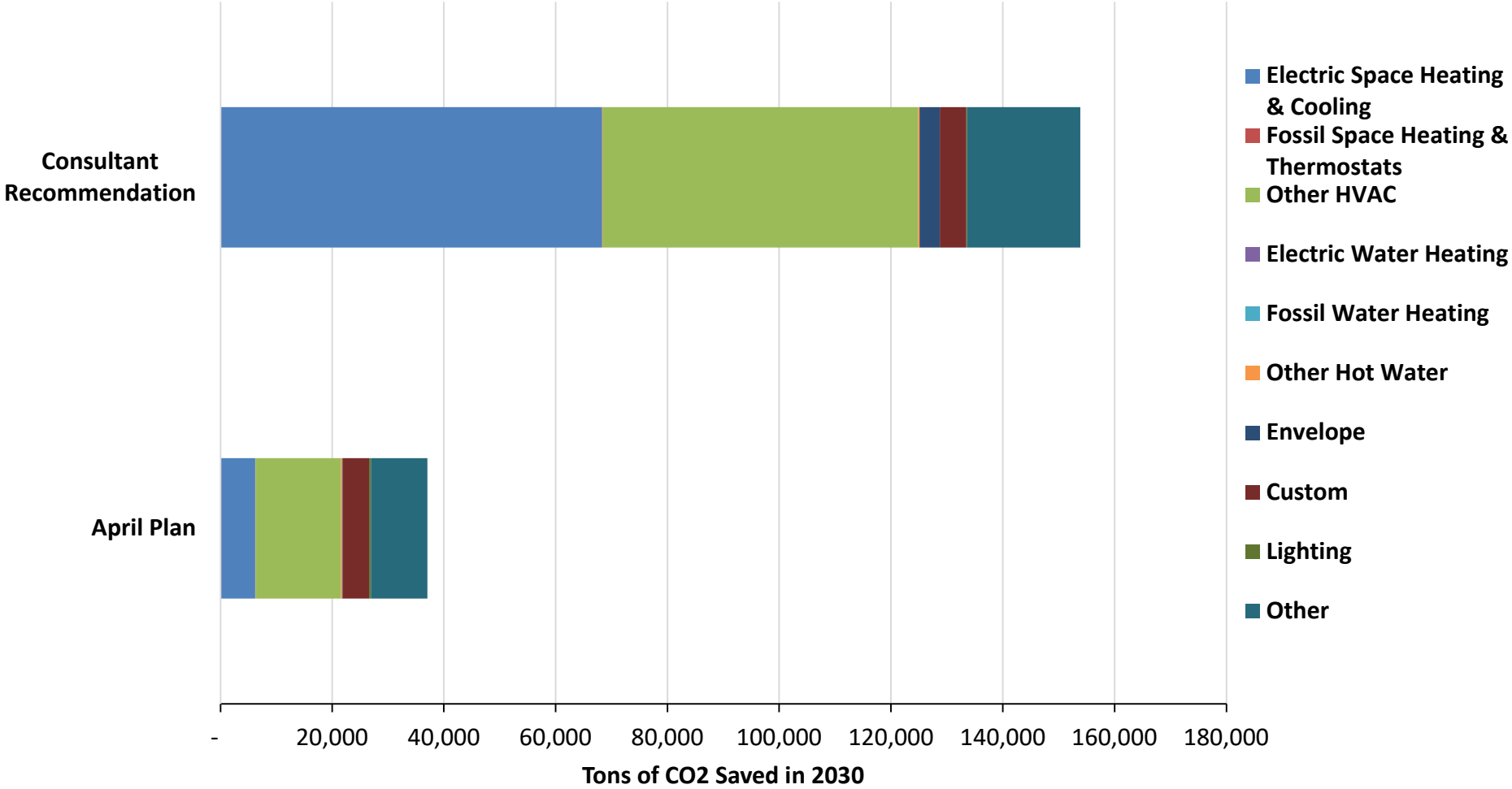
# C&I ELECTRIC PROGRAM BENEFITS COMPARISON TO APRIL DRAFT PLAN



# C&I ELECTRIC PROGRAM INCENTIVE COST COMPARISON TO APRIL DRAFT PLAN

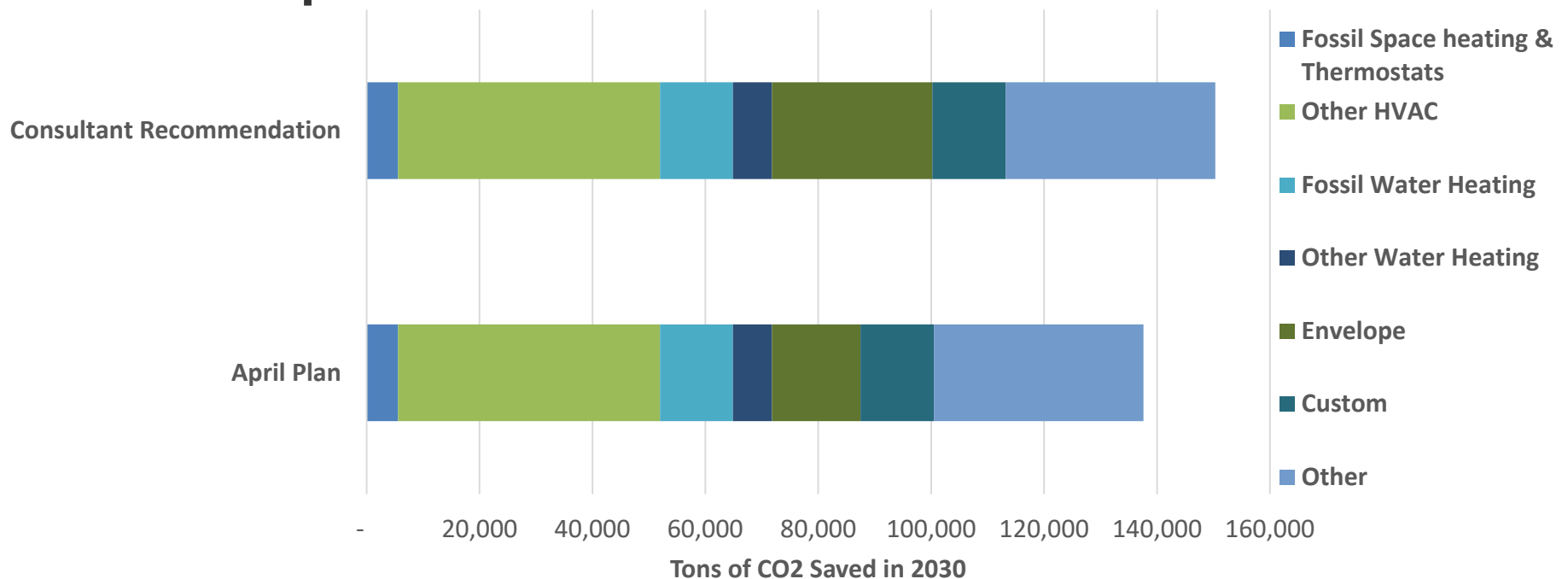


# C&I ELECTRIC PROGRAM GHG SAVINGS COMPARISON TO APRIL DRAFT PLAN



# C&I GAS PROGRAM ALTERATIONS TO APRIL DRAFT PLAN

- ▶ Overall incentive spending on gas increased slightly over 2019-2021 Planned levels (An increase of ~\$13 Million)
- ▶ Use increase in funding to pursue additional envelope



# CONCLUSION AND NEXT STEPS

- ▶ **Achieving the Commonwealth’s GHG reduction goals for the 2022-2024 plan will require changes from the April Draft Plan**
- ▶ **Consultant Team has identified a path to address Council priorities and achieve GHG goals by focusing on:**
  - Residential HPs & HPWHs
  - IES envelope, thermostats, and HP & HPWHs
  - C&I envelope and HVAC
- ▶ **Consultant Team will continue to work with the PAs through the Key Drivers process and other forums to discuss how to best achieve the state GHG goal**

