VI. APPENDICES

Appendices

A. **Glossary**

GLOSSARY OF TERMS AND ABBREVIATIONS	
2010-2012 Orders	Orders issued by the Department on January 28, 2010 for the 2010-2012 Plans in dockets D.P.U. 09-121 through D.P.U. 09-128 and D.P.U. 09-116 through D.P.U. 09-120
2012-2012 Plans	2010-2012 Electric Three-Year Energy Efficiency Plan, D.P.U. 09-116 through D.P.U. 09-120; 2010-2012 Gas Three-Year Energy Efficiency Plan, D.P.U. 09-121 through D.P.U. 09-128
2013-2015 Order	Order issued by the Department on January 31, 2013 for the 2013-2015 Plans in dockets D.P.U. 12-100 through 12-111
2013-2015 Plan	2013-2015 Three-Year Energy Efficiency Plan, D.P.U. 12-100 through D.P.U. 12-111
2015 AESC	Avoided Energy Supply Costs in New England: 2015 Report
2016-2018 Order	Order issued by the Department on January 28, 2016 for the 2016-2018 Plans in dockets D.P.U. 15-160 through D.P.U. 15-169
2016-2018 Plan	2016-2018 Three-Year Energy Efficiency Plan
2018 AESC Study	Avoided Energy Supply Components in New England: 2018 Report (March 30, 2018)
2019-2021 Plan	2019-2021 Three-Year Energy Efficiency Plan
ACEEE	American Council for an Energy-Efficient Economy
Act Relative to Competitively Priced Electricity in the Commonwealth	Chapter 209 of the Acts of 2012. Signed into law on August 23, 2012.
AESC	Avoided Energy Supply Costs
AFUE	Annual Fuel Utilization Efficiency
AG	Office of the Attorney General of Massachusetts
ALCS	Advanced Lighting Controls Systems
API	Application programming interface
Appeals Committee	Evaluation appeals committee of the Council
Attorney General	Office of the Attorney General
BCR	Benefit/Cost Ratio
C&I	Commercial and Industrial
C&IMC	Commercial and Industrial Management Committee
CAP	Community Action Program
CELT	Capacity, Energy, Loads, and Transmission
CDO	Customer Directed Option
CHP	Combined Heat and Power
Consultants	Consultants employed by the Energy Efficiency Advisory Council
Council	Energy Efficiency Advisory Council
CSP	Curtailment Service Provider

Department	Massachusetts Department of Public Utilities
DEP	Massachusetts Department of Environmental Protection
DHCD	Massachusetts Department of Housing and Community Development
DOE	Department of Energy
DOER	Massachusetts Department of Energy Resources
DPU	Massachusetts Department of Public Utilities
D.P.U. 08-50	Energy Efficiency Guidelines, D.P.U. 08-50 (2008)
D.P.U. 08-50-B Guidelines	Energy efficiency guidelines established in D.P.U. 08-50-B (2009)
D.T.E. 98-100 Guidelines	Energy efficiency guidelines established in Investigation to Establish Methods and Procedures to Evaluate and Approve Energy Efficiency Programs, D.T.E. 98-100 (2000)
D.P.U. 11-120 Guidelines	Energy efficiency guidelines established in D.P.U. 11-120-A, Phase II (2013)
DRIPE	Demand Reduction Induced Price Effect
DSM	Demand-Side Management
ECM	Electronically Commutated Motor
EEAC	Energy Efficiency Advisory Council
EERF	Energy Efficiency Reconciliation Factor
EES	Energy Efficiency Surcharge
EISA	Energy Independence and Security Act
Energy Act of 2012	Act Relative to Competitively Priced Electricity in the Commonwealth
EMC	Evaluation Management Committee
EMS	Energy Management System
EM&V	Evaluation, Measurement and Verification
EM&V Consultant	A third-party expert consultant who has primary responsibility for working with the PAs to plan and implement high-quality EM&V in Massachusetts.
ENERGY STAR®	Brand name for the voluntary energy efficiency labeling initiative sponsored by the U.S. Environmental Protection Agency and Department of Energy.
EPA	U.S. Environmental Protection Agency
EUI	Energy use intensity
FCM	Forward Capacity Market
Free Riders	Customers who participate in an energy efficiency program but would have installed the same measure(s) on their own if the program had not been available.
Free-Ridership Rate	The percent of savings attributable to Free Riders.
FTE	Full-Time Employee

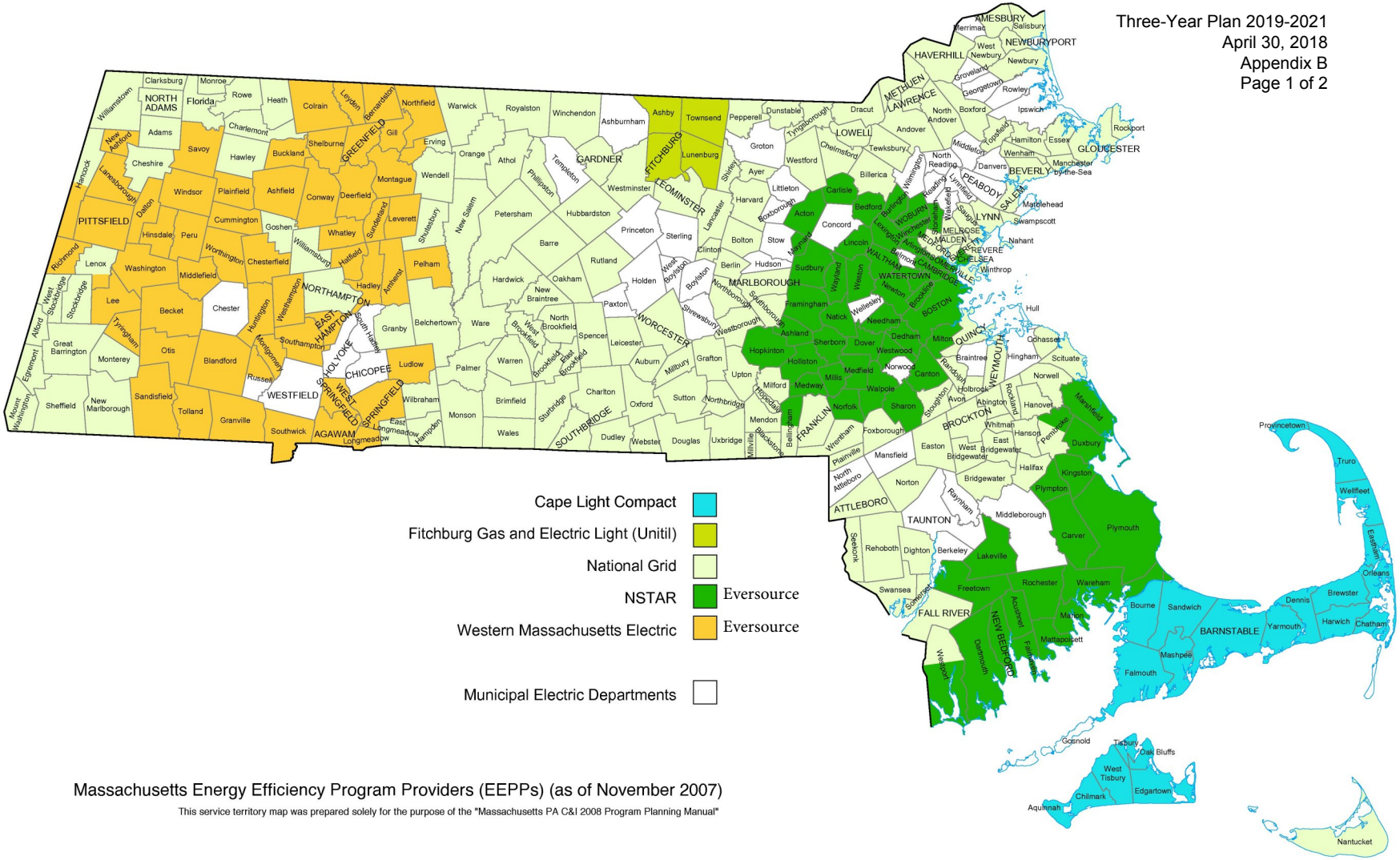
GCA	Green Communities Act
GHG	Greenhouse Gas
Green Communities Act	An Act Relative to Green Communities, Chapter 169 of the Acts of 2008. Signed into law on July 2, 2008.
Guidelines	Department's D.P.U. 11-120 Guidelines
GWSA	Global Warming Solutions Act, St. 2008, c. 298
HEARTWAP	Heating System Repair and Replacement program
HER	Home Energy Report
HERS	Home Energy Rating System
HES	Home Energy Services
HPCs	Home Performance Contractors
HRV	Home Recovery Ventilator
HVAC	Heating, Ventilation, and Air Conditioning
ICAP	Installed Capacity
IIC	Independent Installation Contractors
Impact Factor	Generic term for persistence, realization rates, in-service rates, non-coincident connected demand factors, etc., developed during the evaluation of energy efficiency programs and used to calculate net savings.
ISO-NE	Independent System Operator – New England
JMC	Joint Management Committee of PA and non-PA parties that manages the Residential and Low-Income New Construction Core Initiatives
LBR	Lost Base Revenue (for PAs not operating under decoupled rate structure, these costs account for revenues not collected by the PA's distribution business as a result of the energy efficiency undertaken during the program year)
LDAF	Local Distribution Adjustment Factor
LDAC	Local Distribution Adjustment Clause
LEAN	The Low-Income Energy Affordability Network
LED	Light Emitting Diode
Lifetime	The expected length of time, in years, that an installed measure will be in service and producing savings.
LLLC	Luminaire Level Lighting Control
MAEEP	Massachusetts Energy Efficiency Partnership
MAP	Mass Save Application Portal
MassCEC	Massachusetts Clean Energy Center
MBCx	Monitoring Based Commissioning
Measure	Specific technology or practice that produces energy and/or demand savings for which the PA provides financial incentives.
Mid-Term Modification	Modification to approved Three-Year Plan during term of Plan.

MMBTU	Millions of British Thermal Units
MOU	Memorandum of Understanding
MSD	Mass Save Data
MTAC	Massachusetts Technical Assessment Committee
MTM	Mid-Term Modification
NALCTP	National Advanced Lighting Controls Training Program
NEED	National Energy Education Development
Net to Gross Ratio or NTGR	A factor representing net program savings divided by gross program savings that is applied to gross program impacts to convert them into net program load impacts.
NEI	Non-Energy Impacts
Network	Low-Income Weatherization and Fuel Assistance Program Network
NTG	Net-to-Gross
O&M	Operations and Maintenance
PA	Program Administrator
Participant Cost	The total cost of a project or measure less the customer incentive.
Performance Incentive	Compensation for the Company's successful execution of the energy efficiency programs during the program year as determined by Massachusetts Department of Public Utilities.
PI	Performance Incentive
Plan	Three-Year Energy Efficiency Plan
PP&A	Program Planning and Administration
Program Administrators	Utilities and municipal aggregators that offer energy efficiency programs.
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
QSRs	Quick Service Restaurants
R&D	Research and Development
RCD	Residential Coordinated Delivery
RCS	Residential Conservation Service, established in An Act Establishing The Massachusetts Residential Conservation Service, Chapter 465 of the Acts of 1980, July 11, 1980.
RCx	Retrocommissioning
RFP	Request For Proposal
RGGI	Regional Greenhouse Gas Initiative
RMC	Residential Management Committee
SBC	System Benefit Charge
SEM	Strategic Energy Management

SEMP	Strategic Energy Management Plan
STAT	Sales, Technical Assistance & Training
Spillover	Additional energy efficient equipment installed by customers that was influenced by the PA's sponsored program, but without direct financial or technical assistance from the program. Spillover is separated into Participant and Non-participant factors. Non-participating customers may be influenced by product availability, publicity, education and other factors that are affected by the program.
Spillover Rate	Estimate of energy savings attributable to spillover effects expressed as a percent of savings installed by participants through an energy efficiency program.
TA	Technical Assistance
T&D	Transmission and Distribution
Term	Three-year term of the energy efficiency plan
Three-Year Plan	Energy Efficiency Investment Plans required by the GCA every three years.
TRC	Total Resource Cost
Tri-MC	Tri-Management Committee
TRL	Technical Resource Library
WAP	Weatherization Assistance Program

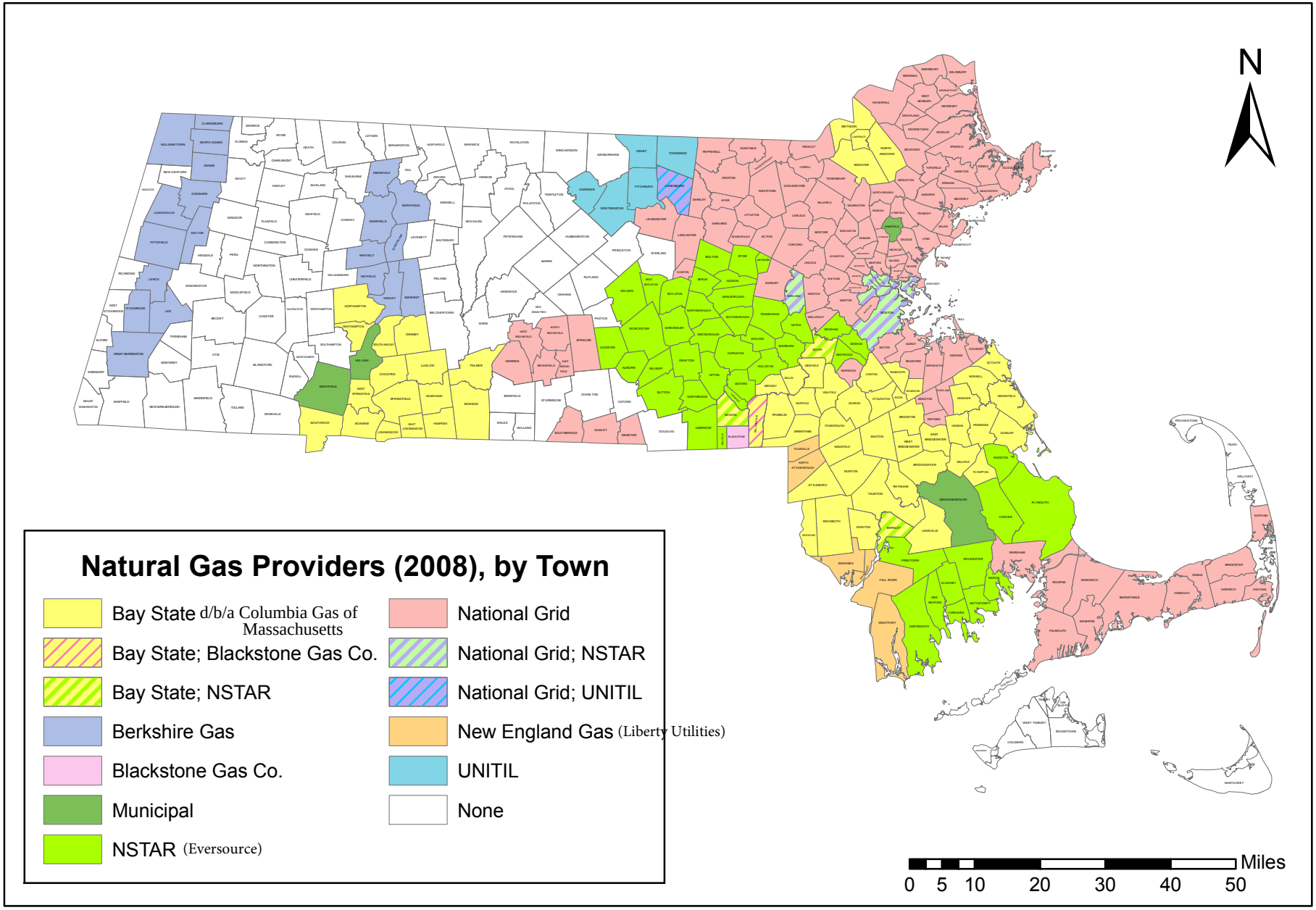
Appendices

B. **Maps of Service Areas**



Massachusetts Energy Efficiency Program Providers (EEPPs) (as of November 2007)

This service territory map was prepared solely for the purpose of the "Massachusetts PA C&I 2008 Program Planning Manual"


N
Natural Gas Providers (2008), by Town
Bay State d/b/a Columbia Gas of Massachusetts
Bay State; Blackstone Gas Co.
Bay State; NSTAR
Berkshire Gas
Blackstone Gas Co.
Municipal
NSTAR (Eversource)
National Grid
National Grid; NSTAR
National Grid; UNITIL
New England Gas (Liberty Utilities)
UNITIL
None
Miles
0 5 10 20 30 40 50

Appendices

C. **Statewide Energy Efficiency Data Tables**

IV.C. Program Administrator Budgets

1. Summary Table

Statewide Electric
April 30, 2018

2019 Program Administrator Budget								
Program	Program Costs						Performance Incentive	Total Program Administrator Budget
	Program Planning and Administration	Marketing and Advertising	Participant Incentive	Sales, Technical Assistance & Training	Evaluation and Market Research	Total Program Costs		
A - Residential	**10,621,944**	**11,864,842**	**147,925,210**	**43,455,466**	**7,295,287**	**221,162,748**	**9,703,908**	**230,866,657**
A1 - Residential New Buildings	659,861	204,314	11,169,146	1,529,879	-	13,563,200	1,687,534	15,250,734
A1a - Residential New Homes & Renovations	659,861	204,314	11,169,146	1,529,879	-	13,563,200	1,687,534	15,250,734
A2 - Residential Existing Buildings	7,856,866	9,028,902	119,423,707	38,347,363	-	174,656,838	8,016,375	182,673,212
A2a - Residential Coordinated Delivery	4,253,419	2,289,322	74,631,350	13,749,612	-	94,923,703	5,785,872	100,709,575
A2b - Residential Conservation Services (RCS)	1,107,915	1,005,531	-	15,447,391	-	17,560,838	-	17,560,838
A2c - Residential Retail	2,047,128	5,559,974	38,363,330	5,457,696	-	51,428,127	1,918,560	53,346,687
A2d - Residential Behavior & Active Demand Reduction	448,404	174,075	6,429,028	3,692,663	-	10,744,170	311,942	11,056,112
A3 - Residential Hard-to-Measure	2,105,216	2,631,626	17,332,356	3,578,225	7,295,287	32,942,711	-	32,942,711
A3a - Residential Statewide Marketing	-	1,315,787	-	-	-	1,315,787	-	1,315,787
A3b - Residential Statewide Database	135,052	-	-	-	-	135,052	-	135,052
A3c - Residential DOER Assessment	1,529,119	-	-	-	-	1,529,119	-	1,529,119
A3d - Residential EEAC Consultants	60,000	-	-	-	-	60,000	-	60,000
A3e - Residential Sponsorships & Subscriptions	107,903	19,909	-	23,969	1,237	153,017	-	153,017
A3f - Residential HEAT Loan	123,759	175,245	16,912,914	2,007,880	-	19,219,798	-	19,219,798
A3g - Residential Workforce Development	-	-	-	140,665	-	140,665	-	140,665
A3h - Residential R&D and Demonstration	4,875	20,000	419,442	394,211	-	838,528	-	838,528
A3i - Residential Education	144,510	1,100,685	-	1,011,500	-	2,256,695	-	2,256,695
A3j - Residential Evaluation and Market Research	-	-	-	-	7,294,050	7,294,050	-	7,294,050
B - Income Eligible	**3,673,396**	**865,218**	**49,431,944**	**12,442,433**	**1,954,502**	**68,367,493**	**2,397,618**	**70,765,112**
B1 - Income Eligible Existing Buildings	2,817,174	554,469	49,431,944	12,409,662	-	65,213,249	2,397,618	67,610,868
B1a - Income Eligible Coordinated Delivery	2,817,174	554,469	49,431,944	12,409,662	-	65,213,249	2,397,618	67,610,868
B2 - Income Eligible Hard-to-Measure	856,223	310,748	-	32,771	1,954,502	3,154,244	-	3,154,244
B2a - Income Eligible Statewide Marketing	-	307,273	-	-	-	307,273	-	307,273
B2b - Income Eligible Statewide Database	38,922	-	-	-	-	38,922	-	38,922
B2c - Income Eligible DOER Assessment	433,554	-	-	-	-	433,554	-	433,554
B2d - Income Eligible Energy Affordability Network	354,005	-	-	-	-	354,005	-	354,005
B2e - Income Eligible Sponsorships & Subscriptions	29,742	3,476	-	7,771	401	41,389	-	41,389
B2f - Income Eligible Evaluation and Market Research	-	-	-	-	1,954,101	1,954,101	-	1,954,101
B2g - Income Eligible Workforce Development	-	-	-	25,000	-	25,000	-	25,000
C - Commercial & Industrial	**17,653,082**	**4,095,528**	**199,979,481**	**28,211,790**	**6,645,870**	**256,585,751**	**21,413,300**	**277,999,050**
C1 - C&I New Buildings	1,323,459	478,785	13,029,439	5,461,111	-	20,292,794	1,368,659	21,661,453
C1a - C&I New Buildings & Major Renovations	1,323,459	478,785	13,029,439	5,461,111	-	20,292,794	1,368,659	21,661,453
C2 - C&I Existing Buildings	14,273,667	2,454,433	186,657,794	21,946,288	-	225,332,182	20,044,641	245,376,822
C2a - C&I Existing Building Retrofit	11,470,046	2,147,657	153,265,294	17,103,393	-	183,986,391	15,513,855	199,500,245
C2b - C&I New & Replacement Equipment	2,382,887	261,086	31,181,463	4,132,972	-	37,958,408	4,405,530	42,363,938
C2c - C&I Active Demand Reduction	420,733	45,690	2,211,037	709,923	-	3,387,384	125,256	3,512,639
C3 - C&I Hard-to-Measure	2,055,955	1,162,310	292,249	804,392	6,645,870	10,960,775	-	10,960,775
C3a - C&I Statewide Marketing	-	1,001,052	-	-	-	1,001,052	-	1,001,052
C3b - C&I Statewide Database	149,837	-	-	-	-	149,837	-	149,837
C3c - C&I DOER Assessment	1,658,949	-	-	-	-	1,658,949	-	1,658,949
C3d - C&I EEAC Consultants	60,000	-	-	-	-	60,000	-	60,000
C3e - C&I Sponsorships & Subscriptions	186,073	26,258	-	23,932	1,235	237,498	-	237,498
C3f - C&I Workforce Development	-	5,000	-	272,477	-	277,477	-	277,477
C3g - C&I R&D and Demonstration	1,097	130,000	292,249	507,982	-	931,328	-	931,328
C3h - C&I Evaluation and Market Research	-	-	-	-	6,644,635	6,644,635	-	6,644,635
Grand Total	**31,948,422**	**16,825,587**	**397,336,635**	**84,109,689**	**15,895,659**	**546,115,992**	**33,514,827**	**579,630,819**

IV.C. Program Administrator Budgets

1. Summary Table

Statewide Electric
April 30, 2018

2020 Program Administrator Budget								
Program	Program Costs						Performance Incentive	Total Program Administrator Budget
	Program Planning and Administration	Marketing and Advertising	Participant Incentive	Sales, Technical Assistance & Training	Evaluation and Market Research	Total Program Costs		
A - Residential	**10,601,292**	**12,274,306**	**138,241,684**	**43,988,481**	**7,373,322**	**212,479,085**	**9,611,246**	**222,090,331**
A1 - Residential New Buildings	665,395	199,444	10,978,171	1,577,472	-	13,420,483	1,753,204	15,173,686
A1a - Residential New Homes & Renovations	665,395	199,444	10,978,171	1,577,472	-	13,420,483	1,753,204	15,173,686
A2 - Residential Existing Buildings	7,826,260	9,048,913	109,532,627	38,740,167	-	165,147,967	7,858,042	173,006,009
A2a - Residential Coordinated Delivery	4,157,057	2,271,571	69,920,256	13,849,947	-	90,198,831	5,717,178	95,916,009
A2b - Residential Conservation Services (RCS)	1,089,006	1,009,341	-	15,478,505	-	17,576,852	-	17,576,852
A2c - Residential Retail	1,884,500	5,551,855	29,957,646	5,526,686	-	42,920,687	1,803,699	44,724,386
A2d - Residential Behavior & Active Demand Reduction	695,697	216,146	9,654,725	3,885,029	-	14,451,596	337,166	14,788,762
A3 - Residential Hard-to-Measure	2,109,638	3,025,948	17,730,886	3,670,842	7,373,322	33,910,636	-	33,910,636
A3a - Residential Statewide Marketing	-	1,322,347	-	-	-	1,322,347	-	1,322,347
A3b - Residential Statewide Database	135,598	-	-	-	-	135,598	-	135,598
A3c - Residential DOER Assessment	1,543,629	-	-	-	-	1,543,629	-	1,543,629
A3d - Residential EEAC Consultants	60,000	-	-	-	-	60,000	-	60,000
A3e - Residential Sponsorships & Subscriptions	108,036	20,030	-	23,782	1,227	153,075	-	153,075
A3f - Residential HEAT Loan	114,325	173,625	17,135,664	2,034,708	-	19,458,321	-	19,458,321
A3g - Residential Workforce Development	-	-	-	142,165	-	142,165	-	142,165
A3h - Residential R&D and Demonstration	5,021	387,686	595,221	428,687	-	1,416,616	-	1,416,616
A3i - Residential Education	143,029	1,122,261	-	1,041,500	-	2,306,790	-	2,306,790
A3j - Residential Evaluation and Market Research	-	-	-	-	7,372,095	7,372,095	-	7,372,095
B - Income Eligible	**3,853,421**	**892,514**	**49,965,803**	**12,682,112**	**2,034,308**	**69,428,158**	**2,431,507**	**71,859,665**
B1 - Income Eligible Existing Buildings	2,967,069	568,802	49,965,803	12,648,483	-	66,150,157	2,431,507	68,581,664
B1a - Income Eligible Coordinated Delivery	2,967,069	568,802	49,965,803	12,648,483	-	66,150,157	2,431,507	68,581,664
B2 - Income Eligible Hard-to-Measure	886,352	323,712	-	33,629	2,034,308	3,278,001	-	3,278,001
B2a - Income Eligible Statewide Marketing	-	320,149	-	-	-	320,149	-	320,149
B2b - Income Eligible Statewide Database	40,012	-	-	-	-	40,012	-	40,012
B2c - Income Eligible DOER Assessment	456,099	-	-	-	-	456,099	-	456,099
B2d - Income Eligible Energy Affordability Network	359,105	-	-	-	-	359,105	-	359,105
B2e - Income Eligible Sponsorships & Subscriptions	31,136	3,563	-	8,329	430	43,457	-	43,457
B2f - Income Eligible Evaluation and Market Research	-	-	-	-	2,033,878	2,033,878	-	2,033,878
B2g - Income Eligible Workforce Development	-	-	-	25,300	-	25,300	-	25,300
C - Commercial & Industrial	**18,740,016**	**4,277,177**	**204,118,002**	**30,182,655**	**6,899,687**	**264,217,538**	**21,850,676**	**286,068,214**
C1 - C&I New Buildings	1,341,071	483,638	11,688,139	5,557,139	-	19,069,987	1,165,874	20,235,861
C1a - C&I New Buildings & Major Renovations	1,341,071	483,638	11,688,139	5,557,139	-	19,069,987	1,165,874	20,235,861
C2 - C&I Existing Buildings	15,269,736	2,554,820	192,144,212	23,844,809	-	233,813,577	20,684,801	254,498,379
C2a - C&I Existing Building Retrofit	11,805,709	2,175,416	153,949,945	17,427,762	-	185,358,832	15,916,441	201,275,273
C2b - C&I New & Replacement Equipment	2,446,924	264,203	31,358,825	4,226,327	-	38,296,278	4,581,602	42,877,881
C2c - C&I Active Demand Reduction	1,017,104	115,201	6,835,442	2,190,720	-	10,158,467	186,759	10,345,225
C3 - C&I Hard-to-Measure	2,129,210	1,238,720	285,651	780,707	6,899,687	11,333,974	-	11,333,974
C3a - C&I Statewide Marketing	-	1,029,309	-	-	-	1,029,309	-	1,029,309
C3b - C&I Statewide Database	152,549	-	-	-	-	152,549	-	152,549
C3c - C&I DOER Assessment	1,723,512	-	-	-	-	1,723,512	-	1,723,512
C3d - C&I EEAC Consultants	60,000	-	-	-	-	60,000	-	60,000
C3e - C&I Sponsorships & Subscriptions	192,018	26,911	-	25,231	1,302	245,462	-	245,462
C3f - C&I Workforce Development	-	5,000	-	275,477	-	280,477	-	280,477
C3g - C&I R&D and Demonstration	1,130	177,500	285,651	479,998	-	944,280	-	944,280
C3h - C&I Evaluation and Market Research	-	-	-	-	6,898,385	6,898,385	-	6,898,385
Grand Total	**33,194,729**	**17,443,997**	**392,325,489**	**86,853,249**	**16,307,317**	**546,124,782**	**33,893,428**	**580,018,210**

IV.C. Program Administrator Budgets

1. Summary Table

Statewide Electric
April 30, 2018

2021 Program Administrator Budget								
Program	Program Costs						Performance Incentive	Total Program Administrator Budget
	Program Planning and Administration	Marketing and Advertising	Participant Incentive	Sales, Technical Assistance & Training	Evaluation and Market Research	Total Program Costs		
A - Residential	**10,708,463**	**12,050,325**	**131,815,898**	**44,515,014**	**7,640,996**	**206,730,695**	**9,647,964**	**216,378,659**
A1 - Residential New Buildings	686,556	79,046	11,082,154	1,618,806	-	13,466,563	1,816,013	15,282,576
A1a - Residential New Homes & Renovations	686,556	79,046	11,082,154	1,618,806	-	13,466,563	1,816,013	15,282,576
A2 - Residential Existing Buildings	7,889,471	9,065,234	103,132,598	39,195,436	-	159,282,739	7,831,951	167,114,689
A2a - Residential Coordinated Delivery	4,193,154	2,273,982	67,092,754	14,016,632	-	87,576,522	5,511,008	93,087,530
A2b - Residential Conservation Services (RCS)	1,124,182	1,015,188	-	15,536,833	-	17,676,203	-	17,676,203
A2c - Residential Retail	1,850,940	5,557,054	26,308,190	5,614,510	-	39,330,694	1,971,355	41,302,049
A2d - Residential Behavior & Active Demand Reduction	721,195	219,010	9,731,654	4,027,461	-	14,699,320	349,587	15,048,908
A3 - Residential Hard-to-Measure	2,132,435	2,906,045	17,601,146	3,700,772	7,640,996	33,981,394	-	33,981,394
A3a - Residential Statewide Marketing	-	1,343,782	-	-	-	1,343,782	-	1,343,782
A3b - Residential Statewide Database	135,166	-	-	-	-	135,166	-	135,166
A3c - Residential DOER Assessment	1,561,237	-	-	-	-	1,561,237	-	1,561,237
A3d - Residential EEAC Consultants	60,000	-	-	-	-	60,000	-	60,000
A3e - Residential Sponsorships & Subscriptions	108,394	20,013	-	23,678	1,222	153,307	-	153,307
A3f - Residential HEAT Loan	116,502	173,955	17,365,097	2,068,571	-	19,724,126	-	19,724,126
A3g - Residential Workforce Development	-	-	-	143,710	-	143,710	-	143,710
A3h - Residential R&D and Demonstration	5,172	223,811	236,049	392,413	-	857,445	-	857,445
A3i - Residential Education	145,963	1,144,484	-	1,072,400	-	2,362,847	-	2,362,847
A3j - Residential Evaluation and Market Research	-	-	-	-	7,639,774	7,639,774	-	7,639,774
B - Income Eligible	**3,995,413**	**911,720**	**49,938,442**	**12,882,834**	**2,181,277**	**69,909,685**	**2,476,817**	**72,386,502**
B1 - Income Eligible Existing Buildings	3,085,847	576,857	49,938,442	12,848,546	-	66,449,692	2,476,817	68,926,510
B1a - Income Eligible Coordinated Delivery	3,085,847	576,857	49,938,442	12,848,546	-	66,449,692	2,476,817	68,926,510
B2 - Income Eligible Hard-to-Measure	909,565	334,863	-	34,288	2,181,277	3,459,993	-	3,459,993
B2a - Income Eligible Statewide Marketing	-	331,245	-	-	-	331,245	-	331,245
B2b - Income Eligible Statewide Database	40,745	-	-	-	-	40,745	-	40,745
B2c - Income Eligible DOER Assessment	472,452	-	-	-	-	472,452	-	472,452
B2d - Income Eligible Energy Affordability Network	364,358	-	-	-	-	364,358	-	364,358
B2e - Income Eligible Sponsorships & Subscriptions	32,010	3,618	-	8,679	448	44,754	-	44,754
B2f - Income Eligible Evaluation and Market Research	-	-	-	-	2,180,829	2,180,829	-	2,180,829
B2g - Income Eligible Workforce Development	-	-	-	25,609	-	25,609	-	25,609
C - Commercial & Industrial	**19,346,248**	**4,338,639**	**206,809,939**	**31,229,216**	**7,414,390**	**269,138,433**	**22,811,551**	**291,949,984**
C1 - C&I New Buildings	1,452,879	490,017	12,944,710	5,659,235	-	20,546,841	1,229,870	21,776,711
C1a - C&I New Buildings & Major Renovations	1,452,879	490,017	12,944,710	5,659,235	-	20,546,841	1,229,870	21,776,711
C2 - C&I Existing Buildings	15,682,858	2,618,025	193,583,193	24,820,677	-	236,704,753	21,581,681	258,286,433
C2a - C&I Existing Building Retrofit	11,935,841	2,205,725	153,290,591	17,701,681	-	185,133,837	16,388,379	201,522,216
C2b - C&I New & Replacement Equipment	2,480,544	267,883	31,663,872	4,318,974	-	38,731,272	4,831,521	43,562,793
C2c - C&I Active Demand Reduction	1,266,474	144,417	8,628,730	2,800,023	-	12,839,643	361,780	13,201,424
C3 - C&I Hard-to-Measure	2,210,511	1,230,598	282,036	749,303	7,414,390	11,886,839	-	11,886,839
C3a - C&I Statewide Marketing	-	1,067,993	-	-	-	1,067,993	-	1,067,993
C3b - C&I Statewide Database	156,730	-	-	-	-	156,730	-	156,730
C3c - C&I DOER Assessment	1,794,136	-	-	-	-	1,794,136	-	1,794,136
C3d - C&I EEAC Consultants	60,000	-	-	-	-	60,000	-	60,000
C3e - C&I Sponsorships & Subscriptions	198,482	27,605	-	26,706	1,378	254,170	-	254,170
C3f - C&I Workforce Development	-	5,000	-	275,477	-	280,477	-	280,477
C3g - C&I R&D and Demonstration	1,164	130,000	282,036	447,121	-	860,321	-	860,321
C3h - C&I Evaluation and Market Research	-	-	-	-	7,413,012	7,413,012	-	7,413,012
Grand Total	**34,050,124**	**17,300,684**	**388,564,279**	**88,627,064**	**17,236,663**	**545,778,813**	**34,936,332**	**580,715,145**

IV.C. Program Administrator Budgets

1. Summary Table

Statewide Electric
April 30, 2018

2019-2021 Program Administrator Budget								
Program	Program Costs						Performance Incentive	Total Program Administrator Budget
	Program Planning and Administration	Marketing and Advertising	Participant Incentive	Sales, Technical Assistance & Training	Evaluation and Market Research	Total Program Costs		
A - Residential	**31,931,698**	**36,189,472**	**417,982,791**	**131,958,962**	**22,309,605**	**640,372,529**	**28,963,118**	**669,335,647**
A1 - Residential New Buildings	2,011,812	482,804	33,229,472	4,726,157	-	40,450,245	5,256,750	45,706,996
A1a - Residential New Homes & Renovations	2,011,812	482,804	33,229,472	4,726,157	-	40,450,245	5,256,750	45,706,996
A2 - Residential Existing Buildings	23,572,597	27,143,048	332,088,932	116,282,966	-	499,087,543	23,706,368	522,793,911
A2a - Residential Coordinated Delivery	12,603,630	6,834,875	211,644,360	41,616,191	-	272,699,056	17,014,058	289,713,114
A2b - Residential Conservation Services (RCS)	3,321,103	3,030,060	-	46,462,730	-	52,813,893	-	52,813,893
A2c - Residential Retail	5,782,567	16,668,882	94,629,166	16,598,892	-	133,679,508	5,693,614	139,373,122
A2d - Residential Behavior & Active Demand Reduction	1,865,296	609,231	25,815,406	11,605,153	-	39,895,086	998,695	40,893,781
A3 - Residential Hard-to-Measure	6,347,289	8,563,620	52,664,388	10,949,839	22,309,605	100,834,741	-	100,834,741
A3a - Residential Statewide Marketing	-	3,981,916	-	-	-	3,981,916	-	3,981,916
A3b - Residential Statewide Database	405,817	-	-	-	-	405,817	-	405,817
A3c - Residential DOER Assessment	4,633,984	-	-	-	-	4,633,984	-	4,633,984
A3d - Residential EEAC Consultants	180,000	-	-	-	-	180,000	-	180,000
A3e - Residential Sponsorships & Subscriptions	324,333	59,952	-	71,429	3,685	459,399	-	459,399
A3f - Residential HEAT Loan	354,585	522,825	51,413,676	6,111,159	-	58,402,245	-	58,402,245
A3g - Residential Workforce Development	-	-	-	426,540	-	426,540	-	426,540
A3h - Residential R&D and Demonstration	15,068	631,497	1,250,712	1,215,312	-	3,112,588	-	3,112,588
A3i - Residential Education	433,502	3,367,430	-	3,125,400	-	6,926,332	-	6,926,332
A3j - Residential Evaluation and Market Research	-	-	-	-	22,305,920	22,305,920	-	22,305,920
B - Income Eligible	**11,522,230**	**2,669,451**	**149,336,190**	**38,007,378**	**6,170,087**	**207,705,337**	**7,305,942**	**215,011,279**
B1 - Income Eligible Existing Buildings	8,870,090	1,700,128	149,336,190	37,906,692	-	197,813,099	7,305,942	205,119,041
B1a - Income Eligible Coordinated Delivery	8,870,090	1,700,128	149,336,190	37,906,692	-	197,813,099	7,305,942	205,119,041
B2 - Income Eligible Hard-to-Measure	2,652,140	969,323	-	100,687	6,170,087	9,892,238	-	9,892,238
B2a - Income Eligible Statewide Marketing	-	958,667	-	-	-	958,667	-	958,667
B2b - Income Eligible Statewide Database	119,679	-	-	-	-	119,679	-	119,679
B2c - Income Eligible DOER Assessment	1,362,104	-	-	-	-	1,362,104	-	1,362,104
B2d - Income Eligible Energy Affordability Network	1,077,469	-	-	-	-	1,077,469	-	1,077,469
B2e - Income Eligible Sponsorships & Subscriptions	92,887	10,656	-	24,778	1,278	129,600	-	129,600
B2f - Income Eligible Evaluation and Market Research	-	-	-	-	6,168,809	6,168,809	-	6,168,809
B2g - Income Eligible Workforce Development	-	-	-	75,909	-	75,909	-	75,909
C - Commercial & Industrial	**55,739,346**	**12,711,344**	**610,907,423**	**89,623,662**	**20,959,947**	**789,941,721**	**66,075,526**	**856,017,247**
C1 - C&I New Buildings	4,117,409	1,452,440	37,662,287	16,677,485	-	59,909,621	3,764,404	63,674,025
C1a - C&I New Buildings & Major Renovations	4,117,409	1,452,440	37,662,287	16,677,485	-	59,909,621	3,764,404	63,674,025
C2 - C&I Existing Buildings	45,226,261	7,627,277	572,385,199	70,611,775	-	695,850,512	62,311,123	758,161,634
C2a - C&I Existing Building Retrofit	35,211,596	6,528,797	460,505,830	52,232,836	-	554,479,060	47,818,674	602,297,734
C2b - C&I New & Replacement Equipment	7,310,354	793,171	94,204,160	12,678,273	-	114,985,958	13,818,654	128,804,612
C2c - C&I Active Demand Reduction	2,704,311	305,309	17,675,209	5,700,666	-	26,385,494	673,795	27,059,288
C3 - C&I Hard-to-Measure	6,395,676	3,631,628	859,936	2,334,401	20,959,947	34,181,588	-	34,181,588
C3a - C&I Statewide Marketing	-	3,098,354	-	-	-	3,098,354	-	3,098,354
C3b - C&I Statewide Database	459,115	-	-	-	-	459,115	-	459,115
C3c - C&I DOER Assessment	5,176,596	-	-	-	-	5,176,596	-	5,176,596
C3d - C&I EEAC Consultants	180,000	-	-	-	-	180,000	-	180,000
C3e - C&I Sponsorships & Subscriptions	576,573	80,774	-	75,870	3,914	737,130	-	737,130
C3f - C&I Workforce Development	-	15,000	-	823,431	-	838,431	-	838,431
C3g - C&I R&D and Demonstration	3,392	437,500	859,936	1,435,101	-	2,735,929	-	2,735,929
C3h - C&I Evaluation and Market Research	-	-	-	-	20,956,032	20,956,032	-	20,956,032
Grand Total	**99,193,275**	**51,570,268**	**1,178,226,403**	**259,590,002**	**49,439,639**	**1,638,019,587**	**102,344,587**	**1,740,364,173**

Notes:

Budgets for each year are represented in nominal dollars (2019$, 2020$, 2021$).

Refer to common definitions for allocation of costs.

IV.D. Cost-Effectiveness

1. Summary Table

Statewide Electric
April 30, 2018

2019 Total Resource Cost Test (2019$)							
Program	Benefit-Cost Ratio	Net Benefits	Total TRC Test Benefits	Costs			
				Total Program Costs	Performance Incentive	Participant Costs	Total TRC Test Costs
A - Residential	**1.78**	**219,875,151**	**503,238,336**	**221,162,748**	**9,703,908**	**52,496,529**	**283,363,186**
A1 - Residential New Buildings	1.94	41,482,725	85,762,517	13,563,200	1,687,534	29,029,058	44,279,792
A1a - Residential New Homes & Renovations	1.94	41,482,725	85,762,517	13,563,200	1,687,534	29,029,058	44,279,792
A2 - Residential Existing Buildings	2.03	211,335,137	417,475,819	174,656,838	8,016,375	23,467,471	206,140,683
A2a - Residential Coordinated Delivery	2.59	183,344,293	298,347,102	94,923,703	5,785,872	14,293,234	115,002,809
A2b - Residential Conservation Services (RCS)	0.00	-17,560,838	0	17,560,838	-	-	17,560,838
A2c - Residential Retail	1.63	39,224,054	101,672,978	51,428,127	1,918,560	9,102,237	62,448,924
A2d - Residential Behavior & Active Demand Reduction	1.57	6,327,628	17,455,740	10,744,170	311,942	72,000	11,128,112
A3 - Residential Hard-to-Measure	0.00	-32,942,711	0	32,942,711	-	-	32,942,711
B - Income Eligible	**1.80**	**56,262,131**	**127,027,243**	**68,367,493**	**2,397,618**	**-**	**70,765,112**
B1 - Income Eligible Existing Buildings	1.88	59,416,375	127,027,243	65,213,249	2,397,618	-	67,610,868
B1a - Income Eligible Coordinated Delivery	1.88	59,416,375	127,027,243	65,213,249	2,397,618	-	67,610,868
B2 - Income Eligible Hard-to-Measure	0.00	-3,154,244	0	3,154,244	-	-	3,154,244
C - Commercial & Industrial	**2.17**	**493,615,572**	**916,411,476**	**256,585,751**	**21,413,300**	**144,796,853**	**422,795,904**
C1 - C&I New Buildings	2.33	34,210,820	60,027,057	20,292,794	1,368,659	4,154,785	25,816,237
C1a - C&I New Buildings & Major Renovations	2.33	34,210,820	60,027,057	20,292,794	1,368,659	4,154,785	25,816,237
C2 - C&I Existing Buildings	2.22	470,365,528	856,384,419	225,332,182	20,044,641	140,642,069	386,018,891
C2a - C&I Existing Building Retrofit	2.08	349,263,859	671,507,931	183,986,391	15,513,855	122,743,827	322,244,072
C2b - C&I New & Replacement Equipment	2.96	118,200,534	178,390,713	37,958,408	4,405,530	17,826,242	60,190,180
C2c - C&I Active Demand Reduction	1.81	2,901,135	6,485,774	3,387,384	125,256	72,000	3,584,639
C3 - C&I Hard-to-Measure	0.00	-10,960,775	0	10,960,775	-	-	10,960,775
Grand Total	**1.99**	**769,752,854**	**1,546,677,055**	**546,115,992**	**33,514,827**	**197,293,382**	**776,924,201**

2020 Total Resource Cost Test (2019$)							
Program	Benefit-Cost Ratio	Net Benefits	Total TRC Test Benefits	Costs			
				Total Program Costs	Performance Incentive	Participant Costs	Total TRC Test Costs
A - Residential	**1.84**	**231,454,631**	**507,156,794**	**207,641,049**	**9,392,403**	**58,668,710**	**275,702,162**
A1 - Residential New Buildings	2.04	44,421,619	87,284,154	13,114,905	1,713,284	28,034,346	42,862,535
A1a - Residential New Homes & Renovations	2.04	44,421,619	87,284,154	13,114,905	1,713,284	28,034,346	42,862,535
A2 - Residential Existing Buildings	2.10	220,171,521	419,872,640	161,387,635	7,679,119	30,634,365	199,701,118
A2a - Residential Coordinated Delivery	2.62	178,715,643	288,851,162	88,145,052	5,587,001	16,403,466	110,135,519
A2b - Residential Conservation Services (RCS)	0.00	-17,176,637	0	17,176,637	-	-	17,176,637
A2c - Residential Retail	1.67	36,792,073	91,562,779	41,943,406	1,762,630	11,064,671	54,770,707
A2d - Residential Behavior & Active Demand Reduction	2.24	21,840,442	39,458,698	14,122,541	329,489	3,166,227	17,618,256
A3 - Residential Hard-to-Measure	0.00	-33,138,509	0	33,138,509	-	-	33,138,509
B - Income Eligible	**1.80**	**56,341,970**	**126,565,429**	**67,847,316**	**2,376,143**	**-**	**70,223,458**
B1 - Income Eligible Existing Buildings	1.89	59,545,333	126,565,429	64,643,953	2,376,143	-	67,020,096
B1a - Income Eligible Coordinated Delivery	1.89	59,545,333	126,565,429	64,643,953	2,376,143	-	67,020,096
B2 - Income Eligible Hard-to-Measure	0.00	-3,203,363	0	3,203,363	-	-	3,203,363
C - Commercial & Industrial	**2.18**	**496,959,505**	**917,957,804**	**258,201,444**	**21,353,147**	**141,443,707**	**420,998,299**
C1 - C&I New Buildings	2.17	27,514,291	50,989,309	18,635,773	1,139,328	3,699,916	23,475,017
C1a - C&I New Buildings & Major Renovations	2.17	27,514,291	50,989,309	18,635,773	1,139,328	3,699,916	23,475,017
C2 - C&I Existing Buildings	2.24	480,521,120	866,968,495	228,489,766	20,213,819	137,743,791	386,447,376
C2a - C&I Existing Building Retrofit	2.10	352,355,118	672,614,445	181,138,309	15,554,032	123,566,986	320,259,327
C2b - C&I New & Replacement Equipment	3.24	125,038,976	180,765,542	37,424,292	4,477,282	13,824,992	55,726,566
C2c - C&I Active Demand Reduction	1.30	3,127,025	13,588,508	9,927,164	182,506	351,813	10,461,483
C3 - C&I Hard-to-Measure	0.00	-11,075,906	0	11,075,906	-	-	11,075,906
Grand Total	**2.02**	**784,756,107**	**1,551,680,026**	**533,689,809**	**33,121,693**	**200,112,418**	**766,923,919**

IV.D. Cost-Effectiveness

1. Summary Table

Statewide Electric
April 30, 2018

2021 Total Resource Cost Test (2019$)							
Program	Benefit-Cost Ratio	Net Benefits	Total TRC Test Benefits	Costs			
				Total Program Costs	Performance Incentive	Participant Costs	Total TRC Test Costs
A - Residential	**1.89**	**233,991,288**	**498,344,064**	**197,423,577**	**9,213,608**	**57,715,592**	**264,352,776**
A1 - Residential New Buildings	2.11	46,697,971	88,668,499	12,860,291	1,734,255	27,375,981	41,970,528
A1a - Residential New Homes & Renovations	2.11	46,697,971	88,668,499	12,860,291	1,734,255	27,375,981	41,970,528
A2 - Residential Existing Buildings	2.16	219,744,851	409,675,566	152,111,751	7,479,352	30,339,611	189,930,714
A2a - Residential Coordinated Delivery	2.63	170,909,317	275,652,393	83,633,783	5,262,900	15,846,393	104,743,077
A2b - Residential Conservation Services (RCS)	0.00	-16,880,412	0	16,880,412	-	-	16,880,412
A2c - Residential Retail	1.85	43,004,006	93,845,700	37,560,006	1,882,604	11,399,084	50,841,694
A2d - Residential Behavior & Active Demand Reduction	2.30	22,711,940	40,177,472	14,037,550	333,849	3,094,134	17,465,532
A3 - Residential Hard-to-Measure	0.00	-32,451,535	0	32,451,535	-	-	32,451,535
B - Income Eligible	**1.82**	**56,974,362**	**126,101,988**	**66,762,316**	**2,365,310**	**-**	**69,127,626**
B1 - Income Eligible Existing Buildings	1.92	60,278,584	126,101,988	63,458,094	2,365,310	-	65,823,404
B1a - Income Eligible Coordinated Delivery	1.92	60,278,584	126,101,988	63,458,094	2,365,310	-	65,823,404
B2 - Income Eligible Hard-to-Measure	0.00	-3,304,222	0	3,304,222	-	-	3,304,222
C - Commercial & Industrial	**2.24**	**516,488,981**	**933,068,349**	**257,021,687**	**21,784,564**	**137,773,117**	**416,579,368**
C1 - C&I New Buildings	2.17	28,480,093	52,754,612	19,621,812	1,174,501	3,478,206	24,274,519
C1a - C&I New Buildings & Major Renovations	2.17	28,480,093	52,754,612	19,621,812	1,174,501	3,478,206	24,274,519
C2 - C&I Existing Buildings	2.31	499,360,575	880,313,737	226,048,188	20,610,063	134,294,911	380,953,162
C2a - C&I Existing Building Retrofit	2.16	361,421,983	674,052,487	176,799,020	15,650,566	120,180,918	312,630,504
C2b - C&I New & Replacement Equipment	3.35	130,229,946	185,601,713	36,987,571	4,614,004	13,770,192	55,371,766
C2c - C&I Active Demand Reduction	1.60	7,708,646	20,659,537	12,261,596	345,493	343,802	12,950,891
C3 - C&I Hard-to-Measure	0.00	-11,351,687	0	11,351,687	-	-	11,351,687
Grand Total	**2.08**	**807,454,630**	**1,557,514,401**	**521,207,581**	**33,363,481**	**195,488,709**	**750,059,771**

2019-2021 Total Resource Cost Test (2019$)							
Program	Benefit-Cost Ratio	Net Benefits	Total TRC Test Benefits	Costs			
				Total Program Costs	Performance Incentive	Participant Costs	Total TRC Test Costs
A - Residential	**1.83**	**685,321,070**	**1,508,739,194**	**626,227,374**	**28,309,919**	**168,880,831**	**823,418,124**
A1 - Residential New Buildings	2.03	132,602,315	261,715,170	39,538,397	5,135,073	84,439,385	129,112,855
A1a - Residential New Homes & Renovations	2.03	132,602,315	261,715,170	39,538,397	5,135,073	84,439,385	129,112,855
A2 - Residential Existing Buildings	2.09	651,251,509	1,247,024,025	488,156,223	23,174,846	84,441,446	595,772,515
A2a - Residential Coordinated Delivery	2.62	532,969,253	862,850,657	266,702,538	16,635,773	46,543,094	329,881,405
A2b - Residential Conservation Services (RCS)	0.00	-51,617,886	0	51,617,886	-	-	51,617,886
A2c - Residential Retail	1.71	119,020,132	287,081,457	130,931,539	5,563,794	31,565,992	168,061,324
A2d - Residential Behavior & Active Demand Reduction	2.10	50,880,010	97,091,910	38,904,260	975,280	6,332,361	46,211,900
A3 - Residential Hard-to-Measure	0.00	-98,532,754	0	98,532,754	-	-	98,532,754
B - Income Eligible	**1.81**	**169,578,463**	**379,694,659**	**202,977,126**	**7,139,071**	**-**	**210,116,196**
B1 - Income Eligible Existing Buildings	1.89	179,240,292	379,694,659	193,315,297	7,139,071	-	200,454,367
B1a - Income Eligible Coordinated Delivery	1.89	179,240,292	379,694,659	193,315,297	7,139,071	-	200,454,367
B2 - Income Eligible Hard-to-Measure	0.00	-9,661,829	0	9,661,829	-	-	9,661,829
C - Commercial & Industrial	**2.20**	**1,507,064,058**	**2,767,437,629**	**771,808,882**	**64,551,011**	**424,013,677**	**1,260,373,570**
C1 - C&I New Buildings	2.23	90,205,205	163,770,978	58,550,379	3,682,488	11,332,907	73,565,773
C1a - C&I New Buildings & Major Renovations	2.23	90,205,205	163,770,978	58,550,379	3,682,488	11,332,907	73,565,773
C2 - C&I Existing Buildings	2.26	1,450,247,222	2,603,666,651	679,870,135	60,868,523	412,680,771	1,153,419,429
C2a - C&I Existing Building Retrofit	2.11	1,063,040,960	2,018,174,863	541,923,720	46,718,452	366,491,730	955,133,903
C2b - C&I New & Replacement Equipment	3.18	373,469,456	544,757,968	112,370,271	13,496,815	45,421,426	171,288,512
C2c - C&I Active Demand Reduction	1.51	13,736,806	40,733,820	25,576,144	653,255	767,615	26,997,013
C3 - C&I Hard-to-Measure	0.00	-33,388,368	0	33,388,368	-	-	33,388,368
Grand Total	**2.03**	**2,361,963,591**	**4,655,871,482**	**1,601,013,382**	**100,000,000**	**592,894,508**	**2,293,907,891**

Notes:

The Benefit-Cost Ratio is the Total TRC Test Benefits divided by the Total TRC Test Costs.
The Net Benefits are the Total TRC Test Benefits minus the Total TRC Test Costs.
For supporting information on the Total TRC Test Benefits, see Table IV.D.3.1.i.
For supporting information on the Total Program Costs, see Table IV.C.1.
For supporting information on the Performance Incentive, refer to the Performance Incentive Model.
The Total TRC Costs are the sum of the Total Program Costs, Performance Incentives, and Participant Costs.