# THANK YOU

## Questions?

▶ July 28, 2021

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





# APPENDIX

# RESIDENTIAL SECTOR METRICS SUMMARY

Electric - April Plan	2030 Emissions	Electric Savings (Lifetime MWh)	Gas Savings (Lifetime Therms)	Oil Savings (Lifetime MMBTU)	Propane Savings (Lifetime MMBTU)	Benefits	Incentive Costs
Electric Space Heating & Cooling	119,484	(959,924)	-	19,071,039	8,109,310	\$1,071,091,568	\$187,494,895
Fossil Space Heating & Thermostats	31,293	120,943	805,314	4,822,509	1,364,910	\$281,328,084	\$22,002,346
Other HVAC	13,186	452,637	451,975	658,878	1,208,657	\$158,505,237	\$44,048,995
Electric Water Heating	2,849	15,589	(37,019)	279,893	120,368	\$18,174,923	\$3,791,150
Fossil Water Heating	2,455	(991)	-	309,674	167,563	\$19,530,218	\$3,458,000
Other Water Heating	3,038	53,547	127,648	583,312	(12,444)	\$57,697,297	\$1,550,667
Envelope	49,444	580,675	14,327,292	14,911,870	1,558,208	\$857,825,159	\$200,018,339
Other	597	631,923	-	10,985	955	\$196,035,532	\$55,843,456
<b>Total</b>	<b>222,251</b>	<b>894,400</b>	<b>15,675,211</b>	<b>40,648,159</b>	<b>12,517,528</b>	<b>\$2,660,188,017</b>	<b>\$518,207,848</b>

Electric - Consultant Plan	2030 Emissions	Electric Savings (Lifetime MWh)	Gas Savings (Lifetime Therms)	Oil Savings (Lifetime MMBTU)	Propane Savings (Lifetime MMBTU)	Benefits	Incentive Costs
Electric Space Heating & Cooling	210,882	(1,714,860)	-	33,711,029	14,304,927	\$1,891,235,219	\$331,364,011
Fossil Space Heating & Thermostats	31,293	120,943	805,314	4,822,509	1,364,910	\$281,328,084	\$22,002,346
Other HVAC	13,109	673,901	672,068	959,382	1,801,029	\$235,444,419	\$44,048,995
Electric Water Heating	7,554	37,646	(96,020)	739,687	328,302	\$48,062,003	\$9,922,034
Fossil Water Heating	2,455	(991)	-	309,674	167,563	\$19,530,218	\$3,458,000
Other Water Heating	3,038	53,547	127,648	583,312	(12,444)	\$57,697,297	\$1,550,667
Envelope	49,444	580,675	14,327,292	14,911,870	1,558,208	\$857,825,159	\$200,018,339
Other	579	631,923	-	10,985	955	\$196,035,532	\$55,843,456
<b>Total</b>	<b>318,353</b>	<b>382,784</b>	<b>15,836,303</b>	<b>56,048,446</b>	<b>19,513,451</b>	<b>\$3,587,157,931</b>	<b>\$668,207,848</b>

# RESIDENTIAL SECTOR – CONSULTANT CHANGES

April Draft Plan	2030 Emissions	Electric Savings (Lifetime MWh)	Oil Savings (Lifetime MMBTU)	Propane Savings (Lifetime MMBTU)	Benefits (\$Millions)	Incentive Costs (\$Millions)
<b>Electric Space Heating &amp; Cooling</b>	119,484	(959,924)	19,071,039	8,109,310	\$1,071	\$187
<b>Electric Water Heating</b>	2,849	15,589	279,893	120,368	\$18	\$4

Consultant Estimate	2030 Emissions	Electric Savings (Lifetime MWh)	Oil Savings (Lifetime MMBTU)	Propane Savings (Lifetime MMBTU)	Benefits (\$Millions)	Incentive Costs (\$Millions)
<b>Electric Space Heating &amp; Cooling</b>	210,882	(1,714,860)	33,711,029	14,304,927	\$1,891,235,219	\$331,364,011
<b>Electric Water Heating</b>	7,554	37,646	739,687	328,302	\$48,062,003	\$9,922,034

# RESIDENTIAL & IES HEAT PUMPS

April Draft Plan	Incentive Budget	Quantity
Residential	\$187,494,895	67,082
Income Eligible	\$45,954,185	3,856
Fuel Switching (Subset of above categories)	\$159,940,562	28,393

Consultant Recommended Plan	Incentive Budget	Quantity
Residential	\$331,364,011	118,425
Income Eligible	\$98,407,397	8,222
Fuel Switching (Subset of above categories)	\$294,444,856	50,450