IV.D Cost-Effectiveness

3.1.i. Benefits Summary Table

Statewide Electric

April 30, 2018

2019 Total Benefits					
Program	**Electric (Capacity and Energy)**	**Natural Gas**	**Other Resources (Oil, Propane, Water)**	**Non-Energy Impacts**	**Total Benefits**
A - Residential	**250,239,456**	**(4,133,709)**	**51,059,834**	**206,072,756**	**503,238,336**
A1 - Residential New Buildings	44,109,392	(342,399)	4,823,363	37,172,161	85,762,517
A1a - Residential New Homes & Renovations	44,109,392	(342,399)	4,823,363	37,172,161	85,762,517
A2 - Residential Existing Buildings	206,130,064	(3,791,310)	46,236,471	168,900,595	417,475,819
A2a - Residential Coordinated Delivery	71,571,520	4,827,064	38,119,532	183,828,986	298,347,102
A2b - Residential Conservation Services (RCS)	-	-	-	-	-
A2c - Residential Retail	117,102,804	(8,618,374)	8,116,939	(14,928,391)	101,672,978
A2d - Residential Behavior & Active Demand Reduction	17,455,740	-	-	-	17,455,740
B - Income Eligible	**42,255,520**	**397,123**	**47,824,263**	**36,550,336**	**127,027,243**
B1 - Income Eligible Existing Buildings	42,255,520	397,123	47,824,263	36,550,336	127,027,243
B1a - Income Eligible Coordinated Delivery	42,255,520	397,123	47,824,263	36,550,336	127,027,243
C - Commercial & Industrial	**854,435,552**	**(66,579,524)**	**148,699,514**	**(20,144,065)**	**916,411,476**
C1 - C&I New Buildings	69,073,252	(9,037,287)	2,301,752	(2,310,659)	60,027,057
C1a - C&I New Buildings & Major Renovations	69,073,252	(9,037,287)	2,301,752	(2,310,659)	60,027,057
C2 - C&I Existing Buildings	785,362,300	(57,542,237)	146,397,762	(17,833,406)	856,384,419
C2a - C&I Existing Building Retrofit	602,526,692	(56,877,429)	143,919,015	(18,060,346)	671,507,931
C2b - C&I New & Replacement Equipment	176,349,833	(664,808)	2,478,747	226,940	178,390,713
C2c - C&I Active Demand Reduction	6,485,774	-	-	-	6,485,774
Grand Total	**1,146,930,528**	**(70,316,110)**	**247,583,611**	**222,479,026**	**1,546,677,055**

2020 Total Benefits					
Program	**Electric (Capacity and Energy)**	**Natural Gas**	**Other Resources (Oil, Propane, Water)**	**Non-Energy Impacts**	**Total Benefits**
A - Residential	**254,037,598**	**(2,546,688)**	**459,062,986**	**48,093,808**	**507,156,794**
A1 - Residential New Buildings	43,911,152	(274,543)	82,458,047	4,826,107	87,284,154
A1a - Residential New Homes & Renovations	43,911,152	(274,543)	82,458,047	4,826,107	87,284,154
A2 - Residential Existing Buildings	210,126,446	(2,272,145)	376,604,939	43,267,701	419,872,640
A2a - Residential Coordinated Delivery	65,874,179	4,850,876	252,462,277	36,388,886	288,851,162
A2b - Residential Conservation Services (RCS)	-	-	-	-	-
A2c - Residential Retail	104,793,568	(7,123,021)	84,683,964	6,878,816	91,562,779
A2d - Residential Behavior & Active Demand Reduction	39,458,698	-	39,458,698	-	39,458,698
B - Income Eligible	**40,575,218**	**393,727**	**78,600,533**	**47,964,895**	**126,565,429**
B1 - Income Eligible Existing Buildings	40,575,218	393,727	78,600,533	47,964,895	126,565,429
B1a - Income Eligible Coordinated Delivery	40,575,218	393,727	78,600,533	47,964,895	126,565,429
C - Commercial & Industrial	**856,640,650**	**(66,776,772)**	**769,408,926**	**148,548,878**	**917,957,804**
C1 - C&I New Buildings	49,897,708	(611,269)	46,889,376	4,099,933	50,989,309
C1a - C&I New Buildings & Major Renovations	49,897,708	(611,269)	46,889,376	4,099,933	50,989,309
C2 - C&I Existing Buildings	806,742,942	(66,165,502)	722,519,550	144,448,945	866,968,495
C2a - C&I Existing Building Retrofit	614,405,080	(65,494,423)	530,658,501	141,955,944	672,614,445
C2b - C&I New & Replacement Equipment	178,749,353	(671,079)	178,272,541	2,493,001	180,765,542
C2c - C&I Active Demand Reduction	13,588,508	-	13,588,508	-	13,588,508
Grand Total	**1,151,253,466**	**(68,929,733)**	**1,307,072,446**	**244,607,581**	**1,551,680,026**

IV.D Cost-Effectiveness

3.1.i. Benefits Summary Table

Statewide Electric

April 30, 2018

2021 Total Benefits					
Program	**Electric (Capacity and Energy)**	**Natural Gas**	**Other Resources (Oil, Propane, Water)**	**Non-Energy Impacts**	**Total Benefits**
A - Residential	**236,635,571**	**2,704,747**	**454,106,725**	**44,237,340**	**498,344,064**
A1 - Residential New Buildings	43,395,868	(171,698)	83,829,464	4,839,035	88,668,499
A1a - Residential New Homes & Renovations	43,395,868	(171,698)	83,829,464	4,839,035	88,668,499
A2 - Residential Existing Buildings	193,239,703	2,876,445	370,277,260	39,398,305	409,675,566
A2a - Residential Coordinated Delivery	59,826,366	4,895,046	242,005,630	33,646,764	275,652,393
A2b - Residential Conservation Services (RCS)	-	-	-	-	-
A2c - Residential Retail	93,235,865	(2,018,601)	88,094,158	5,751,541	93,845,700
A2d - Residential Behavior & Active Demand Reduction	40,177,472	-	40,177,472	-	40,177,472
B - Income Eligible	**39,159,781**	**386,715**	**78,238,430**	**47,863,557**	**126,101,988**
B1 - Income Eligible Existing Buildings	39,159,781	386,715	78,238,430	47,863,557	126,101,988
B1a - Income Eligible Coordinated Delivery	39,159,781	386,715	78,238,430	47,863,557	126,101,988
C - Commercial & Industrial	**864,054,974**	**(62,046,740)**	**779,620,258**	**153,448,091**	**933,068,349**
C1 - C&I New Buildings	52,908,432	(965,480)	48,072,092	4,682,519	52,754,612
C1a - C&I New Buildings & Major Renovations	52,908,432	(965,480)	48,072,092	4,682,519	52,754,612
C2 - C&I Existing Buildings	811,146,542	(61,081,260)	731,548,166	148,765,571	880,313,737
C2a - C&I Existing Building Retrofit	610,221,192	(60,450,959)	531,071,760	142,980,727	674,052,487
C2b - C&I New & Replacement Equipment	180,265,812	(630,301)	179,816,868	5,784,844	185,601,713
C2c - C&I Active Demand Reduction	20,659,537	-	20,659,537	-	20,659,537
Grand Total	**1,139,850,325**	**(58,955,278)**	**1,311,965,413**	**245,548,988**	**1,557,514,401**

2019-2021 Total Benefits					
Program	**Electric (Capacity and Energy)**	**Natural Gas**	**Other Resources (Oil, Propane, Water)**	**Non-Energy Impacts**	**Total Benefits**
A - Residential	**740,912,624**	**(3,975,650)**	**1,365,348,213**	**143,390,981**	**1,508,739,194**
A1 - Residential New Buildings	131,416,412	(788,640)	247,226,665	14,488,505	261,715,170
A1a - Residential New Homes & Renovations	131,416,412	(788,640)	247,226,665	14,488,505	261,715,170
A2 - Residential Existing Buildings	609,496,212	(3,187,010)	1,118,121,548	128,902,477	1,247,024,025
A2a - Residential Coordinated Delivery	197,272,065	14,572,985	754,695,476	108,155,182	862,850,657
A2b - Residential Conservation Services (RCS)	-	-	-	-	-
A2c - Residential Retail	315,132,237	(17,759,995)	266,334,161	20,747,295	287,081,457
A2d - Residential Behavior & Active Demand Reduction	97,091,910	-	97,091,910	-	97,091,910
B - Income Eligible	**121,990,520**	**1,177,565**	**236,041,943**	**143,652,716**	**379,694,659**
B1 - Income Eligible Existing Buildings	121,990,520	1,177,565	236,041,943	143,652,716	379,694,659
B1a - Income Eligible Coordinated Delivery	121,990,520	1,177,565	236,041,943	143,652,716	379,694,659
C - Commercial & Industrial	**2,575,131,176**	**(195,403,036)**	**2,316,741,146**	**450,696,482**	**2,767,437,629**
C1 - C&I New Buildings	171,879,392	(10,614,037)	152,686,774	11,084,204	163,770,978
C1a - C&I New Buildings & Major Renovations	171,879,392	(10,614,037)	152,686,774	11,084,204	163,770,978
C2 - C&I Existing Buildings	2,403,251,783	(184,788,999)	2,164,054,372	439,612,278	2,603,666,651
C2a - C&I Existing Building Retrofit	1,827,152,965	(182,822,811)	1,589,319,177	428,855,686	2,018,174,863
C2b - C&I New & Replacement Equipment	535,364,999	(1,966,188)	534,001,375	10,756,593	544,757,968
C2c - C&I Active Demand Reduction	40,733,820	-	40,733,820	-	40,733,820
Grand Total	**3,438,034,320**	**(198,201,121)**	**3,918,131,302**	**737,740,180**	**4,655,871,482**

IV.D. Cost-Effectiveness

3.2.i. Savings Summary Table

Statewide Electric

April 30, 2018

2019 Net Savings

Program	Electric						Natural Gas		Deliverable Fuels				Other		Total Savings	
	Annual Capacity (kW)		Electric Energy (MWh)		Electric Energy (MMBTU)		MMBTU		Oil (MMBTU)		Propane (MMBTU)		Water (Gallons)		MMBTU	
	Summer	Winter	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime
A - Residential	**58,399**	**64,279**	**337,802**	**1,763,658**	**1,152,579**	**6,017,600**	**(112,960)**	**(257,158)**	**295,487**	**6,345,585**	**65,524**	**1,660,290**	**70,248,579**	**512,646,964**	**1,400,629**	**13,766,317**
A1 - Residential New Buildings	5,430	2,993	12,977	182,937	44,276	624,181	(5,666)	(27,236)	5,416	180,975	40,971	1,011,735	-	-	84,998	1,789,654
A1a - Residential New Homes & Renovations	5,430	2,993	12,977	182,937	44,276	624,181	(5,666)	(27,236)	5,416	180,975	40,971	1,011,735	-	-	84,998	1,789,654
A2 - Residential Existing Buildings	52,969	61,286	324,825	1,580,721	1,108,303	5,393,419	(107,294)	(229,922)	290,071	6,164,610	24,552	648,556	70,248,579	512,646,964	1,315,632	11,976,662
A2a - Residential Coordinated Delivery	10,299	12,551	60,333	512,602	205,857	1,748,997	23,006	477,072	369,446	6,592,907	44,890	757,588	67,955,166	496,593,074	643,198	9,576,564
A2b - Residential Conservation Services (RCS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2c - Residential Retail	18,555	23,478	146,290	949,985	499,143	3,241,348	(130,300)	(706,994)	(79,375)	(428,297)	(20,337)	(109,033)	2,293,413	16,053,891	269,131	1,997,025
A2d - Residential Behavior & Active Demand Reduction	24,115	25,257	118,201	118,134	403,303	403,074	-	-	-	-	-	-	-	-	403,303	403,074
B - Income Eligible	**5,331**	**8,975**	**35,335**	**338,530**	**120,563**	**1,155,066**	**3,778**	**50,316**	**68,631**	**1,359,854**	**5,734**	**111,171**	**9,371,966**	**91,877,262**	**198,707**	**2,676,407**
B1 - Income Eligible Existing Buildings	5,331	8,975	35,335	338,530	120,563	1,155,066	3,778	50,316	68,631	1,359,854	5,734	111,171	9,371,966	91,877,262	198,707	2,676,407
B1a - Income Eligible Coordinated Delivery	5,331	8,975	35,335	338,530	120,563	1,155,066	3,778	50,316	68,631	1,359,854	5,734	111,171	9,371,966	91,877,262	198,707	2,676,407
C - Commercial & Industrial	**116,981**	**67,091**	**632,194**	**7,703,829**	**2,157,044**	**26,285,464**	**(416,471)**	**(6,921,017)**	**(106,783)**	**(1,197,176)**	**-**	**-**	**5,645,856**	**98,007,720**	**1,633,790**	**18,167,271**
C1 - C&I New Buildings	5,617	4,678	37,861	591,568	129,181	2,018,432	(56,219)	(938,524)	(9,349)	(124,770)	-	-	-	-	63,613	955,138
C1a - C&I New Buildings & Major Renovations	5,617	4,678	37,861	591,568	129,181	2,018,432	(56,219)	(938,524)	(9,349)	(124,770)	-	-	-	-	63,613	955,138
C2 - C&I Existing Buildings	111,364	62,413	594,333	7,112,260	2,027,863	24,267,033	(360,252)	(5,982,493)	(97,434)	(1,072,406)	-	-	5,645,856	98,007,720	1,570,177	17,212,134
C2a - C&I Existing Building Retrofit	46,625	47,148	443,102	5,546,056	1,511,865	18,923,142	(352,200)	(5,922,777)	(90,628)	(998,644)	-	-	11,953	114,316	1,069,036	12,001,721
C2b - C&I New & Replacement Equipment	20,615	15,265	151,238	1,566,279	516,024	5,344,145	(8,052)	(59,715)	(6,806)	(73,763)	-	-	5,633,904	97,893,404	501,167	5,210,667
C2c - C&I Active Demand Reduction	44,124	-	(7)	(75)	(25)	(254)	-	-	-	-	-	-	-	-	(25)	(254)
Grand Total	**180,711**	**140,345**	**1,005,330**	**9,806,017**	**3,430,186**	**33,458,130**	**(525,653)**	**(7,127,859)**	**257,336**	**6,508,263**	**71,258**	**1,771,461**	**85,266,402**	**702,531,946**	**3,233,126**	**34,609,995**

2020 Net Savings

Program	Electric						Natural Gas		Deliverable Fuels				Other		Total Savings	
	Annual Capacity (kW)		Electric Energy (MWh)		Electric Energy (MMBTU)		MMBTU		Oil (MMBTU)		Propane (MMBTU)		Water (Gallons)		MMBTU	
	Summer	Winter	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime
A - Residential	**61,738**	**62,270**	**310,956**	**1,604,768**	**1,060,982**	**5,475,469**	**(89,950)**	**(129,255)**	**291,332**	**6,159,954**	**69,423**	**1,694,007**	**69,959,965**	**511,477,712**	**1,331,788**	**13,200,174**
A1 - Residential New Buildings	5,315	2,814	11,979	178,880	40,871	610,339	(4,612)	(21,936)	6,255	189,734	42,085	1,035,548	-	-	84,598	1,813,686
A1a - Residential New Homes & Renovations	5,315	2,814	11,979	178,880	40,871	610,339	(4,612)	(21,936)	6,255	189,734	42,085	1,035,548	-	-	84,598	1,813,686
A2 - Residential Existing Buildings	56,424	59,456	298,978	1,425,888	1,020,111	4,865,129	(85,337)	(107,320)	285,077	5,970,220	27,339	658,459	69,959,965	511,477,712	1,247,190	11,386,488
A2a - Residential Coordinated Delivery	9,310	11,541	51,932	461,473	177,190	1,574,546	23,368	483,258	351,344	6,328,067	44,293	749,303	67,666,552	495,423,822	596,196	9,135,174
A2b - Residential Conservation Services (RCS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2c - Residential Retail	16,342	20,498	127,194	847,582	433,985	2,891,951	(108,706)	(590,578)	(66,267)	(357,847)	(16,954)	(90,844)	2,293,413	16,053,891	242,058	1,852,682
A2d - Residential Behavior & Active Demand Reduction	30,771	27,417	119,852	116,832	408,936	398,632	-	-	-	-	-	-	-	-	408,936	398,632
B - Income Eligible	**4,988**	**9,605**	**35,143**	**337,797**	**119,909**	**1,152,562**	**3,811**	**50,704**	**69,095**	**1,367,970**	**5,788**	**111,980**	**9,567,823**	**94,227,546**	**198,603**	**2,683,216**
B1 - Income Eligible Existing Buildings	4,988	9,605	35,143	337,797	119,909	1,152,562	3,811	50,704	69,095	1,367,970	5,788	111,980	9,567,823	94,227,546	198,603	2,683,216
B1a - Income Eligible Coordinated Delivery	4,988	9,605	35,143	337,797	119,909	1,152,562	3,811	50,704	69,095	1,367,970	5,788	111,980	9,567,823	94,227,546	198,603	2,683,216
C - Commercial & Industrial	**141,646**	**65,475**	**632,531**	**7,726,675**	**2,158,196**	**26,363,417**	**(412,717)**	**(7,009,424)**	**(105,630)**	**(1,183,647)**	**-**	**-**	**5,655,603**	**97,831,571**	**1,639,849**	**18,170,346**
C1 - C&I New Buildings	3,433	3,021	30,672	471,119	104,651	1,607,458	(4,691)	(62,380)	(9,393)	(125,214)	-	-	-	-	90,567	1,419,864
C1a - C&I New Buildings & Major Renovations	3,433	3,021	30,672	471,119	104,651	1,607,458	(4,691)	(62,380)	(9,393)	(125,214)	-	-	-	-	90,567	1,419,864
C2 - C&I Existing Buildings	138,212	62,453	601,860	7,255,556	2,053,545	24,755,958	(408,026)	(6,947,044)	(96,237)	(1,058,433)	-	-	5,655,603	97,831,571	1,549,281	16,750,482
C2a - C&I Existing Building Retrofit	46,533	47,028	449,235	5,673,773	1,532,790	19,358,915	(399,928)	(6,886,900)	(89,279)	(983,006)	-	-	11,936	114,168	1,043,583	11,489,009
C2b - C&I New & Replacement Equipment	20,835	15,425	152,662	1,582,156	520,882	5,398,316	(8,098)	(60,144)	(6,958)	(75,427)	-	-	5,643,667	97,717,402	505,825	5,262,745
C2c - C&I Active Demand Reduction	70,844	-	(37)	(373)	(127)	(1,272)	-	-	-	-	-	-	-	-	(127)	(1,272)
Grand Total	**208,371**	**137,350**	**978,631**	**9,669,240**	**3,339,088**	**32,991,448**	**(498,856)**	**(7,087,975)**	**254,797**	**6,344,276**	**75,211**	**1,805,987**	**85,183,391**	**703,536,829**	**3,170,240**	**34,053,736**

IV.D. Cost-Effectiveness

3.2.i. Savings Summary Table

Statewide Electric

April 30, 2018

2021 Net Savings

Program	Electric						Natural Gas		Deliverable Fuels				Other		Total Savings	
	Annual Capacity (kW)		Electric Energy (MWh)		Electric Energy (MMBTU)		MMBTU		Oil (MMBTU)		Propane (MMBTU)		Water (Gallons)		MMBTU	
	Summer	Winter	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime
A - Residential	**59,999**	**58,569**	**286,332**	**1,452,466**	**976,966**	**4,955,815**	**(10,145)**	**306,771**	**314,245**	**6,084,327**	**82,872**	**1,785,640**	**69,666,124**	**510,197,271**	**1,363,939**	**13,132,553**
A1 - Residential New Buildings	5,216	2,652	11,091	171,207	37,841	584,158	(3,705)	(13,550)	7,038	200,670	43,289	1,062,815	-	-	84,462	1,834,093
A1a - Residential New Homes & Renovations	5,216	2,652	11,091	171,207	37,841	584,158	(3,705)	(13,550)	7,038	200,670	43,289	1,062,815	-	-	84,462	1,834,093
A2 - Residential Existing Buildings	54,782	55,917	275,242	1,281,259	939,125	4,371,657	(6,440)	320,321	307,208	5,883,657	39,583	722,824	69,666,124	510,197,271	1,279,476	11,298,460
A2a - Residential Coordinated Delivery	8,537	10,361	45,391	407,758	154,873	1,391,269	24,176	495,201	326,027	5,989,138	44,292	748,534	67,372,711	494,143,381	549,368	8,624,141
A2b - Residential Conservation Services (RCS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2c - Residential Retail	14,232	17,776	109,923	756,593	375,058	2,581,497	(30,616)	(174,879)	(18,819)	(105,481)	(4,709)	(25,710)	2,293,413	16,053,891	320,913	2,275,427
A2d - Residential Behavior & Active Demand Reduction	32,014	27,780	119,928	116,908	409,195	398,891	-	-	-	-	-	-	-	-	409,195	398,891
B - Income Eligible	**4,828**	**9,387**	**34,579**	**326,759**	**117,985**	**1,114,901**	**3,811**	**50,704**	**69,578**	**1,377,624**	**5,946**	**115,136**	**9,567,823**	**94,227,546**	**197,319**	**2,658,365**
B1 - Income Eligible Existing Buildings	4,828	9,387	34,579	326,759	117,985	1,114,901	3,811	50,704	69,578	1,377,624	5,946	115,136	9,567,823	94,227,546	197,319	2,658,365
B1a - Income Eligible Coordinated Delivery	4,828	9,387	34,579	326,759	117,985	1,114,901	3,811	50,704	69,578	1,377,624	5,946	115,136	9,567,823	94,227,546	197,319	2,658,365
C - Commercial & Industrial	**177,468**	**64,807**	**634,110**	**7,703,217**	**2,163,583**	**26,283,376**	**(393,665)**	**(6,587,748)**	**(113,235)**	**(1,259,188)**	**-**	**-**	**5,663,110**	**97,847,000**	**1,656,683**	**18,436,441**
C1 - C&I New Buildings	3,551	3,101	32,344	501,415	110,358	1,710,828	(8,259)	(99,554)	(16,374)	(198,012)	-	-	-	-	85,726	1,413,262
C1a - C&I New Buildings & Major Renovations	3,551	3,101	32,344	501,415	110,358	1,710,828	(8,259)	(99,554)	(16,374)	(198,012)	-	-	-	-	85,726	1,413,262
C2 - C&I Existing Buildings	173,917	61,706	601,766	7,201,802	2,053,225	24,572,548	(385,406)	(6,488,194)	(96,862)	(1,061,176)	-	-	5,663,110	97,847,000	1,570,957	17,023,179
C2a - C&I Existing Building Retrofit	46,428	46,936	445,305	5,599,728	1,519,381	19,106,272	(377,106)	(6,432,357)	(89,487)	(984,571)	-	-	11,943	114,228	1,052,788	11,689,344
C2b - C&I New & Replacement Equipment	20,339	14,770	156,498	1,602,447	533,972	5,467,548	(8,300)	(55,836)	(7,375)	(76,604)	-	-	5,651,167	97,732,772	518,296	5,335,107
C2c - C&I Active Demand Reduction	107,150	-	(37)	(373)	(127)	(1,272)	-	-	-	-	-	-	-	-	(127)	(1,272)
Grand Total	**242,295**	**132,764**	**955,022**	**9,482,442**	**3,258,534**	**32,354,092**	**(399,999)**	**(6,230,273)**	**270,588**	**6,202,763**	**88,818**	**1,900,776**	**84,897,057**	**702,271,817**	**3,217,941**	**34,227,358**

2019-2021 Net Savings

Program	Electric						Natural Gas		Deliverable Fuels				Other		Total Savings	
	Annual Capacity (kW)		Electric Energy (MWh)		Electric Energy (MMBTU)		MMBTU		Oil (MMBTU)		Propane (MMBTU)		Water (Gallons)		MMBTU	
	Summer	Winter	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime
A - Residential	**180,136**	**185,118**	**935,090**	**4,820,892**	**3,190,527**	**16,448,884**	**(213,054)**	**(79,643)**	**901,064**	**18,589,865**	**217,819**	**5,139,937**	**209,874,668**	**1,534,321,947**	**4,096,356**	**40,099,043**
A1 - Residential New Buildings	15,961	8,459	36,046	533,024	122,988	1,818,678	(13,983)	(62,722)	18,708	571,379	126,345	3,110,098	-	-	254,058	5,437,433
A1a - Residential New Homes & Renovations	15,961	8,459	36,046	533,024	122,988	1,818,678	(13,983)	(62,722)	18,708	571,379	126,345	3,110,098	-	-	254,058	5,437,433
A2 - Residential Existing Buildings	164,175	176,659	899,044	4,287,868	3,067,539	14,630,206	(199,071)	(16,920)	882,356	18,018,487	91,474	2,029,839	209,874,668	1,534,321,947	3,842,298	34,661,611
A2a - Residential Coordinated Delivery	28,146	34,454	157,655	1,381,832	537,920	4,714,812	70,550	1,455,531	1,046,817	18,910,112	133,475	2,255,425	202,994,429	1,486,160,276	1,788,762	27,335,879
A2b - Residential Conservation Services (RCS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2c - Residential Retail	49,129	61,752	383,407	2,554,161	1,308,186	8,714,796	(269,622)	(1,472,451)	(164,461)	(891,625)	(42,001)	(225,586)	6,880,239	48,161,672	832,102	6,125,134
A2d - Residential Behavior & Active Demand Reduction	86,900	80,454	357,982	351,875	1,221,433	1,200,597	-	-	-	-	-	-	-	-	1,221,433	1,200,597
B - Income Eligible	**15,146**	**27,967**	**105,058**	**1,003,086**	**358,457**	**3,422,528**	**11,399**	**151,725**	**207,304**	**4,105,448**	**17,468**	**338,287**	**28,507,612**	**280,332,354**	**594,629**	**8,017,988**
B1 - Income Eligible Existing Buildings	15,146	27,967	105,058	1,003,086	358,457	3,422,528	11,399	151,725	207,304	4,105,448	17,468	338,287	28,507,612	280,332,354	594,629	8,017,988
B1a - Income Eligible Coordinated Delivery	15,146	27,967	105,058	1,003,086	358,457	3,422,528	11,399	151,725	207,304	4,105,448	17,468	338,287	28,507,612	280,332,354	594,629	8,017,988
C - Commercial & Industrial	**436,095**	**197,373**	**1,898,835**	**23,133,721**	**6,478,824**	**78,932,257**	**(1,222,853)**	**(20,518,189)**	**(325,648)**	**(3,640,011)**	**-**	**-**	**16,964,569**	**293,686,290**	**4,930,322**	**54,774,058**
C1 - C&I New Buildings	12,602	10,801	100,876	1,564,102	344,190	5,336,718	(69,169)	(1,100,458)	(35,115)	(447,996)	-	-	-	-	239,906	3,788,264
C1a - C&I New Buildings & Major Renovations	12,602	10,801	100,876	1,564,102	344,190	5,336,718	(69,169)	(1,100,458)	(35,115)	(447,996)	-	-	-	-	239,906	3,788,264
C2 - C&I Existing Buildings	423,493	186,572	1,797,958	21,569,619	6,134,633	73,595,539	(1,153,685)	(19,417,730)	(290,533)	(3,192,015)	-	-	16,964,569	293,686,290	4,690,416	50,985,794
C2a - C&I Existing Building Retrofit	139,586	141,112	1,337,642	16,819,557	4,564,035	57,388,329	(1,129,235)	(19,242,035)	(269,394)	(2,966,221)	-	-	35,832	342,713	3,165,407	35,180,073
C2b - C&I New & Replacement Equipment	61,789	45,460	460,398	4,750,882	1,570,878	16,210,009	(24,450)	(175,695)	(21,139)	(225,794)	-	-	16,928,737	293,343,578	1,525,288	15,808,520
C2c - C&I Active Demand Reduction	222,117	-	(82)	(820)	(280)	(2,798)	-	-	-	-	-	-	-	-	(280)	(2,798)
Grand Total	**631,377**	**410,459**	**2,938,982**	**28,957,699**	**10,027,808**	**98,803,669**	**(1,424,508)**	**(20,446,106)**	**782,720**	**19,055,302**	**235,287**	**5,478,224**	**255,346,849**	**2,108,340,592**	**9,621,307**	**102,891,089**

VII. Appendix

GHG reductions are provided for information purposes only. They are not included in the TRC test.

Statewide Electric

April 30, 2018

2019 Greenhouse Gas Reductions						
Sector	Adjusted Gross Annual Savings			Annual Emissions Reductions (Short Tons)		
	Electric Energy (MWh)	Natural Gas (Therm)	Oil (MMBTU)	NOX	SO2	CO2
A - Residential	563,945	(3,217,809)	154,966	104.9	50.8	217,045
B - Income Eligible	35,335	37,782	68,631	6.6	3.2	19,754
C - Commercial & Industrial	680,730	(4,537,479)	(116,477)	126.6	61.3	233,678
Grand Total	**1,280,009**	**(7,717,506)**	**107,120**	**238.1**	**115.2**	**470,477**

2020 Greenhouse Gas Reductions						
Sector	Adjusted Gross Annual Savings			Annual Emissions Reductions (Short Tons)		
	Electric Energy (MWh)	Natural Gas (Therm)	Oil (MMBTU)	NOX	SO2	CO2
A - Residential	516,993	(2,809,747)	160,901	96.2	46.5	201,315
B - Income Eligible	35,143	38,105	69,095	6.5	3.2	19,718
C - Commercial & Industrial	680,558	(4,448,404)	(115,154)	126.6	61.3	234,237
Grand Total	**1,232,694**	**(7,220,046)**	**114,842**	**229.3**	**110.9**	**455,270**

2021 Greenhouse Gas Reductions						
Sector	Adjusted Gross Annual Savings			Annual Emissions Reductions (Short Tons)		
	Electric Energy (MWh)	Natural Gas (Therm)	Oil (MMBTU)	NOX	SO2	CO2
A - Residential	471,540	(957,375)	262,451	87.7	42.4	202,343
B - Income Eligible	34,579	38,105	69,578	6.4	3.1	19,533
C - Commercial & Industrial	682,611	(4,256,695)	(126,308)	127.0	61.4	235,272
Grand Total	**1,188,731**	**(5,175,965)**	**205,721**	**221.1**	**107.0**	**457,149**

2019-2021 Greenhouse Gas Reductions						
Sector	Adjusted Gross Annual Savings			Annual Emissions Reductions (Short Tons)		
	Electric Energy (MWh)	Natural Gas (Therm)	Oil (MMBTU)	NOX	SO2	CO2
A - Residential	1,552,477	(6,984,931)	578,318	288.8	139.7	620,703
B - Income Eligible	105,058	113,992	207,304	19.5	9.5	59,006
C - Commercial & Industrial	2,043,899	(13,242,579)	(357,939)	380.2	184.0	703,187
Grand Total	**3,701,435**	**(20,113,517)**	**427,683**	**688.5**	**333.1**	**1,382,896**

Notes:

The Program Administrators are working with DEP to determine the best method for properly and precisely capturing the full impact of energy efficiency measures on GHG emissions. As part of this process, the Program Administrators have included this additional table on greenhouse gas reductions, based on continuing discussions with the DEP. These reductions are calculated using factors proposed by DEP, which are based on adjusted gross annual electric energy, natural gas, and oil savings. The Program Administrators look forward to discussing these proposed factors with DEP and are committed to ensuring that the full impact of energy efficiency measures on GHG emissions are captured.

IV.C. Program Administrator Budgets

1. Summary Table

Statewide Gas
April 30, 2018

2019 Program Administrator Budget								
Program	Program Costs						Performance Incentive	Total Program Administrator Budget
	Program Planning and Administration	Marketing and Advertising	Participant Incentive	Sales, Technical Assistance & Training	Evaluation and Market Research	Total Program Costs		
A - Residential	**5,446,420**	**3,680,926**	**90,462,085**	**28,996,855**	**3,179,155**	**131,765,441**	**3,447,250**	**135,212,691**
A1 - Residential New Buildings	390,455	63,786	9,695,657	1,047,121	-	11,197,019	531,556	11,728,574
A1a - Residential New Homes & Renovations	390,455	63,786	9,695,657	1,047,121	-	11,197,019	531,556	11,728,574
A2 - Residential Existing Buildings	3,823,462	2,489,543	79,484,511	27,394,403	-	113,191,919	2,915,694	116,107,614
A2a - Residential Coordinated Delivery	2,410,553	1,085,796	62,739,330	10,117,048	-	76,352,727	2,076,706	78,429,433
A2b - Residential Conservation Services (RCS)	595,880	403,977	-	15,409,595	-	16,409,452	-	16,409,452
A2c - Residential Retail	696,155	965,742	14,313,212	1,182,434	-	17,157,542	772,451	17,929,993
A2d - Residential Behavior	120,874	34,029	2,431,969	685,325	-	3,272,198	66,537	3,338,735
A3 - Residential Hard-to-Measure	1,232,502	1,127,597	1,281,917	555,331	3,179,155	7,376,503	-	7,376,503
A3a - Residential Statewide Marketing	-	888,899	-	-	-	888,899	-	888,899
A3b - Residential Statewide Database	107,234	-	-	-	-	107,234	-	107,234
A3c - Residential DOER Assessment	708,531	-	-	-	-	708,531	-	708,531
A3d - Residential EEAC Consultants	321,207	-	-	-	-	321,207	-	321,207
A3e - Residential Sponsorships & Subscriptions	54,157	7,016	-	1,187	4,680	67,040	-	67,040
A3f - Residential HEAT Loan	33,324	48,806	1,117,917	120,862	-	1,320,909	-	1,320,909
A3g - Residential Workforce Development	-	-	-	198,346	-	198,346	-	198,346
A3h - Residential R&D and Demonstration	8,049	20,000	164,000	215,986	-	408,036	-	408,036
A3i - Residential Education	-	162,876	-	18,950	-	181,826	-	181,826
A3j - Residential Evaluation and Market Research	-	-	-	-	3,174,475	3,174,475	-	3,174,475
B - Income Eligible	**2,093,919**	**880,844**	**37,314,295**	**8,172,393**	**1,191,155**	**49,652,606**	**974,715**	**50,627,321**
B1 - Income Eligible Existing Buildings	1,609,882	562,700	37,314,295	8,156,503	-	47,643,379	974,715	48,618,094
B1a - Income Eligible Coordinated Delivery	1,609,882	562,700	37,314,295	8,156,503	-	47,643,379	974,715	48,618,094
B2 - Income Eligible Hard-to-Measure	484,037	318,144	-	15,891	1,191,155	2,009,227	-	2,009,227
B2a - Income Eligible Statewide Marketing	-	315,654	-	-	-	315,654	-	315,654
B2b - Income Eligible Statewide Database	41,503	-	-	-	-	41,503	-	41,503
B2c - Income Eligible DOER Assessment	272,274	-	-	-	-	272,274	-	272,274
B2d - Income Eligible Energy Affordability Network	151,344	-	-	-	-	151,344	-	151,344
B2e - Income Eligible Sponsorships & Subscriptions	18,916	2,490	-	473	-	21,879	-	21,879
B2f - Income Eligible Evaluation and Market Research	-	-	-	-	1,191,155	1,191,155	-	1,191,155
B2g - Income Eligible Workforce Development	-	-	-	15,418	-	15,418	-	15,418
C - Commercial & Industrial	**2,920,352**	**2,063,035**	**28,139,365**	**10,813,621**	**1,357,432**	**45,293,806**	**1,597,013**	**46,890,819**
C1 - C&I New Buildings	536,119	431,440	4,629,554	2,453,177	-	8,050,290	340,424	8,390,714
C1a - C&I New Buildings & Major Renovations	536,119	431,440	4,629,554	2,453,177	-	8,050,290	340,424	8,390,714
C2 - C&I Existing Buildings	1,910,226	1,282,031	23,384,810	8,064,436	-	34,641,504	1,256,589	35,898,093
C2a - C&I Existing Building Retrofit	1,189,233	1,009,078	14,571,578	5,866,345	-	22,636,234	1,030,695	23,666,929
C2b - C&I New & Replacement Equipment	720,993	272,953	8,813,233	2,198,091	-	12,005,270	225,895	12,231,164
C3 - C&I Hard-to-Measure	474,008	349,564	125,000	296,008	1,357,432	2,602,012	-	2,602,012
C3a - C&I Statewide Marketing	-	323,141	-	-	-	323,141	-	323,141
C3b - C&I Statewide Database	34,796	-	-	-	-	34,796	-	34,796
C3c - C&I DOER Assessment	326,905	-	-	-	-	326,905	-	326,905
C3d - C&I EEAC Consultants	77,791	-	-	-	-	77,791	-	77,791
C3e - C&I Sponsorships & Subscriptions	27,773	3,955	-	488	1,320	33,536	-	33,536
C3f - C&I Workforce Development	-	-	-	47,401	-	47,401	-	47,401
C3g - C&I R&D and Demonstration	6,742	22,468	125,000	248,120	-	402,330	-	402,330
C3h - C&I Evaluation and Market Research	-	-	-	-	1,356,112	1,356,112	-	1,356,112
Grand Total	**10,460,691**	**6,624,806**	**155,915,744**	**47,982,870**	**5,727,742**	**226,711,853**	**6,018,978**	**232,730,831**

IV.C. Program Administrator Budgets

1. Summary Table

Statewide Gas
April 30, 2018

2020 Program Administrator Budget								
Program	Program Costs						Performance Incentive	Total Program Administrator Budget
	Program Planning and Administration	Marketing and Advertising	Participant Incentive	Sales, Technical Assistance & Training	Evaluation and Market Research	Total Program Costs		
A - Residential	**5,532,865**	**3,754,452**	**92,124,427**	**29,521,979**	**3,251,530**	**134,185,252**	**3,526,221**	**137,711,473**
A1 - Residential New Buildings	398,631	67,186	9,864,170	924,508	-	11,254,495	554,176	11,808,671
A1a - Residential New Homes & Renovations	398,631	67,186	9,864,170	924,508	-	11,254,495	554,176	11,808,671
A2 - Residential Existing Buildings	3,859,835	2,535,597	81,128,290	28,108,383	-	115,632,105	2,972,045	118,604,150
A2a - Residential Coordinated Delivery	2,417,875	1,108,344	63,697,490	10,417,553	-	77,641,262	2,100,261	79,741,523
A2b - Residential Conservation Services (RCS)	602,263	418,636	-	15,728,903	-	16,749,803	-	16,749,803
A2c - Residential Retail	713,149	974,147	14,997,357	1,213,588	-	17,898,241	794,686	18,692,928
A2d - Residential Behavior	126,548	34,469	2,433,443	748,339	-	3,342,799	77,098	3,419,897
A3 - Residential Hard-to-Measure	1,274,399	1,151,669	1,131,967	489,088	3,251,530	7,298,652	-	7,298,652
A3a - Residential Statewide Marketing	-	901,905	-	-	-	901,905	-	901,905
A3b - Residential Statewide Database	109,379	-	-	-	-	109,379	-	109,379
A3c - Residential DOER Assessment	735,037	-	-	-	-	735,037	-	735,037
A3d - Residential EEAC Consultants	331,951	-	-	-	-	331,951	-	331,951
A3e - Residential Sponsorships & Subscriptions	55,795	7,311	-	1,207	4,820	69,133	-	69,133
A3f - Residential HEAT Loan	33,946	49,691	1,131,967	123,297	-	1,338,901	-	1,338,901
A3g - Residential Workforce Development	-	-	-	199,981	-	199,981	-	199,981
A3h - Residential R&D and Demonstration	8,291	25,000	-	145,203	-	178,494	-	178,494
A3i - Residential Education	-	167,762	-	19,400	-	187,162	-	187,162
A3j - Residential Evaluation and Market Research	-	-	-	-	3,246,709	3,246,709	-	3,246,709
B - Income Eligible	**2,108,475**	**897,014**	**37,472,381**	**8,413,225**	**1,205,231**	**50,096,326**	**1,000,010**	**51,096,336**
B1 - Income Eligible Existing Buildings	1,615,867	578,284	37,472,381	8,396,010	-	48,062,541	1,000,010	49,062,551
B1a - Income Eligible Coordinated Delivery	1,615,867	578,284	37,472,381	8,396,010	-	48,062,541	1,000,010	49,062,551
B2 - Income Eligible Hard-to-Measure	492,608	318,730	-	17,215	1,205,231	2,033,785	-	2,033,785
B2a - Income Eligible Statewide Marketing	-	316,132	-	-	-	316,132	-	316,132
B2b - Income Eligible Statewide Database	41,752	-	-	-	-	41,752	-	41,752
B2c - Income Eligible DOER Assessment	278,672	-	-	-	-	278,672	-	278,672
B2d - Income Eligible Energy Affordability Network	152,646	-	-	-	-	152,646	-	152,646
B2e - Income Eligible Sponsorships & Subscriptions	19,538	2,598	-	481	-	22,617	-	22,617
B2f - Income Eligible Evaluation and Market Research	-	-	-	-	1,205,231	1,205,231	-	1,205,231
B2g - Income Eligible Workforce Development	-	-	-	16,734	-	16,734	-	16,734
C - Commercial & Industrial	**2,980,945**	**2,092,784**	**28,360,100**	**11,089,949**	**1,391,490**	**45,915,268**	**1,627,691**	**47,542,959**
C1 - C&I New Buildings	549,912	440,038	4,715,623	2,523,765	-	8,229,337	334,150	8,563,487
C1a - C&I New Buildings & Major Renovations	549,912	440,038	4,715,623	2,523,765	-	8,229,337	334,150	8,563,487
C2 - C&I Existing Buildings	1,943,313	1,301,137	23,528,478	8,290,972	-	35,063,899	1,293,541	36,357,440
C2a - C&I Existing Building Retrofit	1,158,528	992,616	13,723,880	5,584,489	-	21,459,513	1,073,317	22,532,830
C2b - C&I New & Replacement Equipment	784,784	308,521	9,804,597	2,706,483	-	13,604,386	220,224	13,824,610
C3 - C&I Hard-to-Measure	487,721	351,609	116,000	275,213	1,391,490	2,622,032	-	2,622,032
C3a - C&I Statewide Marketing	-	324,960	-	-	-	324,960	-	324,960
C3b - C&I Statewide Database	35,250	-	-	-	-	35,250	-	35,250
C3c - C&I DOER Assessment	337,048	-	-	-	-	337,048	-	337,048
C3d - C&I EEAC Consultants	79,949	-	-	-	-	79,949	-	79,949
C3e - C&I Sponsorships & Subscriptions	28,530	4,106	-	494	1,360	34,489	-	34,489
C3f - C&I Workforce Development	-	-	-	50,175	-	50,175	-	50,175
C3g - C&I R&D and Demonstration	6,944	22,542	116,000	224,544	-	370,031	-	370,031
C3h - C&I Evaluation and Market Research	-	-	-	-	1,390,130	1,390,130	-	1,390,130
Grand Total	**10,622,285**	**6,744,250**	**157,956,908**	**49,025,153**	**5,848,250**	**230,196,846**	**6,153,922**	**236,350,768**

IV.C. Program Administrator Budgets

1. Summary Table

Statewide Gas
April 30, 2018

2021 Program Administrator Budget								
Program	Program Costs						Performance Incentive	Total Program Administrator Budget
	Program Planning and Administration	Marketing and Advertising	Participant Incentive	Sales, Technical Assistance & Training	Evaluation and Market Research	Total Program Costs		
A - Residential	**5,747,250**	**3,982,845**	**93,328,517**	**30,531,740**	**3,500,349**	**137,090,701**	**3,600,624**	**140,691,325**
A1 - Residential New Buildings	414,475	70,683	10,036,172	956,610	-	11,477,940	574,952	12,052,892
A1a - Residential New Homes & Renovations	414,475	70,683	10,036,172	956,610	-	11,477,940	574,952	12,052,892
A2 - Residential Existing Buildings	3,971,542	2,584,151	82,146,206	29,002,394	-	117,704,293	3,025,672	120,729,965
A2a - Residential Coordinated Delivery	2,518,594	1,130,397	64,665,819	10,761,471	-	79,076,281	2,130,301	81,206,582
A2b - Residential Conservation Services (RCS)	637,143	435,977	-	16,170,813	-	17,243,932	-	17,243,932
A2c - Residential Retail	738,412	982,825	15,052,944	1,250,195	-	18,024,376	808,365	18,832,741
A2d - Residential Behavior	77,393	34,953	2,427,443	819,914	-	3,359,703	87,006	3,446,709
A3 - Residential Hard-to-Measure	1,361,233	1,328,011	1,146,139	572,736	3,500,349	7,908,468	-	7,908,468
A3a - Residential Statewide Marketing	-	918,268	-	-	-	918,268	-	918,268
A3b - Residential Statewide Database	111,960	-	-	-	-	111,960	-	111,960
A3c - Residential DOER Assessment	764,503	-	-	-	-	764,503	-	764,503
A3d - Residential EEAC Consultants	344,478	-	-	-	-	344,478	-	344,478
A3e - Residential Sponsorships & Subscriptions	57,696	7,745	-	1,229	4,965	71,635	-	71,635
A3f - Residential HEAT Loan	35,307	50,453	1,146,139	108,458	-	1,340,356	-	1,340,356
A3g - Residential Workforce Development	-	-	-	201,745	-	201,745	-	201,745
A3h - Residential R&D and Demonstration	47,290	178,750	-	241,455	-	467,494	-	467,494
A3i - Residential Education	-	172,795	-	19,850	-	192,645	-	192,645
A3j - Residential Evaluation and Market Research	-	-	-	-	3,495,384	3,495,384	-	3,495,384
B - Income Eligible	**2,182,902**	**916,597**	**37,636,403**	**8,670,950**	**1,291,820**	**50,698,672**	**1,020,325**	**51,718,997**
B1 - Income Eligible Existing Buildings	1,678,868	594,374	37,636,403	8,652,302	-	48,561,946	1,020,325	49,582,272
B1a - Income Eligible Coordinated Delivery	1,678,868	594,374	37,636,403	8,652,302	-	48,561,946	1,020,325	49,582,272
B2 - Income Eligible Hard-to-Measure	504,035	322,223	-	18,648	1,291,820	2,136,726	-	2,136,726
B2a - Income Eligible Statewide Marketing	-	319,470	-	-	-	319,470	-	319,470
B2b - Income Eligible Statewide Database	42,365	-	-	-	-	42,365	-	42,365
B2c - Income Eligible DOER Assessment	287,353	-	-	-	-	287,353	-	287,353
B2d - Income Eligible Energy Affordability Network	154,067	-	-	-	-	154,067	-	154,067
B2e - Income Eligible Sponsorships & Subscriptions	20,250	2,753	-	490	-	23,493	-	23,493
B2f - Income Eligible Evaluation and Market Research	-	-	-	-	1,291,820	1,291,820	-	1,291,820
B2g - Income Eligible Workforce Development	-	-	-	18,158	-	18,158	-	18,158
C - Commercial & Industrial	**3,089,280**	**2,122,613**	**28,524,229**	**11,411,618**	**1,445,499**	**46,593,239**	**1,627,585**	**48,220,824**
C1 - C&I New Buildings	569,045	446,439	4,765,214	2,614,847	-	8,395,545	319,869	8,715,414
C1a - C&I New Buildings & Major Renovations	569,045	446,439	4,765,214	2,614,847	-	8,395,545	319,869	8,715,414
C2 - C&I Existing Buildings	2,018,380	1,322,973	23,711,015	8,576,743	-	35,629,111	1,307,716	36,936,827
C2a - C&I Existing Building Retrofit	1,199,577	1,004,375	13,761,687	5,728,040	-	21,693,679	1,087,585	22,781,264
C2b - C&I New & Replacement Equipment	818,803	318,598	9,949,328	2,848,703	-	13,935,432	220,131	14,155,563
C3 - C&I Hard-to-Measure	501,855	353,201	48,000	220,028	1,445,499	2,568,583	-	2,568,583
C3a - C&I Statewide Marketing	-	328,869	-	-	-	328,869	-	328,869
C3b - C&I Statewide Database	35,972	-	-	-	-	35,972	-	35,972
C3c - C&I DOER Assessment	348,310	-	-	-	-	348,310	-	348,310
C3d - C&I EEAC Consultants	82,678	-	-	-	-	82,678	-	82,678
C3e - C&I Sponsorships & Subscriptions	29,358	4,292	-	500	1,320	35,470	-	35,470
C3f - C&I Workforce Development	-	-	-	53,192	-	53,192	-	53,192
C3g - C&I R&D and Demonstration	5,536	20,040	48,000	166,336	-	239,912	-	239,912
C3h - C&I Evaluation and Market Research	-	-	-	-	1,444,179	1,444,179	-	1,444,179
Grand Total	**11,019,432**	**7,022,055**	**159,489,148**	**50,614,308**	**6,237,669**	**234,382,612**	**6,248,534**	**240,631,146**

IV.C. Program Administrator Budgets

1. Summary Table

Statewide Gas
April 30, 2018

2019-2021 Program Administrator Budget								
Program	Program Costs						Performance Incentive	Total Program Administrator Budget
	Program Planning and Administration	Marketing and Advertising	Participant Incentive	Sales, Technical Assistance & Training	Evaluation and Market Research	Total Program Costs		
A - Residential	**16,726,535**	**11,418,224**	**275,915,029**	**89,050,573**	**9,931,034**	**403,041,395**	**10,574,094**	**413,615,489**
A1 - Residential New Buildings	1,203,561	201,655	29,595,999	2,928,239	-	33,929,454	1,660,683	35,590,137
A1a - Residential New Homes & Renovations	1,203,561	201,655	29,595,999	2,928,239	-	33,929,454	1,660,683	35,590,137
A2 - Residential Existing Buildings	11,654,840	7,609,292	242,759,007	84,505,179	-	346,528,317	8,913,411	355,441,728
A2a - Residential Coordinated Delivery	7,347,022	3,324,537	191,102,639	31,296,072	-	233,070,270	6,307,268	239,377,538
A2b - Residential Conservation Services (RCS)	1,835,286	1,258,590	-	47,309,311	-	50,403,187	-	50,403,187
A2c - Residential Retail	2,147,716	2,922,714	44,363,513	3,646,217	-	53,080,159	2,375,502	55,455,662
A2d - Residential Behavior	324,816	103,451	7,292,855	2,253,579	-	9,974,701	230,640	10,205,341
A3 - Residential Hard-to-Measure	3,868,134	3,607,277	3,560,023	1,617,155	9,931,034	22,583,623	-	22,583,623
A3a - Residential Statewide Marketing	-	2,709,071	-	-	-	2,709,071	-	2,709,071
A3b - Residential Statewide Database	328,573	-	-	-	-	328,573	-	328,573
A3c - Residential DOER Assessment	2,208,071	-	-	-	-	2,208,071	-	2,208,071
A3d - Residential EEAC Consultants	997,636	-	-	-	-	997,636	-	997,636
A3e - Residential Sponsorships & Subscriptions	167,647	22,072	-	3,623	14,465	207,808	-	207,808
A3f - Residential HEAT Loan	102,577	148,949	3,396,023	352,617	-	4,000,166	-	4,000,166
A3g - Residential Workforce Development	-	-	-	600,071	-	600,071	-	600,071
A3h - Residential R&D and Demonstration	63,630	223,750	164,000	602,644	-	1,054,024	-	1,054,024
A3i - Residential Education	-	503,434	-	58,200	-	561,634	-	561,634
A3j - Residential Evaluation and Market Research	-	-	-	-	9,916,569	9,916,569	-	9,916,569
B - Income Eligible	**6,385,296**	**2,694,455**	**112,423,078**	**25,256,569**	**3,688,205**	**150,447,604**	**2,995,051**	**153,442,654**
B1 - Income Eligible Existing Buildings	4,904,616	1,735,358	112,423,078	25,204,815	-	144,267,867	2,995,051	147,262,917
B1a - Income Eligible Coordinated Delivery	4,904,616	1,735,358	112,423,078	25,204,815	-	144,267,867	2,995,051	147,262,917
B2 - Income Eligible Hard-to-Measure	1,480,680	959,097	-	51,754	3,688,205	6,179,737	-	6,179,737
B2a - Income Eligible Statewide Marketing	-	951,256	-	-	-	951,256	-	951,256
B2b - Income Eligible Statewide Database	125,620	-	-	-	-	125,620	-	125,620
B2c - Income Eligible DOER Assessment	838,299	-	-	-	-	838,299	-	838,299
B2d - Income Eligible Energy Affordability Network	458,057	-	-	-	-	458,057	-	458,057
B2e - Income Eligible Sponsorships & Subscriptions	58,703	7,841	-	1,444	-	67,989	-	67,989
B2f - Income Eligible Evaluation and Market Research	-	-	-	-	3,688,205	3,688,205	-	3,688,205
B2g - Income Eligible Workforce Development	-	-	-	50,310	-	50,310	-	50,310
C - Commercial & Industrial	**8,990,577**	**6,278,432**	**85,023,694**	**33,315,189**	**4,194,421**	**137,802,313**	**4,852,289**	**142,654,602**
C1 - C&I New Buildings	1,655,075	1,317,917	14,110,391	7,591,789	-	24,675,172	994,442	25,669,614
C1a - C&I New Buildings & Major Renovations	1,655,075	1,317,917	14,110,391	7,591,789	-	24,675,172	994,442	25,669,614
C2 - C&I Existing Buildings	5,871,919	3,906,141	70,624,303	24,932,151	-	105,334,514	3,857,847	109,192,360
C2a - C&I Existing Building Retrofit	3,547,338	3,006,069	42,057,145	17,178,874	-	65,789,426	3,191,596	68,981,023
C2b - C&I New & Replacement Equipment	2,324,581	900,072	28,567,158	7,753,277	-	39,545,087	666,250	40,211,338
C3 - C&I Hard-to-Measure	1,463,583	1,054,374	289,000	791,249	4,194,421	7,792,627	-	7,792,627
C3a - C&I Statewide Marketing	-	976,971	-	-	-	976,971	-	976,971
C3b - C&I Statewide Database	106,018	-	-	-	-	106,018	-	106,018
C3c - C&I DOER Assessment	1,012,263	-	-	-	-	1,012,263	-	1,012,263
C3d - C&I EEAC Consultants	240,418	-	-	-	-	240,418	-	240,418
C3e - C&I Sponsorships & Subscriptions	85,661	12,353	-	1,481	4,000	103,495	-	103,495
C3f - C&I Workforce Development	-	-	-	150,768	-	150,768	-	150,768
C3g - C&I R&D and Demonstration	19,223	65,050	289,000	639,000	-	1,012,272	-	1,012,272
C3h - C&I Evaluation and Market Research	-	-	-	-	4,190,421	4,190,421	-	4,190,421
Grand Total	**32,102,408**	**20,391,111**	**473,361,801**	**147,622,331**	**17,813,661**	**691,291,311**	**18,421,434**	**709,712,745**

Notes:

Budgets for each year are represented in nominal dollars (2019$, 2020$, 2021$).

Refer to common definitions for allocation of costs.