# IES SECTOR METRICS SUMMARY

Electric - April Plan	2030 Emissions	Electric Savings (Lifetime MWh)	Gas Savings (Lifetime Therms)	Oil Savings (Lifetime MMBTU)	Propane Savings (Lifetime MMBTU)	Benefits	Incentive Costs
Electric Space heating and cooling	4,588	77,549	-	383,347	491,198	\$54,193,753	\$45,954,185
Fossil Space heating & T-stats	7,234	26,177	1,613,584	1,510,914	149,663	\$100,639,096	\$23,632,672
Other HVAC	388	36,160	-	20,114	4,356	\$10,885,567	\$8,258,721
Electric Water heating	51	4,798	-	-	-	\$1,041,386	\$1,761,295
Other Water Heating	699	43,668	285,206	34,905	4,088	\$23,177,052	\$7,802,356
Envelope	11,155	133,697	-	2,292,100	587,571	\$212,488,584	\$30,523,179
Other	2,540	521,743	-	-	-	\$150,575,062	\$66,405,514
<b>Total</b>	<b>26,655</b>	<b>843,791</b>	<b>1,898,790</b>	<b>4,241,380</b>	<b>1,236,877</b>	<b>\$553,000,500</b>	<b>\$184,337,922</b>

Electric - Consultant Plan	2030 Emissions	Electric Savings (Lifetime MWh)	Gas Savings (Lifetime Therms)	Oil Savings (Lifetime MMBTU)	Propane Savings (Lifetime MMBTU)	Benefits	Incentive Costs
Electric Space heating and cooling	9,783	167,299	-	814,208	1,046,712	\$115,721,382	\$98,407,397
Fossil Space heating & T-stats	3,540	51,139	3,602,100	459,725	95,751	\$54,417,669	\$8,481,909
Other HVAC	388	50,842	-	28,351	6,145	\$15,283,169	\$8,258,721
Electric Water heating	165	15,527	-	-	-	\$3,373,657	\$5,708,083
Other Water Heating	699	43,668	285,206	34,905	4,088	\$23,177,052	\$7,802,356
Envelope	17,284	207,275	-	3,551,299	910,817	\$329,256,549	\$47,273,941
Other	2,392	458,895	-	-	-	\$132,445,288	\$58,405,514
<b>Total</b>	<b>34,252</b>	<b>994,643</b>	<b>3,887,306</b>	<b>4,888,488</b>	<b>2,063,513</b>	<b>\$673,674,766</b>	<b>\$234,337,922</b>

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

Consultant Recommended Plan to Achieve MA GHG Goals by 2050

20

# IES SECTOR – CONSULTANT CHANGES

April Draft Plan	2030 Emissions	Electric Savings (Lifetime MWh)	Oil Savings (Lifetime MMBTU)	Propane Savings (Lifetime MMBTU)	Benefits (\$Millions)	Incentive Costs (\$Millions)
Electric Space heating and cooling	4,588	77,549	-	383,347	491,198	\$54
Fossil Space heating & T-stats	7,234	26,177	1,613,584	1,510,914	149,663	\$101
Electric Water heating	51	4,798	-	-	-	\$1
Envelope	11,155	133,697	-	2,292,100	587,571	\$212
Other	2,540	521,743	-	-	-	\$151

Consultant Estimate	2030 Emissions	Electric Savings (Lifetime MWh)	Oil Savings (Lifetime MMBTU)	Propane Savings (Lifetime MMBTU)	Benefits (\$Millions)	Incentive Costs (\$Millions)
Electric Space heating and cooling	9,783	167,299	-	814,208	1,046,712	\$116
Fossil Space heating & T-stats	3,540	51,139	3,602,100	459,725	95,751	\$54
Electric Water heating	165	15,527	-	-	-	\$3
Envelope	17,284	207,275	-	3,551,299	910,817	\$329
Other	2,392	458,895	-	-	-	\$132

# C&I SECTOR METRICS SUMMARY

Electric - April Plan	2030 Emissions	Electric Savings (Lifetime MWh)	Gas Savings (Lifetime Therms)	Oil Savings (Lifetime MMBTU)	Propane Savings (Lifetime MMBTU)	Benefits	Incentive Costs
Electric Space Heating & Cooling	6,222	142,191	792,327	445,307	223,054	\$50,671,371	\$15,509,732
Fossil Space Heating & Thermostats	72	5,272	-	3,007	1,574	\$1,330,675	\$564,927
Other HVAC	15,305	1,498,063	335,105	(18,565)	2,386	\$271,521,691	\$80,622,883
Other Water Heating	173	14,201	38,899	239	1,325	\$2,255,325	\$273,634
Envelope	110	18,192	-	5,881	2,047	\$4,182,897	\$1,882,250
Custom	4,756	656,873	(24,964)	-	-	\$112,766,801	\$24,745,432
Lighting	287	2,982,574	(11,866,786)	(969,829)	-	\$554,626,685	\$266,949,457
Other	10,107	4,043,814	(68,071,381)	-	-	\$761,238,639	\$176,849,142
<b>Total</b>	<b>37,031</b>	<b>9,361,180</b>	<b>(78,796,799)</b>	<b>(533,961)</b>	<b>230,385</b>	<b>\$1,758,594,086</b>	<b>\$567,397,458</b>