IV.D. Cost-Effectiveness

1. Summary Table

Statewide Gas
April 30, 2018

2019 Total Resource Cost Test (2019$)							
Program	Benefit-Cost Ratio	Net Benefits	Total TRC Test Benefits	Costs			
				Total Program Costs	Performance Incentive	Participant Costs	Total TRC Test Costs
A - Residential	**1.54**	**108,228,660**	**306,950,141**	**131,765,441**	**3,447,250**	**63,508,790**	**198,721,481**
A1 - Residential New Buildings	1.31	10,597,012	44,933,704	11,197,019	531,556	22,608,118	34,336,692
A1a - Residential New Homes & Renovations	1.31	10,597,012	44,933,704	11,197,019	531,556	22,608,118	34,336,692
A2 - Residential Existing Buildings	1.67	105,008,151	262,016,437	113,191,919	2,915,694	40,900,672	157,008,286
A2a - Residential Coordinated Delivery	1.82	85,525,026	189,841,718	76,352,727	2,076,706	25,887,260	104,316,693
A2b - Residential Conservation Services (RCS)	0.00	-16,409,452	0	16,409,452	-	-	16,409,452
A2c - Residential Retail	1.99	32,715,848	65,659,253	17,157,542	772,451	15,013,413	32,943,405
A2d - Residential Behavior	1.95	3,176,730	6,515,465	3,272,198	66,537	-	3,338,735
A3 - Residential Hard-to-Measure	0.00	-7,376,503	0	7,376,503	-	-	7,376,503
B - Income Eligible	**1.84**	**42,359,023**	**92,986,344**	**49,652,606**	**974,715**	**-**	**50,627,321**
B1 - Income Eligible Existing Buildings	1.91	44,368,250	92,986,344	47,643,379	974,715	-	48,618,094
B1a - Income Eligible Coordinated Delivery	1.91	44,368,250	92,986,344	47,643,379	974,715	-	48,618,094
B2 - Income Eligible Hard-to-Measure	0.00	-2,009,227	0	2,009,227	-	-	2,009,227
C - Commercial & Industrial	**2.13**	**71,273,610**	**134,356,589**	**45,293,806**	**1,597,013**	**16,192,160**	**63,082,979**
C1 - C&I New Buildings	2.75	17,883,111	28,130,978	8,050,290	340,424	1,857,154	10,247,868
C1a - C&I New Buildings & Major Renovations	2.75	17,883,111	28,130,978	8,050,290	340,424	1,857,154	10,247,868
C2 - C&I Existing Buildings	2.11	55,992,511	106,225,610	34,641,504	1,256,589	14,335,006	50,233,099
C2a - C&I Existing Building Retrofit	2.43	49,626,784	84,226,187	22,636,234	1,030,695	10,932,474	34,599,403
C2b - C&I New & Replacement Equipment	1.41	6,365,727	21,999,423	12,005,270	225,895	3,402,532	15,633,696
C3 - C&I Hard-to-Measure	0.00	-2,602,012	0	2,602,012	-	-	2,602,012
Grand Total	**1.71**	**221,861,292**	**534,293,073**	**226,711,853**	**6,018,978**	**79,700,950**	**312,431,781**

2020 Total Resource Cost Test (2019$)							
Program	Benefit-Cost Ratio	Net Benefits	Total TRC Test Benefits	Costs			
				Total Program Costs	Performance Incentive	Participant Costs	Total TRC Test Costs
A - Residential	**1.55**	**108,928,296**	**307,154,738**	**131,129,925**	**3,445,930**	**63,650,586**	**198,226,442**
A1 - Residential New Buildings	1.33	11,342,972	45,554,470	10,998,236	541,557	22,671,705	34,211,498
A1a - Residential New Homes & Renovations	1.33	11,342,972	45,554,470	10,998,236	541,557	22,671,705	34,211,498
A2 - Residential Existing Buildings	1.67	104,717,790	261,600,268	112,999,223	2,904,373	40,978,882	156,882,478
A2a - Residential Coordinated Delivery	1.81	84,501,787	188,362,158	75,873,411	2,052,439	25,934,521	103,860,372
A2b - Residential Conservation Services (RCS)	0.00	-16,368,418	0	16,368,418	-	-	16,368,418
A2c - Residential Retail	1.98	32,756,479	66,068,140	17,490,708	776,592	15,044,361	33,311,660
A2d - Residential Behavior	2.15	3,827,942	7,169,970	3,266,686	75,342	-	3,342,028
A3 - Residential Hard-to-Measure	0.00	-7,132,466	0	7,132,466	-	-	7,132,466
B - Income Eligible	**1.86**	**42,881,469**	**92,814,369**	**48,955,659**	**977,241**	**-**	**49,932,899**
B1 - Income Eligible Existing Buildings	1.94	44,868,946	92,814,369	46,968,182	977,241	-	47,945,423
B1a - Income Eligible Coordinated Delivery	1.94	44,868,946	92,814,369	46,968,182	977,241	-	47,945,423
B2 - Income Eligible Hard-to-Measure	0.00	-1,987,476	0	1,987,476	-	-	1,987,476
C - Commercial & Industrial	**2.15**	**71,370,562**	**133,700,940**	**44,869,802**	**1,590,629**	**15,869,947**	**62,330,378**
C1 - C&I New Buildings	2.66	16,920,053	27,133,303	8,041,959	326,541	1,844,749	10,213,250
C1a - C&I New Buildings & Major Renovations	2.66	16,920,053	27,133,303	8,041,959	326,541	1,844,749	10,213,250
C2 - C&I Existing Buildings	2.15	57,012,839	106,567,637	34,265,512	1,264,088	14,025,198	49,554,798
C2a - C&I Existing Building Retrofit	2.59	51,990,692	84,683,436	20,970,891	1,048,878	10,672,975	32,692,744
C2b - C&I New & Replacement Equipment	1.30	5,022,147	21,884,201	13,294,621	215,210	3,352,223	16,862,054
C3 - C&I Hard-to-Measure	0.00	-2,562,330	0	2,562,330	-	-	2,562,330
Grand Total	**1.72**	**223,180,328**	**533,670,047**	**224,955,386**	**6,013,800**	**79,520,533**	**310,489,719**

IV.D. Cost-Effectiveness

1. Summary Table

Statewide Gas
April 30, 2018

2021 Total Resource Cost Test (2019$)							
Program	Benefit-Cost Ratio	Net Benefits	Total TRC Test Benefits	Costs			
				Total Program Costs	Performance Incentive	Participant Costs	Total TRC Test Costs
A - Residential	**1.55**	**108,934,861**	**305,916,251**	**130,918,810**	**3,438,522**	**62,624,058**	**196,981,390**
A1 - Residential New Buildings	1.36	12,333,667	46,158,813	10,961,198	549,067	22,314,882	33,825,147
A1a - Residential New Homes & Renovations	1.36	12,333,667	46,158,813	10,961,198	549,067	22,314,882	33,825,147
A2 - Residential Existing Buildings	1.67	104,153,620	259,757,438	112,405,187	2,889,455	40,309,176	155,603,818
A2a - Residential Coordinated Delivery	1.80	82,825,599	186,337,709	75,516,228	2,034,394	25,961,488	103,512,109
A2b - Residential Conservation Services (RCS)	0.00	-16,467,602	0	16,467,602	-	-	16,467,602
A2c - Residential Retail	2.03	33,351,264	65,683,834	17,212,910	771,972	14,347,688	32,332,570
A2d - Residential Behavior	2.35	4,444,358	7,735,895	3,208,448	83,089	-	3,291,536
A3 - Residential Hard-to-Measure	0.00	-7,552,425	0	7,552,425	-	-	7,552,425
B - Income Eligible	**1.87**	**42,954,587**	**92,345,170**	**48,416,193**	**974,390**	**-**	**49,390,583**
B1 - Income Eligible Existing Buildings	1.95	44,995,116	92,345,170	46,375,664	974,390	-	47,350,053
B1a - Income Eligible Coordinated Delivery	1.95	44,995,116	92,345,170	46,375,664	974,390	-	47,350,053
B2 - Income Eligible Hard-to-Measure	0.00	-2,040,529	0	2,040,529	-	-	2,040,529
C - Commercial & Industrial	**2.13**	**69,367,761**	**130,940,602**	**44,495,588**	**1,554,310**	**15,522,943**	**61,572,841**
C1 - C&I New Buildings	2.53	15,486,662	25,620,201	8,017,573	305,468	1,810,497	10,133,538
C1a - C&I New Buildings & Major Renovations	2.53	15,486,662	25,620,201	8,017,573	305,468	1,810,497	10,133,538
C2 - C&I Existing Buildings	2.15	56,334,043	105,320,402	34,025,071	1,248,842	13,712,446	48,986,359
C2a - C&I Existing Building Retrofit	2.60	51,637,466	83,819,071	20,717,019	1,038,621	10,425,965	32,181,605
C2b - C&I New & Replacement Equipment	1.28	4,696,577	21,501,331	13,308,052	210,221	3,286,481	16,804,754
C3 - C&I Hard-to-Measure	0.00	-2,452,944	0	2,452,944	-	-	2,452,944
Grand Total	**1.72**	**221,257,209**	**529,202,023**	**223,830,591**	**5,967,222**	**78,147,001**	**307,944,814**

2019-2021 Total Resource Cost Test (2019$)							
Program	Benefit-Cost Ratio	Net Benefits	Total TRC Test Benefits	Costs			
				Total Program Costs	Performance Incentive	Participant Costs	Total TRC Test Costs
A - Residential	**1.55**	**326,091,817**	**920,021,130**	**393,814,176**	**10,331,702**	**189,783,435**	**593,929,313**
A1 - Residential New Buildings	1.33	34,273,651	136,646,988	33,156,453	1,622,180	67,594,704	102,373,337
A1a - Residential New Homes & Renovations	1.33	34,273,651	136,646,988	33,156,453	1,622,180	67,594,704	102,373,337
A2 - Residential Existing Buildings	1.67	313,879,560	783,374,143	338,596,330	8,709,522	122,188,730	469,494,582
A2a - Residential Coordinated Delivery	1.81	252,852,412	564,541,586	227,742,366	6,163,539	77,783,269	311,689,174
A2b - Residential Conservation Services (RCS)	0.00	-49,245,473	0	49,245,473	-	-	49,245,473
A2c - Residential Retail	2.00	98,823,591	197,411,227	51,861,159	2,321,015	44,405,462	98,587,636
A2d - Residential Behavior	2.15	11,449,030	21,421,330	9,747,332	224,968	-	9,972,300
A3 - Residential Hard-to-Measure	0.00	-22,061,394	0	22,061,394	-	-	22,061,394
B - Income Eligible	**1.85**	**128,195,079**	**278,145,882**	**147,024,457**	**2,926,345**	**-**	**149,950,803**
B1 - Income Eligible Existing Buildings	1.93	134,232,312	278,145,882	140,987,225	2,926,345	-	143,913,571
B1a - Income Eligible Coordinated Delivery	1.93	134,232,312	278,145,882	140,987,225	2,926,345	-	143,913,571
B2 - Income Eligible Hard-to-Measure	0.00	-6,037,232	0	6,037,232	-	-	6,037,232
C - Commercial & Industrial	**2.13**	**212,011,933**	**398,998,131**	**134,659,196**	**4,741,953**	**47,585,049**	**186,986,198**
C1 - C&I New Buildings	2.64	50,289,826	80,884,482	24,109,823	972,433	5,512,399	30,594,655
C1a - C&I New Buildings & Major Renovations	2.64	50,289,826	80,884,482	24,109,823	972,433	5,512,399	30,594,655
C2 - C&I Existing Buildings	2.14	169,339,392	318,113,649	102,932,087	3,769,519	42,072,650	148,774,257
C2a - C&I Existing Building Retrofit	2.54	153,254,941	252,728,693	64,324,145	3,118,194	32,031,414	99,473,752
C2b - C&I New & Replacement Equipment	1.33	16,084,451	65,384,955	38,607,943	651,325	10,041,236	49,300,504
C3 - C&I Hard-to-Measure	0.00	-7,617,286	0	7,617,286	-	-	7,617,286
Grand Total	**1.72**	**666,298,829**	**1,597,165,143**	**675,497,830**	**18,000,000**	**237,368,484**	**930,866,314**

Notes:

The Benefit-Cost Ratio is the Total TRC Test Benefits divided by the Total TRC Test Costs.

The Net Benefits are the Total TRC Test Benefits minus the Total TRC Test Costs.

For supporting information on the Total TRC Test Benefits, see Table IV.D.3.1.i.

For supporting information on the Total Program Costs, see Table IV.C.1.

For supporting information on the Performance Incentive, refer to the Performance Incentive Model.

The Total TRC Costs are the sum of the Total Program Costs, Performance Incentives, and Participant Costs.

IV.D Cost-Effectiveness

3.1.i. Benefits Summary Table

Statewide Gas

April 30, 2018

2019 Total Benefits					
Program	**Electric (Capacity and Energy)**	**Natural Gas**	**Other Resources (Oil, Propane, Water)**	**Non-Energy Impacts**	**Total Benefits**
A - Residential	**56,862,573**	**175,044,717**	**5,474,862**	**69,567,988**	**306,950,141**
A1 - Residential New Buildings	1,635,919	28,057,916	-	15,239,870	44,933,704
A1a - Residential New Homes & Renovations	1,635,919	28,057,916	-	15,239,870	44,933,704
A2 - Residential Existing Buildings	55,226,655	146,986,801	5,474,862	54,328,118	262,016,437
A2a - Residential Coordinated Delivery	37,670,660	97,290,528	5,466,950	49,413,580	189,841,718
A2b - Residential Conservation Services (RCS)	-	-	-	-	-
A2c - Residential Retail	17,555,994	43,180,808	7,912	4,914,538	65,659,253
A2d - Residential Behavior	-	6,515,465	-	-	6,515,465
B - Income Eligible	**4,059,387**	**46,934,916**	**173,641**	**41,818,400**	**92,986,344**
B1 - Income Eligible Existing Buildings	4,059,387	46,934,916	173,641	41,818,400	92,986,344
B1a - Income Eligible Coordinated Delivery	4,059,387	46,934,916	173,641	41,818,400	92,986,344
C - Commercial & Industrial	**49,180**	**113,052,276**	**8,249,883**	**13,005,250**	**134,356,589**
C1 - C&I New Buildings	-	27,799,366	60,717	270,896	28,130,978
C1a - C&I New Buildings & Major Renovations	-	27,799,366	60,717	270,896	28,130,978
C2 - C&I Existing Buildings	49,180	85,252,910	8,189,166	12,734,354	106,225,610
C2a - C&I Existing Building Retrofit	47,812	63,412,867	8,031,154	12,734,354	84,226,187
C2b - C&I New & Replacement Equipment	1,367	21,840,043	158,013	-	21,999,423
Grand Total	**60,971,140**	**335,031,909**	**13,898,386**	**124,391,638**	**534,293,073**

2020 Total Benefits					
Program	**Electric (Capacity and Energy)**	**Natural Gas**	**Other Resources (Oil, Propane, Water)**	**Non-Energy Impacts**	**Total Benefits**
A - Residential	**56,774,343**	**175,114,417**	**5,515,936**	**69,750,042**	**307,154,738**
A1 - Residential New Buildings	1,666,964	28,356,557	-	15,530,949	45,554,470
A1a - Residential New Homes & Renovations	1,666,964	28,356,557	-	15,530,949	45,554,470
A2 - Residential Existing Buildings	55,107,380	146,757,860	5,515,936	54,219,093	261,600,268
A2a - Residential Coordinated Delivery	37,651,977	96,003,553	5,508,023	49,198,606	188,362,158
A2b - Residential Conservation Services (RCS)	-	-	-	-	-
A2c - Residential Retail	17,455,403	43,584,337	7,912	5,020,487	66,068,140
A2d - Residential Behavior	-	7,169,970	-	-	7,169,970
B - Income Eligible	**4,109,676**	**46,672,639**	**173,641**	**41,858,413**	**92,814,369**
B1 - Income Eligible Existing Buildings	4,109,676	46,672,639	173,641	41,858,413	92,814,369
B1a - Income Eligible Coordinated Delivery	4,109,676	46,672,639	173,641	41,858,413	92,814,369
C - Commercial & Industrial	**50,187**	**112,406,528**	**8,217,080**	**13,027,146**	**133,700,940**
C1 - C&I New Buildings	-	26,817,005	60,717	255,580	27,133,303
C1a - C&I New Buildings & Major Renovations	-	26,817,005	60,717	255,580	27,133,303
C2 - C&I Existing Buildings	50,187	85,589,523	8,156,363	12,771,565	106,567,637
C2a - C&I Existing Building Retrofit	48,613	63,891,074	7,972,184	12,771,565	84,683,436
C2b - C&I New & Replacement Equipment	1,574	21,698,449	184,178	-	21,884,201
Grand Total	**60,934,206**	**334,193,584**	**13,906,656**	**124,635,601**	**533,670,047**

IV.D Cost-Effectiveness

3.1.i. Benefits Summary Table

Statewide Gas

April 30, 2018

2021 Total Benefits					
Program	**Electric (Capacity and Energy)**	**Natural Gas**	**Other Resources (Oil, Propane, Water)**	**Non-Energy Impacts**	**Total Benefits**
A - Residential	**57,221,788**	**173,448,427**	**5,505,424**	**69,740,612**	**305,916,251**
A1 - Residential New Buildings	1,640,411	28,692,396	-	15,826,006	46,158,813
A1a - Residential New Homes & Renovations	1,640,411	28,692,396	-	15,826,006	46,158,813
A2 - Residential Existing Buildings	55,581,377	144,756,032	5,505,424	53,914,605	259,757,438
A2a - Residential Coordinated Delivery	37,736,687	94,107,315	5,497,512	48,996,195	186,337,709
A2b - Residential Conservation Services (RCS)	-	-	-	-	-
A2c - Residential Retail	17,844,690	42,912,822	7,912	4,918,410	65,683,834
A2d - Residential Behavior	-	7,735,895	-	-	7,735,895
B - Income Eligible	**4,159,122**	**46,153,994**	**173,641**	**41,858,413**	**92,345,170**
B1 - Income Eligible Existing Buildings	4,159,122	46,153,994	173,641	41,858,413	92,345,170
B1a - Income Eligible Coordinated Delivery	4,159,122	46,153,994	173,641	41,858,413	92,345,170
C - Commercial & Industrial	**51,005**	**109,634,547**	**8,239,579**	**13,015,472**	**130,940,602**
C1 - C&I New Buildings	-	25,303,359	60,717	256,125	25,620,201
C1a - C&I New Buildings & Major Renovations	-	25,303,359	60,717	256,125	25,620,201
C2 - C&I Existing Buildings	51,005	84,331,188	8,178,862	12,759,347	105,320,402
C2a - C&I Existing Building Retrofit	49,423	63,015,617	7,994,683	12,759,347	83,819,071
C2b - C&I New & Replacement Equipment	1,582	21,315,571	184,178	-	21,501,331
Grand Total	**61,431,915**	**329,236,968**	**13,918,643**	**124,614,496**	**529,202,023**

2019-2021 Total Benefits					
Program	**Electric (Capacity and Energy)**	**Natural Gas**	**Other Resources (Oil, Propane, Water)**	**Non-Energy Impacts**	**Total Benefits**
A - Residential	**170,858,705**	**523,607,562**	**16,496,222**	**209,058,642**	**920,021,130**
A1 - Residential New Buildings	4,943,294	85,106,869	-	46,596,825	136,646,988
A1a - Residential New Homes & Renovations	4,943,294	85,106,869	-	46,596,825	136,646,988
A2 - Residential Existing Buildings	165,915,411	438,500,693	16,496,222	162,461,817	783,374,143
A2a - Residential Coordinated Delivery	113,059,324	287,401,396	16,472,484	147,608,381	564,541,586
A2b - Residential Conservation Services (RCS)	-	-	-	-	-
A2c - Residential Retail	52,856,087	129,677,967	23,737	14,853,436	197,411,227
A2d - Residential Behavior	-	21,421,330	-	-	21,421,330
B - Income Eligible	**12,328,184**	**139,761,549**	**520,922**	**125,535,227**	**278,145,882**
B1 - Income Eligible Existing Buildings	12,328,184	139,761,549	520,922	125,535,227	278,145,882
B1a - Income Eligible Coordinated Delivery	12,328,184	139,761,549	520,922	125,535,227	278,145,882
C - Commercial & Industrial	**150,371**	**335,093,351**	**24,706,542**	**39,047,867**	**398,998,131**
C1 - C&I New Buildings	-	79,919,730	182,151	782,601	80,884,482
C1a - C&I New Buildings & Major Renovations	-	79,919,730	182,151	782,601	80,884,482
C2 - C&I Existing Buildings	150,371	255,173,621	24,524,391	38,265,266	318,113,649
C2a - C&I Existing Building Retrofit	145,848	190,319,558	23,998,021	38,265,266	252,728,693
C2b - C&I New & Replacement Equipment	4,523	64,854,063	526,369	-	65,384,955
Grand Total	**183,337,260**	**998,462,462**	**41,723,685**	**373,641,735**	**1,597,165,143**

IV.D. Cost-Effectiveness

3.2.i. Savings Summary Table

Statewide Gas

April 30, 2018

2019 Net Savings

Program	Electric						Natural Gas		Deliverable Fuels				Other		Total Savings	
	Annual Capacity (kW)		Electric Energy (MWh)		Electric Energy (MMBTU)		MMBTU		Oil (MMBTU)		Propane (MMBTU)		Water (Gallons)		MMBTU	
	Summer	Winter	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime
A - Residential	**7,539**	**2,446**	**10,576**	**176,476**	**36,086**	**602,135**	**1,484,284**	**17,343,558**	**-**	**-**	**-**	**-**	**53,648,098**	**375,536,684**	**1,520,370**	**17,945,693**
A1 - Residential New Buildings	181	256	907	12,153	3,094	41,466	134,194	2,898,316	-	-	-	-	-	-	137,288	2,939,782
A1a - Residential New Homes & Renovations	181	256	907	12,153	3,094	41,466	134,194	2,898,316	-	-	-	-	-	-	137,288	2,939,782
A2 - Residential Existing Buildings	7,359	2,190	9,670	164,323	32,992	560,669	1,350,090	14,445,242	-	-	-	-	53,648,098	375,536,684	1,383,082	15,005,911
A2a - Residential Coordinated Delivery	3,947	2,186	7,982	138,798	27,235	473,580	506,354	9,531,066	-	-	-	-	52,135,164	364,946,146	533,589	10,004,646
A2b - Residential Conservation Services (RCS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2c - Residential Retail	3,412	4	1,688	25,524	5,758	87,089	264,583	4,335,025	-	-	-	-	1,512,934	10,590,538	270,341	4,422,113
A2d - Residential Behavior	-	-	-	-	-	-	579,152	579,152	-	-	-	-	-	-	579,152	579,152
B - Income Eligible	**541**	**270**	**670**	**13,223**	**2,286**	**45,118**	**235,896**	**4,731,360**	**-**	**-**	**-**	**-**	**1,542,817**	**10,799,719**	**238,181**	**4,776,479**
B1 - Income Eligible Existing Buildings	541	270	670	13,223	2,286	45,118	235,896	4,731,360	-	-	-	-	1,542,817	10,799,719	238,181	4,776,479
B1a - Income Eligible Coordinated Delivery	541	270	670	13,223	2,286	45,118	235,896	4,731,360	-	-	-	-	1,542,817	10,799,719	238,181	4,776,479
C - Commercial & Industrial	**5**	**0**	**4**	**90**	**14**	**307**	**945,280**	**12,165,513**	**-**	**-**	**-**	**-**	**55,943,117**	**601,497,418**	**945,294**	**12,165,820**
C1 - C&I New Buildings	-	-	-	-	-	-	176,118	3,059,118	-	-	-	-	385,541	4,626,489	176,118	3,059,118
C1a - C&I New Buildings & Major Renovations	-	-	-	-	-	-	176,118	3,059,118	-	-	-	-	385,541	4,626,489	176,118	3,059,118
C2 - C&I Existing Buildings	5	0	4	90	14	307	769,162	9,106,395	-	-	-	-	55,557,576	596,870,929	769,177	9,106,702
C2a - C&I Existing Building Retrofit	5	-	3	72	11	247	601,757	6,598,499	-	-	-	-	54,554,227	584,830,747	601,768	6,598,746
C2b - C&I New & Replacement Equipment	0	0	1	18	3	60	167,406	2,507,896	-	-	-	-	1,003,349	12,040,182	167,409	2,507,956
Grand Total	**8,086**	**2,716**	**11,250**	**189,789**	**38,386**	**647,560**	**2,665,459**	**34,240,432**	**-**	**-**	**-**	**-**	**111,134,031**	**987,833,821**	**2,703,845**	**34,887,992**

2020 Net Savings

Program	Electric						Natural Gas		Deliverable Fuels				Other		Total Savings	
	Annual Capacity (kW)		Electric Energy (MWh)		Electric Energy (MMBTU)		MMBTU		Oil (MMBTU)		Propane (MMBTU)		Water (Gallons)		MMBTU	
	Summer	Winter	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime
A - Residential	**7,448**	**2,297**	**9,574**	**167,607**	**32,666**	**571,875**	**1,489,843**	**17,456,861**	**-**	**-**	**-**	**-**	**54,150,531**	**379,053,715**	**1,522,509**	**18,028,736**
A1 - Residential New Buildings	182	258	908	12,265	3,098	41,847	135,797	2,938,920	-	-	-	-	-	-	138,896	2,980,767
A1a - Residential New Homes & Renovations	182	258	908	12,265	3,098	41,847	135,797	2,938,920	-	-	-	-	-	-	138,896	2,980,767
A2 - Residential Existing Buildings	7,266	2,040	8,666	155,342	29,567	530,028	1,354,046	14,517,941	-	-	-	-	54,150,531	379,053,715	1,383,614	15,047,969
A2a - Residential Coordinated Delivery	3,857	2,065	7,220	133,948	24,636	457,031	501,865	9,470,708	-	-	-	-	52,514,027	367,598,187	526,501	9,927,738
A2b - Residential Conservation Services (RCS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2c - Residential Retail	3,409	(25)	1,445	21,394	4,932	72,998	271,769	4,466,821	-	-	-	-	1,636,504	11,455,528	276,701	4,539,819
A2d - Residential Behavior	-	-	-	-	-	-	580,412	580,412	-	-	-	-	-	-	580,412	580,412
B - Income Eligible	**542**	**271**	**671**	**13,244**	**2,289**	**45,189**	**235,896**	**4,731,487**	**-**	**-**	**-**	**-**	**1,542,817**	**10,799,719**	**238,185**	**4,776,676**
B1 - Income Eligible Existing Buildings	542	271	671	13,244	2,289	45,189	235,896	4,731,487	-	-	-	-	1,542,817	10,799,719	238,185	4,776,676
B1a - Income Eligible Coordinated Delivery	542	271	671	13,244	2,289	45,189	235,896	4,731,487	-	-	-	-	1,542,817	10,799,719	238,185	4,776,676
C - Commercial & Industrial	**5**	**0**	**4**	**92**	**15**	**315**	**955,314**	**12,144,980**	**-**	**-**	**-**	**-**	**55,626,588**	**598,645,167**	**955,329**	**12,145,295**
C1 - C&I New Buildings	-	-	-	-	-	-	177,539	2,938,823	-	-	-	-	385,541	4,626,489	177,539	2,938,823
C1a - C&I New Buildings & Major Renovations	-	-	-	-	-	-	177,539	2,938,823	-	-	-	-	385,541	4,626,489	177,539	2,938,823
C2 - C&I Existing Buildings	5	0	4	92	15	315	777,775	9,206,157	-	-	-	-	55,241,048	594,018,678	777,789	9,206,472
C2a - C&I Existing Building Retrofit	5	-	3	72	11	247	609,210	6,681,440	-	-	-	-	54,102,703	580,358,545	609,221	6,681,687
C2b - C&I New & Replacement Equipment	0	0	1	20	4	69	168,564	2,524,716	-	-	-	-	1,138,344	13,660,134	168,568	2,524,785
Grand Total	**7,995**	**2,568**	**10,249**	**180,943**	**34,970**	**617,379**	**2,681,053**	**34,333,328**	**-**	**-**	**-**	**-**	**111,319,936**	**988,498,601**	**2,716,023**	**34,950,707**

IV.D. Cost-Effectiveness

3.2.i. Savings Summary Table

Statewide Gas

April 30, 2018

2021 Net Savings

Program	Electric						Natural Gas		Deliverable Fuels				Other		Total Savings	
	Annual Capacity (kW)		Electric Energy (MWh)		Electric Energy (MMBTU)		MMBTU		Oil (MMBTU)		Propane (MMBTU)		Water (Gallons)		MMBTU	
	Summer	Winter	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime
A - Residential	**7,382**	**2,238**	**9,247**	**167,475**	**31,550**	**571,426**	**1,480,827**	**17,321,866**	**-**	**-**	**-**	**-**	**53,944,480**	**377,611,358**	**1,512,378**	**17,893,292**
A1 - Residential New Buildings	182	258	902	11,895	3,078	40,584	138,495	2,999,765	-	-	-	-	-	-	141,573	3,040,350
A1a - Residential New Homes & Renovations	182	258	902	11,895	3,078	40,584	138,495	2,999,765	-	-	-	-	-	-	141,573	3,040,350
A2 - Residential Existing Buildings	7,200	1,979	8,345	155,581	28,473	530,842	1,342,332	14,322,101	-	-	-	-	53,944,480	377,611,358	1,370,805	14,852,943
A2a - Residential Coordinated Delivery	3,788	1,975	6,657	130,058	22,715	443,758	497,137	9,403,339	-	-	-	-	52,431,546	367,020,820	519,853	9,847,096
A2b - Residential Conservation Services (RCS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2c - Residential Retail	3,412	4	1,687	25,523	5,758	87,084	264,743	4,338,311	-	-	-	-	1,512,934	10,590,538	270,501	4,425,394
A2d - Residential Behavior	-	-	-	-	-	-	580,452	580,452	-	-	-	-	-	-	580,452	580,452
B - Income Eligible	**542**	**271**	**671**	**13,244**	**2,289**	**45,189**	**235,896**	**4,731,487**	**-**	**-**	**-**	**-**	**1,542,817**	**10,799,719**	**238,185**	**4,776,676**
B1 - Income Eligible Existing Buildings	542	271	671	13,244	2,289	45,189	235,896	4,731,487	-	-	-	-	1,542,817	10,799,719	238,185	4,776,676
B1a - Income Eligible Coordinated Delivery	542	271	671	13,244	2,289	45,189	235,896	4,731,487	-	-	-	-	1,542,817	10,799,719	238,185	4,776,676
C - Commercial & Industrial	**5**	**0**	**4**	**92**	**15**	**315**	**951,498**	**11,889,136**	**-**	**-**	**-**	**-**	**55,823,325**	**600,022,325**	**951,513**	**11,889,451**
C1 - C&I New Buildings	-	-	-	-	-	-	178,636	2,758,416	-	-	-	-	385,541	4,626,489	178,636	2,758,416
C1a - C&I New Buildings & Major Renovations	-	-	-	-	-	-	178,636	2,758,416	-	-	-	-	385,541	4,626,489	178,636	2,758,416
C2 - C&I Existing Buildings	5	0	4	92	15	315	772,862	9,130,720	-	-	-	-	55,437,784	595,395,836	772,877	9,131,035
C2a - C&I Existing Building Retrofit	5	-	3	72	11	247	607,287	6,664,740	-	-	-	-	54,299,440	581,735,702	607,298	6,664,986
C2b - C&I New & Replacement Equipment	0	0	1	20	4	69	165,575	2,465,980	-	-	-	-	1,138,344	13,660,134	165,579	2,466,048
Grand Total	**7,929**	**2,508**	**9,922**	**180,812**	**33,854**	**616,930**	**2,668,221**	**33,942,489**	**-**	**-**	**-**	**-**	**111,310,622**	**988,433,401**	**2,702,075**	**34,559,419**

2019-2021 Net Savings

Program	Electric						Natural Gas		Deliverable Fuels				Other		Total Savings	
	Annual Capacity (kW)		Electric Energy (MWh)		Electric Energy (MMBTU)		MMBTU		Oil (MMBTU)		Propane (MMBTU)		Water (Gallons)		MMBTU	
	Summer	Winter	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime	Annual	Lifetime
A - Residential	**22,370**	**6,981**	**29,397**	**511,558**	**100,303**	**1,745,436**	**4,454,954**	**52,122,286**	**-**	**-**	**-**	**-**	**161,743,108**	**1,132,201,756**	**4,555,257**	**53,867,722**
A1 - Residential New Buildings	545	772	2,717	36,312	9,270	123,898	408,486	8,837,001	-	-	-	-	-	-	417,756	8,960,899
A1a - Residential New Homes & Renovations	545	772	2,717	36,312	9,270	123,898	408,486	8,837,001	-	-	-	-	-	-	417,756	8,960,899
A2 - Residential Existing Buildings	21,825	6,209	26,680	475,246	91,033	1,621,539	4,046,468	43,285,285	-	-	-	-	161,743,108	1,132,201,756	4,137,501	44,906,823
A2a - Residential Coordinated Delivery	11,592	6,226	21,860	402,804	74,585	1,374,368	1,505,357	28,405,112	-	-	-	-	157,080,736	1,099,565,152	1,579,942	29,779,481
A2b - Residential Conservation Services (RCS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2c - Residential Retail	10,233	(17)	4,820	72,441	16,447	247,170	801,095	13,140,156	-	-	-	-	4,662,372	32,636,604	817,542	13,387,326
A2d - Residential Behavior	-	-	-	-	-	-	1,740,016	1,740,016	-	-	-	-	-	-	1,740,016	1,740,016
B - Income Eligible	**1,625**	**811**	**2,012**	**39,712**	**6,864**	**135,496**	**707,687**	**14,194,334**	**-**	**-**	**-**	**-**	**4,628,451**	**32,399,157**	**714,551**	**14,329,830**
B1 - Income Eligible Existing Buildings	1,625	811	2,012	39,712	6,864	135,496	707,687	14,194,334	-	-	-	-	4,628,451	32,399,157	714,551	14,329,830
B1a - Income Eligible Coordinated Delivery	1,625	811	2,012	39,712	6,864	135,496	707,687	14,194,334	-	-	-	-	4,628,451	32,399,157	714,551	14,329,830
C - Commercial & Industrial	**15**	**0**	**13**	**275**	**44**	**937**	**2,852,092**	**36,199,629**	**-**	**-**	**-**	**-**	**167,393,030**	**1,800,164,910**	**2,852,136**	**36,200,566**
C1 - C&I New Buildings	-	-	-	-	-	-	532,293	8,756,357	-	-	-	-	1,156,622	13,879,467	532,293	8,756,357
C1a - C&I New Buildings & Major Renovations	-	-	-	-	-	-	532,293	8,756,357	-	-	-	-	1,156,622	13,879,467	532,293	8,756,357
C2 - C&I Existing Buildings	15	0	13	275	44	937	2,319,799	27,443,272	-	-	-	-	166,236,408	1,786,285,443	2,319,843	27,444,209
C2a - C&I Existing Building Retrofit	15	-	10	217	33	740	1,818,253	19,944,680	-	-	-	-	162,956,371	1,746,924,994	1,818,286	19,945,419
C2b - C&I New & Replacement Equipment	0	0	3	58	11	198	501,545	7,498,592	-	-	-	-	3,280,037	39,360,450	501,556	7,498,790
Grand Total	**24,010**	**7,792**	**31,422**	**551,544**	**107,210**	**1,881,869**	**8,014,733**	**102,516,248**	**-**	**-**	**-**	**-**	**333,764,589**	**2,964,765,823**	**8,121,944**	**104,398,118**

VII. Appendix

GHG reductions are provided for information purposes only. They are not included in the TRC test.

Statewide Gas

April 30, 2018

2019 Greenhouse Gas Reductions						
Sector	Adjusted Gross Annual Savings			Annual Emissions Reductions (Short Tons)		
	Electric Energy (MWh)	Natural Gas (Therm)	Oil (MMBTU)	NOX	SO2	CO2
A - Residential	12,249	14,503,354	-	2.3	1.1	89,696
B - Income Eligible	670	2,358,956	-	0.1	0.1	14,065
C - Commercial & Industrial	4	11,612,618	-	0.0	0.0	67,936
Grand Total	**12,923**	**28,474,928**	**-**	**2.4**	**1.2**	**171,697**

2020 Greenhouse Gas Reductions						
Sector	Adjusted Gross Annual Savings			Annual Emissions Reductions (Short Tons)		
	Electric Energy (MWh)	Natural Gas (Therm)	Oil (MMBTU)	NOX	SO2	CO2
A - Residential	10,817	14,560,216	-	2.0	1.0	89,462
B - Income Eligible	671	2,358,956	-	0.1	0.1	14,066
C - Commercial & Industrial	5	11,735,552	-	0.0	0.0	68,655
Grand Total	**11,493**	**28,654,724**	**-**	**2.1**	**1.0**	**172,182**

2021 Greenhouse Gas Reductions						
Sector	Adjusted Gross Annual Savings			Annual Emissions Reductions (Short Tons)		
	Electric Energy (MWh)	Natural Gas (Therm)	Oil (MMBTU)	NOX	SO2	CO2
A - Residential	10,230	14,448,155	-	1.9	0.9	88,574
B - Income Eligible	671	2,358,956	-	0.1	0.1	14,066
C - Commercial & Industrial	5	11,692,316	-	0.0	0.0	68,402
Grand Total	**10,905**	**28,499,427**	**-**	**2.0**	**1.0**	**171,041**

2019-2021 Greenhouse Gas Reductions						
Sector	Adjusted Gross Annual Savings			Annual Emissions Reductions (Short Tons)		
	Electric Energy (MWh)	Natural Gas (Therm)	Oil (MMBTU)	NOX	SO2	CO2
A - Residential	33,296	43,511,725	-	6.2	3.0	267,731
B - Income Eligible	2,012	7,076,868	-	0.4	0.2	42,196
C - Commercial & Industrial	14	35,040,486	-	0.0	0.0	204,992
Grand Total	**35,321**	**85,629,079**	**-**	**6.6**	**3.2**	**514,920**

Notes:

The Program Administrators are working with DEP to determine the best method for properly and precisely capturing the full impact of energy efficiency measures on GHG emissions. As part of this process, the Program Administrators have included this additional table on greenhouse gas reductions, based on continuing discussions with the DEP. These reductions are calculated using factors proposed by DEP, which are based on adjusted gross annual electric energy, natural gas, and oil savings. The Program Administrators look forward to discussing these proposed factors with DEP and are committed to ensuring that the full impact of energy efficiency measures on GHG emissions are captured.

Appendices

D. **Council's Resolution of February 28, 2018**

EEAC Resolution Concerning Its Priorities for the Development, Implementation, and Evaluation of the 2019-2021 Three-Year Energy Efficiency Plan

February 28, 2018

Introduction

Under the Green Communities Act ("GCA"), the Energy Efficiency Advisory Council ("EEAC" or "Council") is charged with reviewing the Massachusetts Program Administrators' ("PAs") energy efficiency investment plans and budgets, which are prepared in coordination with the EEAC. The Council looks forward to continuing its collaboration with the PAs and interested stakeholders as the PAs develop a fourth robust, innovative, and cost-effective electric and natural gas statewide Plan.

This resolution articulates the EEAC's priorities for the upcoming 2019-2021 Plan, which were gathered and refined over the course of six collaborative planning workshops conducted by the Council between September 26, 2017 and January 30, 2018. Detailed briefing documents on priority topics were circulated before each workshop. During the workshops, Councilors engaged in discussion, with input from the PAs and Council Consultants, in order to develop the list of informed recommendations that is attached to this resolution..

In addition to the Council's own input at the workshops, the stakeholder perspectives received during the upcoming public listening sessions will be an important consideration in developing the 2019-2021 Plan.

Priorities

The EEAC affirms the PAs' obligation to acquire "all available energy efficiency and demand reduction resources that are cost effective or less expensive than supply," as stipulated in the GCA. In striving to meet this statutory requirement, the EEAC is requesting a 2019-2021 Plan that builds on prior Plans' achievements, notwithstanding the expected decline in claimable electric savings from residential lighting initiatives. It is the Council's strong sense that, in order to meet the requirements of the GCA, the PAs must approach the development of the 2019-2021 Plan with a willingness to implement innovative new energy efficiency and demand reduction measures and strategies, particularly in the residential, multi-family, and low-income electric sectors.

It is the Council's sense that energy efficiency investments planned under the GCA should reflect the Commonwealth's long-term greenhouse gas reduction requirements as established in the Global Warming Solutions Act ("GWSA"). This will require prioritizing from among cost-effective energy efficiency and demand reduction resources those measures and strategies that lead to greater lifetime emissions reductions. To this end, the Council wants in the plan strategic electrification of space heating and water heating equipment and other innovative approaches for achieving GWSA-supportive emissions reductions via the programs' resource acquisition framework.

The Council will prioritize continuous improvement in lifetime savings, benefits, and customer experience, in order to ensure delivery of cost-effective programs that:

1. Increase participation by, and savings from, hard-to-reach and underserved populations and geographies, including moderate income, renters, small business, and non-profits.
2. Include goals specific to active demand management and integrate the delivery of active demand management offerings within the EE programs in the 2019-2021 Plan.

3. Promote & incentivize fuel switching strategies, in all sectors, that support the Commonwealth's long term greenhouse gas reduction requirements, as established under the Global Warming Solutions Act.
4. Provide a new, integrated residential program design that maintains strong savings and benefits for all residential homeowner and rental initiatives by:
    a. Increasing customer capture,
    b. Providing new methods for realizing savings,
    c. Expanding HVAC, behavioral, financing, and upstream offerings, and
    d. Increasing conversion rates for HVAC and weatherization measures.
5. Increase program savings in the C&I sector from HVAC, process, lighting, and CHP measures.
6. Actively promote zero energy ready buildings (ZEBs) & Passivehouse for new construction and major renovations in all sectors.
7. Establish a multi-family framework that better integrates residential and commercial offerings and is cost-effective.
8. Review low-income programs for potential improvements in participation and achievement of savings, and seek additional savings & cost-efficiency opportunities, to ensure continued success.
9. Modernize data management across all PAs and sectors, enhance accessibility to and usefulness of the data to the public, and leverage additional data sources to accomplish items 1-8 above.

Recommendations

The EEAC's initial recommendations regarding priority elements of the 2019-2021 Plan are listed below. These are the result of a collaborative and deliberative process during which the Council took care to focus its attention at a strategic level, allowing the PAs the flexibility to discern the most appropriate tactics for realizing the recommendations.

The Council appreciates that the cost-effectiveness and budgeting implications of each of these recommendations, individually and in total, will be carefully considered by the PAs. The Council looks forward to continued collaboration with the PAs, and to reviewing the draft 2019-2021 Plan and the PAs' written response to these recommendations.

Cross-Sector Recommendations

Active Demand Management

Include goals specific to active demand management and integrate the delivery of active demand management offerings within the EE programs in the 2019-2021 Plan.

- Move beyond the current demand demonstrations and scale up ADM activities fully in the 2019- 2021 Plan, including claiming demand savings and quantifying impacts.
- Integrate the delivery of ADM offerings with energy efficiency program delivery.
- Develop a goal for ADM that is separate and distinct from goals for traditional EE/passive demand reduction. Plan, track, and report the capabilities, performance, and costs of active demand management separately and in a manner that will enable development of and tracking towards the active demand management goal.

Commercial and Industrial Sector Recommendations

Combined Heat and Power

The electric PAs should set a clear and increasing target to grow CHP savings by:

- Utilizing EM&V and Council feedback to streamline participation, test alternative outreach models (e.g. circuit riders with an emphasis on small/medium customers), and increase collaboration with CHP vendors.
- Addressing potential for CHP in New Construction and small CHP systems
- Continuing to explore and seek to deploy resiliency (e.g. islanding) and ownership innovations (e.g. third party or other)

C&I Process Savings

The PAs should continue to increase process savings goals (electric and gas), in addition to other end use savings from industrial customers by:

- Increasing technical assistance and support to overcome barriers and increase savings
- Demonstrating that the PAs are sharing best practices and developing statewide initiatives on common end uses
- Providing additional energy consumption data to customers, including incentives for EMIS and benchmarking of different processes

Data-Driven Customer Acquisition and Engagement Strategies; and Big Data

The PAs should create a framework and incentives to increase the presence and use of market-driven data acquisition including software, granular energy usage measurement, and monitoring based commissioning services, including adjustments to the M&V framework to facilitate this activity.

Small Business

The PAs should increase savings in the Small Business Initiative (SBI) by:

- Unifying a SBI delivery model statewide (including statewide PA-led marketing)
- Promoting uptake of comprehensive measures

- Expanding outreach strategies and committed resources to target and engage a wider range of small business customers and owners of buildings occupied by small businesses
- Establishing a statewide small business and non-profit ambassador position that can act as an ombudsman for customers

New Construction

The PAs should seek opportunities and increase resources to drive continuous improvement and effective feedback loops in the new construction and major renovation market so that a higher percentage of buildings are served and low-energy use/low-GHG buildings are measured, recognized, promoted, and emulated in the market. Specifically, actively promote zero energy ready buildings (ZEBs) & Passivehouse for new construction and major renovations. Also pay particular attention to the commercial real estate sub-sector including new construction, major renovations, and tenant fit-outs.

Lighting & Controls

The PAs should maximize C&I lighting savings by emphasizing the linear lighting market and incentivizing active demand management-enabled controls. The PAs should increase the percent of lighting opportunities used as lead generation for non-lighting projects. Methods to consider include:

- Increasing participation in lighting initiatives (including upstream) by expanding marketing, outreach and technical support to customers, contractors, and trade associations
- A new offering, including education and training, to increase the penetration and successful use of advanced lighting controls
- Expanding lighting design service support for customers and designers/engineers, through a lighting design initiative.
- Converting all company owned streetlights to LEDs by the end of the next three-year plan including strategies that incentivize use of controls to capture greater energy savings.

HVAC & Controls

The PAs should increase HVAC savings and build market capacity for future HVAC savings growth. The PAs should work toward HVAC market transformation to make right-sized energy efficient HVAC systems the norm, and take a system optimization approach for existing and new systems in order to build a long-term upward savings trajectory for the next two three-year-plans. The PAs should:

- Conduct a market baseline study that includes recommendations to increase HVAC savings in the 2022-2024 three-year plan, and lays the groundwork for potential future efforts to assess market effects.
- Promote optimized building automation systems, including retro-commissioning and persistent commissioning of existing systems and rigorous design review and commissioning of new control systems.
- Address known market barriers to upfront investment in the engineering services necessary for system optimization through innovative program offerings. Incentivize performance verification and ongoing system tuning.
- Substantially increase ongoing education and training programs for building operators.

Fuel Switching

The Council recommends that the 2019-2021 Plan include fuel switching strategies that are consistent with and support the Global Warming Solutions Act. These include opportunities to strategically electrify energy use, and to switch from inefficient equipment to more efficient fuel and/or equipment, where cost-effective. A customer should be able to choose energy efficiency services regardless of current fuel, as long as the equipment or upgrade is to efficient equipment and is cost-effective.

Municipal

PAs should seek opportunities and increase dedicated resources to align relevant programs with municipal processes, timelines and financing streams, and to enhance savings and participation.

Residential Sector Recommendations

Heating and Cooling Equipment

- Emphasize an integrated, systems-based approach to HVAC equipment promotion and installation, particularly for heat pumps and condensing boilers
- Streamline the customer experience and ensure seamless and comprehensive delivery of all measures
- Ensure service providers are broadly knowledgeable and compensated appropriately, and/or prescreen customer projects to match them with service providers with appropriate expertise
- Expand HVAC efforts by providing new active demand management and fuel switching measures along with the appropriate education of the consumer
- Expand water heating and HVAC upstream offerings, leveraging best practices and lessons learned from the C&I sector
- Enhance connections between HVAC, weatherization, and other whole-house offerings, enabling customers to engage in more holistic improvements in a single transaction or over time
- Weatherization should remain a high priority and focal point

Serving Hard to Reach and Underserved Populations and Geographies

Increase participation and savings for hard to reach populations by:

- Implementing a stakeholder engagement process to reassess program design and improve participation in renter and moderate income customer initiatives
- Identifying underserved demographic groups, developing new segmented approaches to serve them, identifying best marketing and sales approaches to reach them, and adequately funding and incentivizing these approaches
- Increasing outreach and partnerships with community based organizations and social networks, municipalities, employers, and other organizations
- Applying lessons learned from low income programs
- Using data more effectively to better target customers – specifically geo-targeting and identification of areas with linguistic barriers
- Developing new delivery models to increase participation rate of households between 60 and 80 percent median income

- Implement methods to increase access to and use of financing across all customer segments

Behavior Programs

Broaden current behavioral program strategies to include cost-efficient new approaches for customers of all Massachusetts PAs – for example, using a statewide procurement and integrating customer data for better customization

New Construction

- Offer specific low energy path(s) such as net zero energy ready and Passivehouse (multi-family) to better align with the stretch code and to drive construction of low energy buildings and market transformation
- Integrate active demand management measures that promote load shifting opportunities of solar photovoltaics, electric vehicles and chargers, and storage
- Explore opportunities to capture additional savings via major renovations

Integrated Residential Program Design

Increase participation levels and maintain strong program savings and benefits achievements for all residential homeowner and rental initiatives by providing a new integrated residential program design that:

1. **Increases customer capture**
    - Segment, target, prioritize, and customize marketing and offers to customers by leveraging remotely accessible data, third-party sources, and real-time site data
    - Increase the points of entry into the Mass Save program for customers during home improvement, financing, and other transactions, linked to incentives that meet a wider range of customer needs
    - Cultivate, diversify, and expand market channel and community partnerships to inform, recruit, and enroll customers in the program
2. **Provides new methods of realizing savings**
    - Promote cost-effective new fuel switching measures that are consistent with and support the Global Warming Solutions Act
    - Integrate new active demand management measures (e.g. EV charging) and storage into EE programs, in addition to achieving passive demand reductions through efficiency
    - Co-deliver and coordinate electric vehicles/charging, distributed energy resources, and other related services with EE programs, while ensuring primacy of energy efficiency measures
3. **Increases conversion rates for existing measures** (especially weatherization, heating and cooling)
    - Develop new audit approaches, including data-driven remote options
    - Provide an easier path and reduce barriers for customers – require fewer steps, automate and expedite the approval processes, and improve access to financing
    - Improve feedback loop and increase targeted reengagement to close on recommendations
    - Cultivate and expand trusted, long-term relationships with customers
    - Offer greater customization to customers using single measure, comprehensive, incremental, and performance-based options
    - Support sales training and recognition for individuals who are in contact with the customer.

Multi-Family Program

- Establish a multi-family retrofit program framework that seamlessly integrates residential and commercial metered savings opportunities into whole building solutions, and increases uptake of whole building measures
- Enable program tracking and energy benchmarking by building/facility to support improved customer service and provide customizable levels of service appropriate to varying customer and building types including incremental paths to whole building improvements
- Identify and present options to address market and regulatory barriers to serving multifamily properties, including a blended benefit cost ratio for multifamily core initiative
- Leverage key points in the building life cycle including refinancing
- Reexamine a pay for performance program for market rate multifamily

Low-Income Sector Recommendations

- Identify and support new and enhanced electric and gas measures and innovative strategies
- Review program model strategies to achieve additional cost efficiencies
- Identify and implement continuous improvement opportunities and document in the 2019-2021 Plan
- Assess whether there are gaps in participation and take steps to deliver equivalent and proportional services across the Commonwealth, if necessary
- Develop and demonstrate alternative measure packages and service delivery models to serve a wider and diverse range of customer needs and interests
- Ensure communication between the market rate and Low-Income Programs to identify and coordinate program innovations when applicable
- Increase outreach and partnerships with community based organizations and social networks, municipalities, employers, and other organizations

Appendices

E. **Avoided Energy Supply Costs in New England: 2018 Report**

Avoided Energy Supply Components in New England: 2018 Report

Available at: http://www.synapse-energy.com/sites/default/files/AESC-2018-17-080.pdf

Appendices

F. **PA-Specific Programming**

Introduction

In addition to the statewide plan, which is always the core of the Compact's approved Three-Year Plans, the Compact provides for specific cost-effective program enhancements that have been identified to better meet the needs and demands of its unique customer base.
In developing the April 2018 draft of the 2019-2021 Three Year Plan, the Compact staff have identified proposed enhancements and modifications as a result of the Compact's administration of its 2016-2018 Three Year Plan, direction from the Compact's Governing Board and stakeholder input, which included eleven stakeholder meetings over a four month period. The Compact's proposed enhancements were presented to the Compact's Governing Board, twice in public sessions, and were approved by a vote of the Governing Board for inclusion in the April 30, 2018 draft of the Compact's 2019-2021 Three-Year Plan.

The following sections provide a summary of the enhancements to programs proposed for the 2019-2021 Three-Year Plan term.

Residential and Income Eligible Program Enhancements

Residential Coordinated Delivery

For the 2019-2021 term, the Compact proposes to continue without an incentive cap for qualified insulation incentives in a fuel blind manner for homeowners, year-round renters who are responsible for paying the electric bill, customers whose income is within 61-80% of state median income, and customers whose operations are managed by municipalities or other government entities.

As background, during the 2013-2015 plan term, the Compact identified cost-effective enhancements designed to assist customers with identified barriers such as split incentives and difficulty with co-payments. The Compact offered 100% incentives, up to the program cap of $4,000, for qualified insulation incentives in a fuel blind manner for year-round renters who paid their electric bill, customers whose income was within 61-80% of state median income, and customers whose operations were managed by municipalities or other government entities. The Compact also raised the insulation cap to $4,000 for market rate customers, after determining the average insulation recommendation surpassed the previous cap of $2,000. These changes allowed customers to make improvements within one year rather than over several years. The Compact continued this offer through the 2016-2018 term and then, along with all the Program Administrators, supplemented it by removing the insulation incentive cap beginning in mid-2017 through the end of 2018.

Residential Behavior & Demand Management

The Compact is considering and exploring the possibility of implementing a home energy report behavior model (e.g., OPower) in the 2019-2021 Plan period.

Residential R&D and Demonstration - Connected Devices

Increasingly, customers are choosing to install in-home connected devices such as smart lighting, smart appliances, WiFi thermostats, plug load controllers, etc. as their prices fall, more options become available for them to choose from, and the installation and setup process continues to become easier. These connected devices have the potential to enable the “next generation” of energy efficiency, demand response, and load shifting as baseline energy efficiency continues to increase in Massachusetts.

During the 2019-2021 Plan period, the Compact will explore ways to incentivize and leverage connected devices to reduce residential energy usage, enable demand response, and encourage customers to use energy during off-peak hours. These devices may include smart speakers (e.g., Amazon Echo Dot) and/or apps that control load-connected devices (e.g., plug load controllers), “smart” appliances that can be managed remotely and/or shift load to off-peak hours, and other connected devices that can reduce or shift load. If a customer with connected devices chooses to participate in a demand response program, this would also allow the Compact to manage the load of the connected devices during demand response events.

Commercial & Industrial ("C&I") Program Enhancements

C&I New Buildings

The Compact proposes to continue its enhancements to its new construction and major renovation program to include cost-effective thermal measures designed to save oil, propane and other unregulated fuels.

C&I Existing Buildings

The Compact continues to offer its municipal customers specialized incentives that cover up to 100% of cost-effective measure costs as part of this program.

The Compact also plans to continue two special incentive options first adopted in 2013 to assist small business customers further in overcoming barriers to participation: a 95% incentive option for qualifying small business tenants; and for other small businesses, the zero-interest financing option.

The Compact is also looking to continue several enhancements in its 2019-2021 Plan to its C&I Existing Buildings Program, each designed to further reduce barriers to participation for key customer segments.

First, the Compact proposes to continue enhancements to its commercial and industrial retrofit program to include all cost-effective thermal measures designed to save oil, propane, and other unregulated fuels.

Second, the Compact modeled its small business effort after the HES program and will include a BEA (Business Energy Audit) and a core offering of deemed savings measures, many of which can be installed in the first visit, some at 100% incentive coverage. For its small business customers, the Compact continues to offer higher incentives for standard direct install measures (up to 100% rather than up to 70% as offered in the Statewide Plan).

Third, the Compact will continue offering 100% incentive for all cost-effective measures for up to 100 (first come, first serve) non-profit corporations on Cape Cod and Martha's Vineyard per year as follows: (a) Non-profit organizations must be a 501(c)(3); (b) Operating more than five years with an unrestricted annual operating revenue of less than $15M for non-profit serving low income customers and less than $2M for all other non-profit organizations.

Finally, the Compact will continue the Main Streets initiative.

Residential and C&I Program Enhancements

Demand Management – Energy Storage

The Compact is exploring offering residential battery storage to reduce peak demand in its service territory. Due to its high penetration of residential solar on Cape Cod and Martha's Vineyard, the Compact will initially focus on installing residential batteries in homes that have distributed energy resources.

The Compact's program will be informed by other Program Administrator's demand management efforts, especially Unitil Electric's 2016-2018 Demand Response Offering. The Compact hopes to learn from Unitil's marketing experiences; what marketing efforts successfully enrolled and educated customers and what marketing efforts were not so successful. Also, the Compact will incorporate any lessons Unitil learned relative to the procurement of small scale battery storage (e.g., request for proposal and contract terms and conditions).

R&D and Demonstration – Electric Vehicle Charging

The Cape Light Compact is aware of the observed and projected growth of electric vehicle (EV) ownership. While the Compact recognizes that the electrification of transportation is an important step in reducing the carbon emissions from the transportation sector, this increase in EVs will have major implications for Massachusetts' and New England's electric grid, including a growth in peak demand. Increased peak demand increases costs for all ratepayers due to the need to buy additional capacity in the market and build additional transmission and distribution infrastructure.

During the 2019-2021 period, the Compact will explore ways to help address this issue by shifting EV charging to off-peak hours. This may include enabling demand response at EV charging stations (either home-based or public), working with/through EV manufacturers to shift charging to off-peak hours (through direct dispatch and/or an incentive program), or a behavioral-based program that uses an in-car device to record charging hours and provides an incentive to customers that choose to charge the EVs during off-peak hours (e.g., FleetCarma).

Residential Energy Education

Recognizing that education is key to affecting change in our society, the Compact has made a strong commitment to education outreach and continues to be a nationally recognized leader in the design and implementation of energy education programs. The Compact strives to address the continuing need for greater consumer awareness and encourage the development of deeper and broader community knowledge and commitment of energy efficiency technology and practices.