Electric - Consultant Plan	2030 Emissions	Electric Savings (Lifetime MWh)	Gas Savings (Lifetime Therms)	Oil Savings (Lifetime MMBTU)	Propane Savings (Lifetime MMBTU)	Benefits	Incentive Costs
Electric Space Heating & Cooling	68,283	784,719	4,408,707	2,476,897	1,227,014	279,897,549	\$90,445,866
Fossil Space Heating & Thermostats	72	7,833	-	4,483	2,345	1,977,744	\$564,927
Other HVAC	56,500	3,802,684	846,677	(46,933)	6,036	688,908,787	\$215,219,072
Other Water Heating	262	21,555	59,012	363	2,013	\$3,423,157	\$415,254
Envelope	3,630	500,481	-	162,694	56,631	\$115,296,977	\$51,568,542
Custom	4,756	656,873	(24,964)	-	-	\$112,766,801	\$24,745,432
Lighting	143	1,491,287	(5,933,393)	(484,915)	-	\$277,313,343	\$133,474,729
Other	20,230	4,630,931	(68,238,761)	-	-	\$930,581,128	\$233,112,448
<b>Total</b>	<b>153,877</b>	<b>11,896,363</b>	<b>(68,882,720)</b>	<b>2,112,590</b>	<b>1,294,039</b>	<b>\$2,400,165,486</b>	<b>\$749,546,270</b>

# C&I SECTOR – CONSULTANT HVAC CHANGES

April Draft Plan	2030 Emissions	Electric Savings (Lifetime MWh)	Gas Savings (Lifetime Therms)	Oil Savings (Lifetime MMBTU)	Propane Savings (Lifetime MMBTU)	Benefits (\$Millions)	Incentive Costs (\$Millions)
Electric Space Heating & Cooling	6,222	142,191	-	524,540	223,054	\$51	\$16
Fossil Space Heating & Thermostats	72	5,272	-	3,007	1,574	\$1	\$0.6
Other HVAC	15,305	1,498,063	335,105	(18,565)	2,386	\$272	\$81

Consultant Estimate	2030 Emissions	Electric Savings (Lifetime MWh)	Gas Savings (Lifetime Therms)	Oil Savings (Lifetime MMBTU)	Propane Savings (Lifetime MMBTU)	Benefits (\$Millions)	Incentive Costs (\$Millions)
Electric Space Heating & Cooling	68,283	784,719	-	2,917,768	1,227,014	\$280	\$90
Fossil Space Heating & Thermostats	72	7,833	-	4,483	2,345	\$2	\$0.6
Other HVAC	56,500	3,802,684	846,677	(46,933)	6,036	\$689	\$215



# C&I SECTOR – CONSULTANT OTHER CHANGES

April Draft Plan	2030 Emissions	Electric Savings (Lifetime MWh)	Gas Savings (Lifetime Therms)	Oil Savings (Lifetime MMBTU)	Propane Savings (Lifetime MMBTU)	Benefits (\$Millions)	Incentive Costs (\$Millions)
Other Water Heating	173	14,201	38,899	239	1,325	\$2	\$0.2
Envelope	110	18,192		5,881	2,047	\$4	\$2
Custom	4,756	656,873	(24,964)			\$113	\$25
Lighting	287	2,982,574	(11,866,786)	(969,829)		\$555	\$267
Other	10,107	4,043,814	(68,071,381)			\$761	\$177

Consultant Estimate	2030 Emissions	Electric Savings (Lifetime MWh)	Gas Savings (Lifetime Therms)	Oil Savings (Lifetime MMBTU)	Propane Savings (Lifetime MMBTU)	Benefits (\$Millions)	Incentive Costs (\$Millions)
Other Water Heating	2	21,555	59,012	363	2,013	\$3	\$0.4
Envelope	3,630	500,481	-	162,694	56,631	\$115	\$52
Custom	4,756	656,873	(24,964)	-	-	\$113	\$25
Lighting	143	1,491,287	(5,933,393)	(484,915)	-	\$277	\$133
Other	20,230	4,630,931	(68,238,761)	-	-	\$921	\$233