Using a model for science-based learning, the Compact's energy education program aligns with the Massachusetts State Frameworks for Science and Technology allowing teachers to introduce lessons discussing energy efficiency and conservation as well as emerging renewable energy technologies, including:

- Coordination between other PAs and education agencies for teacher training and graduate level courses for teachers
- Co-ordination for "Kids Teaching Kids" program at the high school and middle school level
- Support and coordination for school and community-based Energy Clubs
- In-class hands-on presentations on
    1. Science of Energy and Energy Transformations
    2. Energy Sources (renewable and non-renewable)
    3. Electricity
    4. Energy Efficiency and Conservation
    5. Hydrogen Fuel Cells and Biofuels
    6. Climate Change
- Statewide Awards program in conjunction with other PAs, the Division of Energy Resources and the NEED Youth Awards Program
- Support for school-based "Energy" summer camps
- Support for school districts STEM improvements through energy education

Eversource PA-Specific Materials

Pilgrim Fund

The Pilgrim Fund was established in 1990 in the context of a settlement agreement resolving litigation associated with replacement power costs incurred by Commonwealth Electric Company ("ComElectric") in connection with an outage at Boston Edison Company's ("Boston Edison") Pilgrim Nuclear Power Station. Under the settlement, Boston Edison paid ComElectric funds to be applied for Demand Side Management ("DSM") programs which would be specified by the Attorney General and filed with the Department of Public Utilities ("Department") for approval. A further settlement in 1991 allocated ½ of the funds to DSM activities, with the balance designated for specification by the Attorney General. A third settlement addressing the use of these funds was approved by the Department in 1996. The settlement funds have been used to support various DSM and energy efficiency programs between 1996 and the present.

In keeping with the original intent of the settlement that created the Pilgrim Fund, the remaining settling parties propose that the remaining funds be used to supplement energy efficient services by funding necessary health and safety repairs within the Income-Eligible Coordinated Delivery Initiative. Eversource and the Low-Income Energy Affordability Network ("LEAN") believe this is a great opportunity to mitigate the barriers and expenses associated with repairs that typically prohibit the installation of energy efficiency upgrades. Expending the fund balance on such repairs will allow for more energy efficiency services to be implemented and more energy savings to be achieved within the income-eligible population of the ComElectric territory. Eversource plans to work collaboratively with the Attorney General and LEAN to pursue this great opportunity.

PA Specific Initiative Design
Residential Behavior & Demand Management

Gas and Electric Behavior Offering– Unitil issued a competitive Request for Proposals and selected a vendor to implement a residential Home Energy Report ("HER") strategy, with a goal of launching in New Hampshire in 2018 and in Massachusetts in 2019. The assumptions included in the April 30th draft plan are based on preliminary, vendor-proposed costs and savings per customer. A more detailed design based on Unitil's customers' actual usage is being developed by Oracle / OPower, which is now under contract with Unitil. Before the October filing, Unitil will re-calculate estimated costs and benefits of an HER offering and will only propose if it can be offered cost-effectively over the 2019-2021 Term.

Electric Active Demand Management Measures – Unitil is currently negotiating with vendors in order to implement the statewide direct load control offering during the 2019-2021 plan period. For its April draft plan, Unitil used estimated costs and savings from National Grid's evaluated parameters per participant for the wi-fi thermostat demonstration. Unitil will refine its estimates of benefits, costs and participation and will only propose if it can be offered in conjunction with the Electric Behavior Offering cost-effectively over the 2019-2021 Term.

Appendices

G. **Studies of Remaining Potential**

Appendices

H. **Vendor Cost Categories**

Program Administrator Vendor Cost Categories

Row Number	Cost Type	Elec/Gas/Both	Cost Category
1	Statewide Database/Mass Save Data	B	PP&A
2	Builder and Equipment Incentives	B	Incentive
3	Heating System Rebates	B	Incentive
4	Lighting/ISMs	B	Incentive
5	Permits	B	Incentive
6	Pre-weatherization Incentive	B	Incentive
7	Rater Inspection Fees	B	Incentive
8	Rebates/ Incentives (customer)	B	Incentive
9	Refrigerator Costs within Low-Income	E	Incentive
10	Repairs within the Low-Income Initiatives	B	Incentive
11	Total Interest Subsidy	B	Incentive
12	Weatherization Costs	B	Incentive
13	Marketing and Advertising Support	B	Marketing
14	Cost Effectiveness Screening	B	PP&A
15	EEAC Consultants/Regulatory Assessments/LEAN	B	PP&A
16	Legal Services	B	PP&A
17	Planning Support	B	PP&A
18	Tracking System Maintenance	B	PP&A
19	Account Management	B	STAT
20	Audit Fees	B	STAT
21	Call Center Activities	B	STAT
22	Circuit Rider Activities	B	STAT
23	Postage Associated with Rebate Processing	B	STAT
24	Processing Fee	B	STAT
25	Program Administration Fees	B	STAT
26	Quality Assurance and Control activities	B	STAT
27	Reporting	B	STAT
28	Technical Assistance Studies	B	STAT
29	Technical Support for Contractors	B	STAT
30	Travel	B	STAT
31	Contractor Fees	B	STAT (contractor services/fees); Incentive (measure costs/labor)
32	Training	B	STAT (Workforce Development)

Appendices

I. **Sponsorships & Subscriptions Policy**

POLICY ON SPONSORSHIPS & SUBSCRIPTIONS

A. Hard-to Measure "Sponsorships and Subscriptions"

Sponsorships and subscriptions are undertaken by the PAs in order to support the goals of the Green Communities Act ("GCA") and acquire all available cost-effective energy efficiency. Costs included on the Sponsorships and Subscriptions hard-to-measure line items provide direct benefits to customers, but are not directly linked to specific in-the-field energy efficiency measures or services. Sponsorships and subscriptions support the energy efficiency market, encourage workforce education, attract skilled employees to Massachusetts, and promote innovation in both service delivery and the development and testing of energy efficient technologies. In accordance with the Order of the Department of Public Utilities regarding the 2016-2018 Three-Year Energy Efficiency Plan and general accepted practice, each sponsorship and subscription expense must be reasonable, prudently incurred, and provide a direct benefit to Massachusetts customers. Detailed definitions are as follows:

- **Sponsorship**: Payment by or on behalf of a PA to financially support an organization, event, or project directed by a non-PA person or group, in order to gain participation or access to a benefit of sponsorship. The purpose of these costs may include, without limitation, sharing of regional and national best practices, transformation of energy efficiency markets, influencing manufacturers, furthering energy efficiency evaluation techniques and standards, and the ability to network (with customers, contractors, evaluators, or other experts) to learn about additional energy efficiency opportunities and ways in which to improve offered energy efficiency services. These activities all provide benefits to customers and programs generally, but do not focus on a specific initiative. Specific categories of sponsorships enumerated by the Department include:

    1. Energy efficiency forums
    2. Trade associations
    3. National industry associations
    4. Groups that target specific industry sectors
    5. Universities and organizations that develop new technologies
    6. Residential focused groups to educate and engage with the community

    Costs reported in the hard-to-measure line items will be limited to sponsorships that are anticipated to provide benefits to customers but are not associated with a specific program or initiative. Conversely, expenses related to the above categories that directly impact programs will be included in the appropriate program budget (see Section B, below).

- **Subscription**: Payment by or on behalf of a PA to receive or use something related to energy efficiency over a fixed period of time, such as a periodical, a book series, or an informational service.

Costs will be categorized in the appropriate cost category.

Examples and Cost Categorization

1. Membership Dues for Consortium for Energy Efficiency ("CEE") - allows the PAs to provide guidance to manufacturers who make equipment that can be used to increase efficiency or options in the programs, and gives the PAs early insight into new technologies coming to market.
   - *Line item*: Sponsorships & Subscriptions hard-to-measure for each sector
   - *Cost Category*: PP&A

   (Note that other charges from CEE specifically related to programs may be included as program costs; see Section B, below)

2. Membership in Ally Program of American Council for an Energy-Efficient Economy ("ACEEE") - allows PAs to bring awareness to the programs generally and advance Massachusetts' goals throughout the national energy efficiency community. Allies gain access to a national center of expertise as well as unique opportunities to help contribute to and shape the nation's energy efficiency research and program agenda. Allies also learn from networks of peers and other experts about the latest trends and issues in energy efficiency. Additionally, Allies receive industry-leading information on energy efficiency markets, technology, and policy. Participation in ACEEE's Ally program allows the PAs to share in the expertise of ACEEE and other Ally members on energy efficiency technologies and opportunities that can influence the programs of the future and help PAs improve program delivery.
   - *Line item*: Sponsorships & Subscriptions hard-to-measure for each sector
   - *Cost Category*: PP&A

3. Sponsorship of International Energy Program Evaluation Conference ("IEPEC") – allows the PAs to participate in the annual professional conference, which is held for energy program implementers, evaluators of those programs, local, state, national and international representatives, and academic researchers involved in evaluation. The conference provides a forum for the presentation, critique and discussion of objective evaluations of energy programs, and promotes the documentation of unbiased, peer-reviewed evaluations that establish the basis for accurate information and provide credible evidence of program success or failure. In addition, the PAs gain access to information on current issues, market assessments, emerging technologies, and alternatives to traditional centralized supply-side options, as well as educational workshops on relevant topics, including information on evaluation methodologies, vendors, and strategies to continuously improve evaluation of the PAs' programs. In addition, support of IEPEC provides the PAs with the opportunity to learn about new program efforts and how those innovative approaches are working in other areas. This helps the PAs to effectively deliver energy efficiency solutions to customers.
   - *Line item: Sponsorships & Subscriptions hard-to-measure for each sector*
   - *Cost Category: Evaluation and Market Research*

B. Program Expenses (NOT Hard-to-Measure "Sponsorships and Subscriptions")

Expenses paid to directly support a program are program expenses and will be included in and allocated to the appropriate programs/core initiatives where benefits are expected to be realized. *A cost may be included in program line items even if called a sponsorship or subscription because the expense is directly related to the program.* These expenses include:

- **Data Purchase**: Payments made to receive data on a one-time or recurring basis will be included in the programs to which the data relates.

- **Memberships / Employee Training**: Membership fees (group or individual) where the fee is not used to sponsor a conference or event, but rather as a cost-efficient way to obtain multiple individual employee memberships, receive tickets to conferences for learning opportunities for employees, advertise energy efficiency programs to customers/contractors, provide direct access to member lists, and advertise energy efficiency job positions. Employee conference and training attendance enhances employee skills and teaches the employee about new technologies and strategies, helping the employee in his or her job/role and improving the programs. The conference/training must provide an energy efficiency related benefit and the PA should determine if the value of the employee's attendance justifies the costs.

- **Goods or Services**: Expenditures made to pay for a good or service, such as a product table at an event (without otherwise sponsoring the event or organization).

Costs will be categorized in the appropriate cost category.

Examples and Cost Categorization

1. Sponsorship of an HVAC conference where a PA presents on Heating & Cooling energy efficiency in order to market the Mass Save program.
   - *Line item*: Residential Heating & Cooling program core initiatives
   - *Cost Category*: Marketing and Advertising

2. Subscription to or sponsorship of an organization that shares or disseminates data that the PAs use for planning or evaluation.
   - *Line item*: Each affected program/core initiative
   - *Cost Category*: PP&A for planning data or Evaluation and Market Research for evaluation data

3. Sponsorship of a community event at which a PA promotes Mass Save through brochures, banners, and tabling to potential customers.
   - *Line item*: All relevant programs/core initiatives
   - *Cost Category*: Marketing and Advertising

4. Sponsorship of the Design Lights Consortium, which directly impacts the lighting products the PAs offer in C&I programs as well as lighting design practices for C&I customers and program design and implementation.
   - *Line item*: C&I Upstream Lighting and C&I Retrofit core initiatives
   - *Cost Category*: Sales, Technical Assistance & Training

4. Group Membership in Association of Energy Services Professionals, with which the PA gains "points," and uses these points to assign individual memberships to staff members, allowing staff to improve their skills and learn innovate ideas and best practices to improve program delivery and achieve energy savings.
   - *Line item*: All relevant programs/core initiatives
   - *Cost Category*: PP&A

Documentation of Expenditures Included in Program Costs

In 2016-2018, the PAs will contemporaneously document the benefits to customers of expenditures that are or were previously included in the Sponsorships & Subscriptions hard-to-measure line item in 2013-2015, including any sponsorship or membership payment that is made to directly affect programs and is included in program line items. PAs do not intend to provide a detailed explanation of benefits (or contemporaneously document the benefits) associated with costs that were never included in the Sponsorships & Subscriptions line items, including (1) payments solely for goods and services (e.g., tabling), (2) the purchasing of data, (3) conference fees paid for directly by employees, and (4) costs included in other line items (e.g., Residential Education (in-school programs), Workforce Development (third-party trainings)). The PAs will provide detailed information about all costs in the Term Report in accordance with the Term Report template.

C. Lobbying or Engagement in Legislative Activity

For each sponsorship and subscription expenditure, the PA will determine whether the sponsored organization is a registered lobbyist or engages in legislative activity[1]. For all sponsored organizations, whether registered as a lobbyist or not, PAs will seek to obtain a written statement prior to providing monetary support covenanting in substance as follows:

[The Organization] understands that the Massachusetts energy efficiency Program Administrators cannot and do not support lobbying activities by organizations sponsored by the Program Administrators. [The Organization] covenants and agrees that funds provided by [Company] as an energy efficiency or demand savings sponsorship or subscription will not be used for lobbying or other legislative activities.

In the event a PA determines that sponsorship of an organization that is involved in lobbying activities has a direct benefit to Massachusetts customers, the PA will document the benefits and provide evidence of how the funds at issue are used by the sponsored organization. Consistent

[1] In 2016 – 2018, this information will also be obtained for commitments that were included as "Sponsorships and Subscriptions" in 2013-2015 even if the costs are now being directed to specific programs or core initiatives.

with the Department's directives in the 2016-2018 Three-Year Plan Order, the organization must also provide documentation that (1) details the structure and function of the sponsored organization; (2) identifies the percentage of resources devoted to lobbying and legislative activities; and (3) provides the method used to derive the percentage.

PAs expect to sponsor organizations that lobby or advocate for more stringent codes and standards. The PAs will document all spending as noted above, but will work under the presumption that more stringent codes and standards provide a direct benefit to customers.

D. Annual Review Process

Prior to filing the Plan-Year Report or Term Report, each PA will review all sponsorship and subscription spending incurred during the prior program year (including, in 2016-2018, those expenses directly affecting programs and categorized in program line items that were previously included as Sponsorships & Subscriptions hard-to-measure costs in 2013-2015) to determine whether the events or organizations sponsored in the prior year realized the expected benefits (noting that some benefits may take more than a year to accrue, and that many benefits are not quantifiable). Each PA will document actual benefits realized, and verify that each expense was reasonable, prudently incurred, and was intended to provide a direct benefit to customers.

E. Process to Determine Whether to Enter into a Sponsorship or Subscription; Contemporaneous Documentation

Step 1. **Identify** sponsorship or subscription opportunity – may come from staff or vendor.

Step 2. Identify and document the **purpose** of the organization or event to assess whether it is **directly related to energy efficiency**.

Step 3. Identify and document in detail the expected **direct energy efficiency-related benefit to Massachusetts customers** of the expense, which may include: enhanced energy efficiency program delivery, marketing and education opportunities, reaching key industry sectors, sharing of best practices, access to manufacturers, contractors, and/or data and evaluation materials, assisting the PA in achieving savings or satisfying an energy efficiency related statutory mandate, or other benefits. For sponsorships that are being renewed, identify the benefits that were achieved in prior years and their impact on the decision to renew the sponsorship.

Step 4. Assess whether the associated sponsorship costs are **reasonable and prudent** in relation to the expected benefits; determine if the opportunity is the best and most cost-efficient means by which the PA can achieve the expected benefits.

Step 5. Determine whether or not the organization is a registered lobbyist or otherwise **engages in lobbying** (note that an organization can be engaged in lobbying even if it is not required to be a formally registered lobbyist). For organizations that do engage in lobbying, additional scrutiny should be used to determine that the sponsorship funds will not be spent for lobbying purposes. If it is determined that the sponsorship is prudent, ensure that the organization seeking sponsorship signs a statement that organization will not use PA funds for lobbying purposes and gather evidence that: (1) details the structure and function of the sponsored organization (e.g., organization

chart, mission statement); (2) identifies the percentage of resources devoted to lobbying and legislative activities; and (3) provides the method used to derive the percentage.

Step 6. Determine and document how the expenditure will be allocated between a PA's **gas and electric operations** (when applicable), based on the benefits to be realized by each fuel type's customers.

Step 7. Determine and document the **appropriate line item and cost category**, including: whether the expense (1) is a hard-to-measure Sponsorship or Subscription; or (2) directly affects a program, and if so, determine which programs and how the expense will be allocated among the impacted core initiatives. Determine and document the appropriate budget category (PP&A, Marketing, STAT, or Evaluation and Market Research). When appropriate, coordinate with other PAs for consistency.

Step 8. Obtain sign-off from the designated PA staff approving the sponsorship or subscription.

Step 9. Obtain documentation from a manager (or equivalent) of the organization stating that it **will not use PA funds for lobbying purposes**. For organizations that engage in lobbying, ensure that the PA has received all information listed in Step 5.

Step 10. Confirm that all **logos and marketing** materials used in relation to the sponsorship for which the PA will seek cost recovery from energy efficiency are designed to support and promote energy efficiency programs.

Step 11. **Pay invoice** per standard PA procedure.

Step 12. **Review** all costs following completion of sponsored event or program and determine whether and how the expected benefits were realized. Determine whether the PA would sponsor or participate in the organization or event again in the future.

Appendices

J. **Strategic Evaluation Plan**

mass save
Savings through energy efficiency

2019–2021

Massachusetts
Joint Statewide Three-Year Energy Efficiency Strategic Evaluation Plan
April Draft

BERKSHIRE GAS

Cape Light Compact

Columbia Gas

EVERSOURCE

Liberty Utilities

nationalgrid

Unitil
energy for life

April 20, 2018

Table of Contents

1. BACKGROUND OF EM&V

1.1 INTRODUCTION

Evaluation, Measurement and Verification (EM&V) has been an integral component of the efficiency programs in Massachusetts since their inception. The robust EM&V framework has led to verifiable energy efficiency savings and benefits and has supported continuous improvement in the delivery of cost-effective programs. Over time, the EM&V process has become more rigorous and strategic and has incorporated a long-term evaluation planning approach. From 2013 to 2016, the program administrators (PAs) completed 126[1] EM&V studies at a total cost of $58.4 million[2].

The Evaluation Management Committee (EMC) is a collaborative group of PAs and the Energy Efficiency Advisory Council (EEAC or "Council") EM&V consultants. The statewide process for planning energy efficiency activities for 2019-21 represents a good opportunity for the EMC to regroup and think more proactively and comprehensively about EM&V priorities. To that end, this 2019–2021 Strategic Evaluation Plan (SEP) lays out the EMC's strategy for EM&V activities in 2019–2021, including priorities for research and policies to guide decision making and approaches to EM&V. This April version represents the first draft to correspond with the April draft of the 2019–2021 Energy Efficiency Plan and, as such, does not yet include plans for specific studies. Specific studies will be included in the October 2018 version of the SEP. Additionally, the material in this draft may be updated to reflect changing circumstances (e.g., the scope of programs or budgets change, programs are added or dropped).

This strategic exercise is particularly important given the maturation of programs and rapid changes in markets (e.g., lighting and HVAC). Demand side management (DSM[3]) programs in the 2019–2021 SEP are expected to experience substantial changes in terms of the types and depth of programs that will be delivered, such as moving upstream, demand response (DR), and energy optimization. The EMC needs to be agile and responsive to program needs as they adjust to changing conditions, and do so in a way that is efficient, reasonable, and valuable. Toward that end, recent experience has uncovered some aspects of the policies and processes of EM&V in Massachusetts that the EMC plans to refine for the next three-year period, as discussed in the sections below.

By improving planning and processes, the EMC will have the ability to carry out and manage well-developed, well-intended, transparent, and rigorous EM&V studies that are useful, practical, and appropriate to DSM programs. These improvements include considerations on how to select new evaluations studies that will provide the most value to programs and ratepayers, as well as changes in policy that will give increased flexibility and confidence to verify savings and make continuous program improvements in a practical, sustainable way.

1.2 EM&V STUDIES

[1] Source: Completed studies from 2012–2016 annual reports and 2016–2018 SEP.

[2] Source: Mass Save from 2013 to 2016 for both electric and gas EM&V. Includes evaluation staff salaries, which account for approximately 10% to 20% of the total.

[3] This document generalizes future efforts to include energy efficiency and demand response.

EM&V refers to the systematic collection and analysis of information to document the impacts of DSM programs and recommend improvements in program design and delivery. In Massachusetts, EM&V is divided into three major research areas: Residential; Commercial and Industrial (C&I); and Special and Cross-Cutting (SCC). These research areas are discussed in Sections 5, 6, and 7 below. EM&V includes the following types of studies, which are often conducted in coordination with each other:

- **Impact evaluation** refers to the measurement of gross energy and demand (electric and natural gas) savings achieved within overall program populations. Impact evaluations may also include the study of key impact factors to estimate savings, such as in-service rates and other resource savings, including water and non-utility fuels (e.g., propane and oil).
- **Baseline studies** refer to specific research to determine baselines, such as industry-standard practice baselines. Baseline research is sometimes conducted at the same time as impact evaluation studies.
- **Net-to-gross (NTG) studies** refer to specific research that estimates free-ridership and the various components of spillover (e.g., participant and/or non-participant spillover).
- **Market effects evaluation** refers to the measurement of the effects that programs or measures have on the structure and functioning of their target markets.
- **Non-energy impact (NEI) studies** refer to research that estimates NEIs of DSM measures, including participant and utility benefits. These benefits include operations and maintenance (O&M), comfort, productivity, avoided arrearages, etc.
- **Cost and measure life studies** include research to determine the total and incremental costs and lifetime of DSM measures.
- **Market characterization** refers to the systematic assessment of DSM markets for the purpose of improving the effectiveness of programs targeting those markets.
- **Process evaluation** refers to the systematic assessment of programs for the purpose of documenting their operations and developing recommendations to improve their effectiveness and design. It may also include marketing studies to understand the effectiveness of various marketing approaches.

1.3 PURPOSES OF EM&V

Fundamentally, EM&V is used to meet regulatory commitments to the Department of Public Utilities (DPU) and the ISO New England (ISO), as well as providing ratepayers and stakeholders confidence that programs are effective and that estimates of claimed savings are credible. The EMC will continue the evaluation framework that has successfully resulted in high-quality, independent EM&V efforts. It is critical that the programs are evaluated, measured, and verified in a way that provides confidence to stakeholders, including the DPU, the ISO, the EEAC, the public, and internal PAs' departments[4].

The key purposes of EM&V are to ensure accurate and credible impacts, determine cost effectiveness, and support continuous improvement, as shown in Figure 1 below. These purposes are interactive and are all equally important.

[4] Such as load forecasting, planning, program implementation.

Figure 1: EM&V Purposes

1.3.1 ENSURE ACCURATE AND CREDIBLE IMPACTS

EM&V ensures that program impacts reported to stakeholders are credible and sufficiently accurate for decision-making. Program impacts include gross resource savings, NTG factors, measure lives, and NEIs. These impacts are credible to stakeholders when the results are fact-based and reproducible and when the information is communicated in an understandable, transparent way that identifies actionable steps and key sources of uncertainty and limitations.

The primary studies that support this purpose are impact, NTG, market effects, NEI, and baseline studies (see Section 1.2 . Yet, EM&V research is interactive and other studies also support this purpose, as shown in Table 1 below.

1.3.2 DETERMINE COST EFFECTIVENESS

The determination of cost effectiveness is important for ensuring that the programs are an effective use of ratepayer funds. EM&V calculates the costs associated with DSM programs by researching total and incremental measure costs. Using the credible impacts described above, ratepayer-funded programs are determined to be cost effective if their benefits are greater than their costs (or the ratio of benefits to costs is greater than 1). The primary EM&V studies that support this purpose are cost studies, as well as the impact studies listed above.

1.3.3 SUPPORT CONTINUOUS IMPROVEMENT

EM&V identifies strengths, limitations, and areas for program improvement to ensure that programs are valuable for ratepayers and other stakeholders. These studies help identify if programs are well-designed, well-run, and beneficial to customers. This type of research is focused on the future and how programs can improve to better serve customers, adjust to changing conditions, and achieve program goals. The primary research types for this purpose are process evaluation and market characterization studies, although many other types of research inform continuous improvement, as shown below.

Table 1: EM&V Purposes and Studies

Studies/Purposes	Ensure Accurate, Credible Impacts	Determine Cost Effectiveness	Support Continuous Improvement
Impact Evaluation and NTG Studies	☑	☑	✓
Baseline Studies	☑	✓	✓
Market Effects Evaluation	☑	☑	✓
NEI Studies	☑	☑	✓
Cost Studies		☑	✓
Measure Life Studies	☑	☑	
Market Characterization	✓		☑
Process Evaluation		✓	☑
Legend: Primary Purpose ☑, Secondary Purpose ✓			

1.4 PRINCIPLES OF EM&V

EM&V must meet the purposes described above and uphold the principles of being valuable, high quality, reasonable, and cost efficient. These principles do not have a hierarchy; each principle is equally important and therefore a balance is required to maintain them concurrently. For example, if EM&V raises the expectation of accuracy too high, it can impose unnecessary time and cost burdens on vendors and customers and can result in program barriers, which prevents meaningful projects from moving forward.

1.4.1 VALUABLE

EM&V provides value to all stakeholders, maintaining a key focus on benefits to ratepayers and program implementation. In order to provide value:

- EM&V is communicated effectively, which means the research is transparent, understandable, timely, and actionable.
- EM&V focuses on key information and is inclusive of future needs, recognizing that understanding the past is a way to make improvements for the future.
- EM&V is relevant to the underlying program or measure and consistent with the tracking and reporting approaches of the PAs, whenever possible.

1.4.2 HIGH QUALITY

EM&V is executed with independence and high quality throughout all aspects of its planning, implementing, and reporting. It adheres to standard EM&V methods for conducting EM&V of energy efficiency programs, including leveraging resources like the Uniform Methods Project and International Performance Measurement and Verification Protocols, where relevant. It also adheres to the ISO's requirements for measuring and verifying reductions in demand, particularly for statistical precision and accuracy, as well as specifications for measurement of equipment. Where existing methods are not sufficient,

development of new EM&V approaches may be considered as long as the other principles are upheld. EM&V methods are clearly documented and defined, which supports consistency (across state, sectors, and programs), reduces evaluation time, and mitigates risk of differences between evaluation and program implementation assumptions.

1.4.3 REASONABLE

EM&V meets its purposes (credible impacts, etc.) in a way that is reasonable and sufficient for decision-making needs. The effort and rigor of studies vary to account for issues such as amount of savings relative to the portfolio, level of uncertainty, participant population sizes, data security, and intended usage of results. Approaches are structured to deliver accurate results but avoid introducing false precision. EM&V is understandable and as simple as possible, being sensitive to unnecessarily increasing complexity in methodology, especially when such complexity (or additional studies) will not add meaningful improvements to accuracy. Generally, EM&V tries to minimize burden (e.g., telephone surveys and site visits) on customers, including financial burden, time, and effort. The number of studies is manageable for the EMC, and the resulting findings and recommendations are actionable and manageable for program implementation staff.

1.4.4 COST EFFICIENT

As with other DSM activities, EM&V must be cost efficient for the ratepayers, ensuring that evaluation resources are spent effectively. This condition means that the effort of EM&V is justified by the value of the information and that, as studies increase in cost, their associated value also rises.

1.5 EM&V FRAMEWORK

Consistent with past three-year plans and the Council's September 8, 2009 EM&V Resolution, the PAs propose to continue the evaluation framework that has successfully allowed the EMC to engage in high-quality third-party EM&V efforts. The Council and the PAs find that it is critical that the programs be evaluated, measured, and verified in a way that provides confidence to the public at large that the savings are real and in a way that enables the PAs to report those savings to the DPU with full confidence. Additionally, the Council stated that there is a need to ensure both the reality and the perception of the independence and objectivity of EM&V activities, as well as a need to help ensure consistency, timeliness, and credibility of the results. Accordingly, the Council will continue to have an oversight role over the EM&V activities of the PAs to ensure the objectivity and independence of those activities (and the perception of such) and to help ensure consistency, timeliness, and credibility. The Council's oversight role will be accomplished through the Council's EM&V consultants ("EM&V Consultants"), a team of third-party expert consultants that has primary responsibility for working with the PAs to plan and implement high-quality EM&V activities in Massachusetts.

The PAs and the EM&V Consultants will continue to work diligently to reach a consensus on evaluation issues. Areas of difference may arise, however, that cannot be resolved through consensus during the ongoing interactive process between the EM&V Consultants and the PA evaluation staff. In this instance, authority for decision-making will reside with the EM&V Consultants and the Council.

An appeals process has been established to enable the PAs to fulfill their responsibility of reporting program savings to the DPU with full confidence. Under the appeals process, the PAs may bring decisions made by the EM&V Consultants or the Council to an Appeals Committee for review and resolution. The Council forms the Appeals Committee, whose responsibility is to hear the matter under dispute and rule so that the study may proceed in a timely way. In general, it is expected that this review process will be completed within 72 hours once an issue is elevated to the Appeals Committee. The Appeals Committee will consist of three voting members of the Council, including the Department of Energy Resources

(DOER). Consistent with general Council proceedings, the Appeals Committee will include and consult with, in both deliberations and decision-making, a representative of both the PAs and the Council's consultant team, neither of whom shall have a vote in the standing committee. The Appeals Committee will review the issues related to the disputed matter, hear from the PA evaluation staff and EM&V Consultants, and make a determination on the outcome of the matter. The decision will be recorded, along with a description of the applicable issues. The participants in the appeal will sign the record of the decision, indicating their acceptance and the representation of the issues and the decision. In exceptional cases, where the PAs perceive there to be significant risk to their ability to manage the energy efficiency programs in the near term, the PAs will note their disagreement with the decision of the Appeals Committee on the record of the decision and reserve the right to immediately petition the DPU on the Appeals Committee's decision. The PAs shall be able to submit any such documents to the DPU in conjunction with the filing of the three-year plans, mid-term modifications, and term reports. The DPU will be able to review the record of this decision in its review of three-year plans, mid-term modifications, plan-year reports, and term reports.

As discussed below, the EMC has been a key component to keeping communication channels open. To date, all major disagreements have been resolved through a data-driven consensus process. It is a testament to the hard work and collaborative engagement of the PAs and the EM&V Consultants that the appeals process has not been invoked to date.

The PAs will maintain a statewide focus to the maximum extent possible, will review EM&V budgets with the EM&V Consultants, and will integrate electric and gas evaluation efforts to the maximum extent possible. The PAs will be the main mechanism for contracting with the independent evaluation contractors and will work with evaluation contractors to maintain privacy of customer data.

1.5.1 EVALUATION MANAGEMENT COMMITTEE (EMC)

The PAs and the EM&V Consultants established the EMC to be similar to other management committees. The EMC serves as a steering committee for statewide evaluation issues, providing guidance and direction to each of the evaluation research areas. The EMC works to plan, prioritize, and delineate the research studies to be undertaken over the three-year plan period.

The PAs and the EM&V Consultants have worked to consistently improve the EM&V process over time. As issues arise, the EMC has established working groups to review and address new topics, areas of concern, or disagreement. For example, in 2017 the EMC realized that DR evaluations were being completed by individual PAs, along with EM&V Consultants, and only final results were shared with the full EMC. In response to that issue, the EMC formed an EM&V DR subcommittee that includes a member of each electric PA and members of the EM&V Consultant team. This group meets bi-weekly and has helped ensure that the EMC is up to speed on all issues. The EMC will continue to establish appropriate working groups to address issues as they arise and keep the EM&V process running smoothly.

2. EM&V SUMMIT AND KEY STRATEGIC ISSUES

2.1 EM&V SUMMIT OVERVIEW AND FINDINGS

To encourage early participation in the evaluation planning process, the PAs hosted a Strategic Evaluation Planning Summit (Summit) in December 2017. The Summit provided a forum for the EMC, DOER, the Residential Management Committee (RMC), C&I Management Committee (C&IMC), evaluation contractor teams, and EM&V Consultants to identify emerging evaluation topics and activities. The following list represents key issues discussed during the Summit:

- It is important to maintain the **collaborative environment** of the EM&V framework.
- Improved **communication and collaboration between evaluation and implementation** is needed, such as presenting evaluation results in a timely manner and providing more Quick Hit (or "fast track") studies to inform program design.
- Improved **prioritization of studies** would be valuable, such as creating a prioritization framework and having a champion for each study.
- **Reporting improvements** are needed, including clearer definitions, templates for recommendations, and justification for why the recommendation is needed.
- **Baselines** need to be credible, and additional policy and discussion is needed on industry-standard baselines.
- Important **new technologies and emerging issues** should be considered**,** such as DR, electric vehicles, load shapes, and energy optimization.
- Research and savings claims of **market effects** should be facilitated by including development of program theories, as well as determination of market effects data acquisition and research needs early in the program life cycle.
- The approach to **NTG coordination** should remain flexible. Typically, the SCC research area should serve as an advisor for all NTG studies, but studies are led by the research area (i.e., residential, C&I) contract groups, particularly when the NTG is combined with impact and/or process evaluation. However, complex studies or studies trying new methods are typically completed by the SCC team.

The following sections provide additional insights into key strategic topics. Additionally, the near-term priorities listed in Sections 5.3, 6.3, and 7.3 below were generated through collaborative discussions at the Summit and subsequent discussions with stakeholders. In order to maintain alignment with the three-year planning cycles, it is anticipated that Summits will continue to be held prior to the beginning of each three-year cycle in order to support subsequent planning activities.

2.2 MARKET EFFECTS

The PAs currently implement a number of measures through upstream delivery paths and are considering adding to these offerings in the next program cycle. While these offerings aren't specifically identified as market transformation programs, all of them have been designed with the goal of impacting availability, pricing, awareness, promotion, and ultimately sales of energy efficiency equipment, which are typically considered market transformation indicators. The PAs have also offered incentives/rebates through downstream strategies for measures where there is potential that the programs helped move standard practice to higher levels of efficient equipment.

The EMC plans to take a more proactive, deliberate, and structured effort to measure market effects and market transformation. The EMC will continue to discuss the research framework and potential approaches with the independent evaluators and other stakeholders. In particular, the EMC is aware that market effects research must be guided by a program theory and the research must begin early in the lifecycle of the measure or program, and there must be sufficient data and evidence to support market effects claims. In addition, the use of Delphi panels to synthesize data and construct the counterfactual has proven helpful for prior market effects studies and will be considered for future studies. The EMC will continue to have a productive dialogue to make it possible for programs to measure and claim savings where they have in fact influenced market transformation.

2.3 BASELINES

Massachusetts has recognized that baselines (i.e., the condition that would have existed absent the installed measure) may differ from relevant state/national codes or standards and therefore has moved towards an Industry Standard Practice (ISP) baseline approach. This is particularly important for electricity savings, which must be consistent with the requirements of

the ISO for the bidding of demand reductions into the Forward Capacity Market. The ISO requires that baseline for efficiency projects be defined by the applicable efficiency code or standard. Where there is no code or standard, or if the ISP is more stringent than the relevant code or standard, the ISP is used as the baseline.

To help clarify the procedures for estimating and applying the proper baseline, Massachusetts has recently commissioned a number of evaluation projects, including a study to help define baseline framework (C&I Project 64) and a study examining the relationship of baseline and NTG (C&I Project 73C). Massachusetts has also commissioned a number of recent ISP studies for residential and commercial lighting, commercial boilers, infrared heaters, and air compressors.

As part of the 2019–2021 program cycle, the EMC expects to continue to conduct ISP studies. In addition, the EMC anticipates selecting measures for ISP research using similar criteria as part of the prioritization framework (see Section 3.2). The EMC will possibly consider other criteria as well, including whether a measure is unique or a commodity measure, the existence of an intermediate efficiency level (i.e., between a code/standard and the program efficiency level), and evidence of non-code or standard practices. In addition, the EMC will try to integrate baseline and NTG research together, in order to mitigate the potential for double counting any shifts in the market or free-ridership effects that may be reflected in both baseline and NTG research. This integration effort may be conducted through a modeled partial net approach, which would explicitly incorporate baseline and NTG together rather than applying both separately.

2.4 EMERGING ISSUES

A number of research areas could rise to importance as part of the 2019–2021 Energy Efficiency Plan but, at the time of this SEP, are still under development. Potential areas include:

- **Energy Optimization**: The PAs may include energy optimization (i.e., the adoption of cost-effective measures across fuels, including fossil fuels to electricity or gas) in the 2019–2021 Energy Efficiency Plan, which may require changes to evaluation practices.
- **Standards Advocacy**: The PAs may initiate an effort to promote higher standards for selected products.
- **Demand Response (DR)**: DR programs may be a more prominent component of program offerings in 2019–2021.

The EMC will monitor these areas as they develop and modify updates to this SEP as more information becomes available.

3. PLANNING FOR EVALUATION

3.1 PLANNING PRINCIPLES

Collaboratively, the EMC considers multiple factors in planning EM&V studies, which collectively are utilized to assess potential evaluation activities, identify priorities, and determine the appropriate timing of all evaluation efforts. These factors are consistent with the EM&V principles described in Section 1.4 (i.e., valuable, high quality, reasonable, cost efficient) and are used in the prioritization framework described in Section 3.2. Factors considered by the EMC include:

- **Importance**. The EMC will allocate evaluation resources to research questions that have a significant impact on DSM investments or that directly inform significant policy questions and stakeholder interests. Key indicators of this include:
    - Magnitude of Savings (energy and demand)
    - Expected/Potential Future Savings Trend
    - Implementation Requests

    - Regulatory Requirement/Political Sensitivity
- **History**. The EMC will leverage existing research before investing in additional research, including previous evaluation research conducted in Massachusetts and relevant research from other jurisdictions. Key factors include the age of the most recent study and the stability of evaluation results over time.
- **Uncertainty**. The EMC will allocate evaluation resources to research questions with the greatest uncertainty. Uncertainty may be due to shifts in markets, technologies, or baselines; program implementation changes; or uncertainty in impact factors.

In addition to the factors described above, there are three additional considerations when establishing the evaluation research portfolio. These include:

- **Balance**. The EMC undertakes a mix of studies each year, in terms of the evaluation study types (e.g., impact, process, NTG, market effects), fuel types, and programsto be evaluated.
- **Flexibility**. Unanticipated but not yet known or identified evaluation efforts may arise over time. To ensure that these issues may be addressed, the PAs will allocate sufficient resources for unidentified ad hoc evaluation efforts, including Quick Hit studies. The EMC develops evaluation plans with flexibility to add evaluation activities (such as pilot evaluations or assessments of the effectiveness of mid-year program design changes) without compromising the timing and quality of concurrent evaluation work.
- **Differences**. The EMC recognizes that there can be legitimate reasons for variations in findings of statewide studies within small vs. large PAs, gas vs. electric PAs, or within definable economic/demographic areas of the state. When appropriate, evaluation research activities may be implemented in a manner that ensures consideration, identification, and documentation of any such legitimate differences.

In Massachusetts, EM&V is divided into three major research areas: Residential, C&I, and SCC. Strategies used in each of these areas are discussed below.

3.1.1 RESIDENTIAL

For Residential, the specific strategy for planning impact evaluations is dependent on three things: the size of each core initiative or end-use; when each core initiative or end-use was last evaluated; and whether or not the program has undergone recent and significant changes. Particularly large programs or major end-uses within programs are evaluated on a more frequent basis to ensure the largest contributors to savings in the statewide portfolio are accurate. In addition, the PAs and EM&V Consultants consider evaluating smaller programs, even if the program represents only a small portion of the portfolio savings. Finally, if a program undergoes significant changes or is newly developed, the EMC will consider completing an evaluation to understand how well the program is performing and identify any issues with the delivery as early as possible.

3.1.2 COMMERCIAL AND INDUSTRIAL (C&I)

Historically, the strategy for impact planning has largely mirrored that of Residential. However, during the 2016–2018 period, the EMC coordinated on development of a revised impact framework, the goal of which was to ultimately shift impact evaluation planning to a more frequent and/or rolling approach. In doing so, the EMC anticipates feedback from these evaluations to be timelier due to smaller sample sizes and associated ease of execution, while also being of greater benefit to stakeholders such as the PA implementers. Outside of the impact evaluation space, it is the EMC's intent to adopt a more systematic approach to study planning, which will include adoption of a screening tool and/or process to vet ideas

prior to studies moving forward, consistent with the prioritization framework in Section 3.2 below. This approach will produce a study list that will provide the most value for all stakeholders.

3.1.3 SPECIAL AND CROSS-CUTTING (SCC)

For each SCC topic area, specific planning strategies may vary. Work in this area may cross multiple topics to identify overarching market trends and consumer behavior. When determining whether the EMC should evaluate a specific subject, some of the factors considered include, but are not limited to, the following:

- Ensuring that process and impact evaluations are performed as appropriate based on the defined goals of each delivery model.
- Quantifying market effects where necessary data are available for programs identified as being likely to induce measurable market effects.
- Providing program planning, implementation, and evaluation staff with the market information they need to maximize market effects from program activities.
- Continuing to re-examine the most-appropriate approach for estimating NTG, researching what is driving differences in NTG ratios by end-use and over time, and repeating NTG studies as needed.

Some additional SCC work is typically developed on a short turnaround, ad hoc basis. This work may include literature reviews or surveys of programs in other jurisdictions and other smaller scale work designed to inform implementation efforts or program strategy. Another priority of this research area is to retain the flexibility to respond to new efforts in the field to provide appropriate and timely evaluation support.

3.2 PRIORITIZATION FRAMEWORK

The EMC has developed a study prioritization tool and process to enable the prioritization of studies within a plan term and/or plan year. The tool combines quantitative and qualitative factors to develop an overall score for each study idea. Based upon these scores and subsequent deliberation amongst the working groups and EMC, collective decisions will be made regarding which studies will move ahead.

3.2.1 BACKGROUND

The study prioritization process was developed by the EMC in order to apply a higher degree of rigor and transparency to the process of deciding which evaluation studies will be undertaken under the statewide evaluation framework. Previously, the EMC and research area subgroups considered ideas for studies as they were suggested on an ad hoc basis by various stakeholders. The 2016–2018 SEP established principles regarding the priority of potential evaluation research, but these principles were not integrated into a scoring tool. The study prioritization process described below addresses this challenge by laying out the indicators, scoring, and process to be followed when considering study ideas brought forward during the three-year planning process, as well as ideas that arise during a term.

3.2.2 OVERVIEW OF THE STUDY PRIORITIZATION TOOL

Each proposed study will be described, characterized, and rated on key value factors such as savings, uncertainty, and priorities in the study prioritization tool (Tool). To develop the Tool, the PAs adapted the Massachusetts Commercial and Industrial Gross Impact Evaluation Framework[5], which uses a spreadsheet-based scoring and prioritization tool that was reviewed and tested by stakeholders. In developing the Tool, the PAs adjusted this framework to account for all sectors and types of studies.

Primary elements of the framework include basic study information, key indicators, scoring, and indicator weights, as described below. Please refer to Appendix E for a complete list of key indicators and weights.

Basic Study Information. Each study is described with basic information such as study name, study type, research area, sector, fuel type, underlying program and initiative, technology type, brief description, and study champion (i.e. someone who is supportive of the study).

Key Indicators. Each study is rated on key indicators of relevance, uncertainty, and priorities. These factors include:

- Magnitude of Savings (energy and demand)
- Age of Most Recent Study
- Expected/Potential Future Savings Trend
- Market/Technology/Baseline Shifts
- Program Implementation Changes
- Uncertainty of Impact Factors
- Regulatory Requirement/Political Sensitivity
- Implementation Requests

Scoring Definition. Studies are scored individually on a 1 to 5 basis, with a score of 5 indicating the highest need for additional research. Guidance is provided on each key indicator to support consistency among users. To account for nuances of fuels and study types, “Not Applicable“ (NA) is sometimes allowed.

Indicator Weights. The score for each indicator is weighted to calculate aggregated study scores, which are ranked overall and by fuel type and research area. There are three weighting schemes, which apply to different study types and have different priorities:

- Weight 1 is used for the following studies types: baseline, impact, cost (incremental or total depending on the baseline), market effects, measure life, NEIs, and NTG. Weight 1 is also used for combination studies if a market characterization or process component is integrated into the study. This weighting scheme places highest priority on magnitude of energy savings, expected/potential future savings, and market/technology/baseline shifts.
- Weight 2 is used for market characterization and process studies. This weighting scheme places highest priority on program implementation changes, market/technology/baseline shifts, and expected/potential future savings.
- Weight 3 is used for DR studies. This weighting scheme places highest priority on magnitude of demand savings, expected/potential future savings, and market/technology/baseline shifts.

The PAs will update the Tool and its components on an as-needed basis to remain relevant with current policy priorities.

[5] DNV-GL, Massachusetts Program Administrators and Energy Efficiency Advisory Council, May 2017.

3.2.3 THE STUDY PRIORITIZATION PROCESS

The following section describes the process by which study ideas will be prioritized.

1. The idea or concept for a study is proposed by a Study Idea Originator. A Study Idea Originator may be a PA evaluator, an EM&V Consultant, an evaluation vendor, program implementation staff or consultant, DOER, or EEAC. Alternatively, the study idea may be generated by reviewing the Tool. The Tool can be populated with quantitative program and measure data by the PAs or EM&V contractors on behalf of PAs. A review of the data in the Tool may bring to light certain programs, initiatives, or measures that are higher priority for evaluation.
2. In order to move the idea forward for consideration, it must have a Study Champion. If the Study Idea Originator (Originator) is not a PA evaluator or EM&V Consultant, then the Originator will hand off the idea to a PA evaluator or EM&V Consultant who is supportive of the research and who will take on the role of Study Champion.
3. The responsibilities of the Study Champion are to populate and rate the study idea in the Tool[6], submit the Tool to the relevant working group[7] for consideration, discuss the idea with the working group and/or EMC (see Steps 4 and 5), and communicate back to the Originator as needed.
4. After receiving the Tool populated with the study idea information and ratings, the relevant working group will discuss the idea and decide whether to accept, decline, or table the idea, or to forward the idea to the EMC for further consideration as needed.[8,9] The group may also adjust the ratings and note any key comments. If considering multiple ideas at one time, the working group may choose to prioritize the ideas based upon their relative ratings, rankings, and other criteria, such as maintaining balance between fuels and study types, likely evaluation approaches and associated costs and timelines, and other salient factors. In contrast, if considering one study idea at a time, the score for the idea can be benchmarked against scores from previously considered study ideas.
5. The EMC will consider the study ideas that are sent by the working groups based upon their ratings and rankings in the Tool as well as other criteria, such as maintaining balance between sectors, fuels, and study types; likely evaluation approaches and associated budgets and timelines; and other salient factors. The decision whether or not to move forward will be made by building consensus through discussion.
6. The Research Area Lead will inform the relevant evaluation vendor(s) that the study concept has been approved and request that a Stage 1 plan be developed.
7. The working groups and EMC will forward all rated study ideas to the PA representative who maintains the Tool, who will in turn add the idea to a list of pre-Stage 1 studies. This list will enable the group to track how many study ideas have been approved and the distribution of study types and programs/initiatives/measures represented.
8. One of the PAs will store a master copy of the Tool. This PA will share it with the group to enable the group to rate study ideas and make corrections and alterations to the Tool as needed.

[6] If a study idea is proposed as a Quick Hit study, the prioritization step may be skipped if there is consensus among the working group that the study should be pursued. If there is not a clear consensus, then the study idea should go through the rating process.

[7] The working group should include the topic area lead, PA evaluation representatives, and EM&V Consultants relevant to the proposed study.

[8] Studies expected to require a budget less than $500,000 may be decided upon by the working group rather than being forwarded to the EMC.

[9] In the case of studies that are required for regulatory purposes, the working group and EMC will assign the study as an automatic "Pass" and note the regulatory requirement in the Tool.

3.3 AVAILABLE BUDGET

The EM&V budget available to the research areas for the 2019–2021 Energy Efficiency Plan is projected to be in line with historical program budget levels. Twenty percent of each sector's available evaluation budget is allocated to the SCC research area.

In 2017, EM&V evaluation study expenditures (not including potential studies and internal labor costs) totaled approximately $17.2 million ($12.8 million for electric and $4.4 million for gas). Therefore, for the three years of the 2019–2021 Energy Efficiency Plan, the EMC recommends an EM&V study-specific expenditure of $51.6 million (i.e., three times the 2017 expenditures), which includes $38.4 million for electric and $13.2 million for gas. As mentioned above, this budget does not include potential study costs or internal staffing costs.

3.4 ASSIGNED STAFF

Across the PAs, there are approximately 18 full-time equivalent employees assigned to Massachusetts evaluations, with approximately 30 PA employees actively engaged in study oversight. The PAs currently contract with several external evaluation experts to supplement staff. External evaluation experts are employed in addition to the evaluation contractors that are responsible for completing the evaluations in each research area.

3.5 STAGES OF EVALUATION

The stages through which a project moves from being an initial idea to being completed are shown in Table 2 below.

Table 2: Stages of Evaluation

Stage	Document Under Review	Description
Stage 1: Conceptual Framework	1 Page Summary	Document provides conceptual framework for the project, including a very high-level budget and timing, as well as the objective or goal. For more detail, see Appendix D.
Stage 2: Preliminary (High-Level) Work Plan	2–3 Page Summary	Work plan provides strategies to meet objective, including more detail on the potential research design, level of effort (number of surveys, site visits), and budget/timing. This step is used only for projects where there were major issues or concerns with the Stage 1 plan.
Stage 3: Detailed Work Plan	3–25 Page Work Plan	Work plan provides detailed sampling and analysis plans, specific staffing needs, and milestone deliverables.
Stage 4: In Progress	Status Report	Status reports are prepared consistently with the work plan; there may be detailed planning occurring simultaneously with execution on early tasks.
Stage 5: Reporting	Draft Report	Reporting includes period from draft report through final report and any review/communications/meetings in between; also includes paperwork for submittal.
Stage 6: Complete	Final Report	Report is finalized and either filed or ready to be filed with the DPU.

There are multiple planning stages since there is a need for projects to proceed incrementally from concept to preliminary work plan to detailed work plan. By proceeding incrementally, the PAs and EM&V Consultants are not only able to better manage the stakeholder review process but effectively stage studies across the three research areas.

The methods in which stakeholders are engaged can vary based on the stage of evaluation. The PAs have hosted strategic evaluation planning meetings to encourage participation in the early stage of the evaluation planning process and solicit input from a wide variety of program stakeholders. Additionally, there is active engagement with both program implementers and policymakers to identify additional key research needs and to further refine project recommendations developed at the strategic evaluation planning meetings.

Much of the stakeholder engagement happens through the RMC and C&IMC. For projects in Stage 1, one-page summaries are developed and shared with the management committees. Progress on projects in Stages 2, 3 and 4 (preliminary and detailed work plans and in progress) is also provided to the management committees. For projects in Stage 5, draft reports are shared with the management committees.

Input from non-utility stakeholders represented on the Council generally flows through the EM&V Consultants. A representative from the EMC attends RMC and C&IMC meetings as frequently as possible in order to facilitate coordination and solicit feedback from the various management councils and working groups.

3.6 QUICK HIT APPROVAL APPROACH

In addition to the standard staged process of decision making, the EMC also has a Quick Hit (or "fast track") approach to evaluation study review and approval. This approach is used to produce answers to important researchable questions in an expedited manner, and thus provide more timely feedback to program managers and implementation staff. These evaluations are intended to be smaller in scope and therefore can generally be completed more quickly than a standard evaluation.

The following provides a set of parameters that define Quick Hit evaluations. If these parameters cannot be met, the Quick Hit study would revert back to following the staged-study process described above. This list is intended to serve as guidance rather than an exhaustive checklist where every criterion must be met (i.e., studies that generally meet these parameters can qualify).

- **Scope**. Quick Hit evaluations need a very specific, targeted scope with one or two clearly articulated research questions. The study could potentially focus on scoping/reconnaissance studies for larger projects. Quick Hit studies are not suitable for complex or integrated evaluations.
- **Planning**. The planning of Quick Hit studies is limited to improve timeliness of the research. Specifically, the Study Champion proposes the study idea and date by which the information is needed to the working group (e.g., the residential, C&I, or SCC working groups) for approval. If the working group approves, the study skips Stage 1 and Stage 2 and moves directly into an abridged Stage 3 (without going through the prioritization framework and Tool described in Section 3.2). The abridged Stage 3 succinctly captures the goal of the research, the research methodology, the timeline, and the budget. The Research Area Lead is then responsible for approving the Stage 3 plan and may leverage the working group as they see fit. If consensus to proceed with the study is not reached in the working group, however, then the study should go through the prioritization framework to determine whether or not to proceed to Stage 3.
- **Budget.** Quick Hit studies have comparatively smaller budgets as compared to standard evaluations (i.e., $100,000 or less). The Research Area Lead will define an appropriate budget maximum so that the work can be completed but small enough to dissuade scope creep.

- **Timeline**. The timeline is an abridged timeline that all stakeholders agree to maintain. The aim is to complete Quick Hit studies within six months or less of kick-off. This includes a hard stop on the date for the final report (e.g., study lead to ensure any comments from others arrive on time).
- **Staffing and Project Management**. The project should be staffed with a highly experienced lead contractor that can work autonomously and is familiar with the topics and data involved with answering the researchable question. The contractor should have a strong project manager to ensure no scope creep. The project should avoid use of junior staff that need supervision and could potentially slow down the process and add cost.
- **Reporting and Recommendations**. Output is in memo format to both distinguish from full-fledged studies and spend less time on formalizing a report. The output of the study is flexible and informal so long as the specific research questions are answered. Outcomes may include suggestions, considerations, or limited recommendations. Scoping studies may make recommendations regarding future work.
- **Stakeholder Updates and Comment Processes**. Stakeholders (i.e., research area working group and the EMC), will be updated of the approved Stage 3 workplan and project status during the study process. The comment process will be streamlined to expedite the review process and timely delivery of the research (e.g., only one round of comments). The PA statewide evaluation study lead will send out reminders regarding comment deadlines.

3.7 INTEGRATION OF RESEARCH

To support the principles of reasonableness and cost efficiency, the EMC recommends that, during EM&V planning, staff explicitly consider how and when to integrate similar research components into a single study (e.g., impact, process, NTG, and market characterization on one program). Combining relevant studies can have the following benefits:

- **Increased value and understanding.** Combining topics into a single study can increase stakeholder understanding of the topic, providing both the "what" and the "why" of the research concurrently. There is value to both evaluators and program implementation teams in knowing specifically how program operations **and** delivery can be improved to increase program savings or address deficiencies or poor impact results. It also results in a more comprehensive, but succinct and actionable, set of conclusions and recommendations.
- **Increased study efficiency.** Combining studies can reduce duplication of effort and customer fatigue, as contacts with participants can be integrated. Contact integration can reduce evaluation costs and is an improvement for customers. It also provides a comprehensive, single snapshot of a particular program, rather than disparate snapshots taken at different times.
- **Reduced volume of studies.** Combining studies may be more efficient for evaluation staff management as it reduces the number of study documents requiring review, data requests, contracting efforts, etc.

The EMC recognizes that combining studies could lead to longer study durations and increase study complexity, especially if unrelated tasks are melded into a single study. Additionally, there may be a need for timing to be different among studies (e.g., process evaluations may need to be conducted earlier in the program lifecycle than impact studies). In general, however, combining studies will result in overall lower costs, increased program understanding, more actionable recommendations, and reduced customer burden.

3.8 COLLABORATION WITH IMPLEMENTATION DURING EM&V PLANNING

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3.9 EM&V EARLY INVOLVEMENT

Determining the customer decision-making process is a critical component to determining the baseline, and often customers are faced with multiple, complex options. In addition, pre-treatment conditions are a critical component of many early replacement or retrofit measure impact assessments, and evaluators often struggle with developing savings based upon high-rigor data collection ex-post. This imbalance necessitates assumptions and reliance on verbal reporting and memory, which erode the confidence and accuracy of savings estimation.

Ex-ante evaluation (i.e., evaluation prior to project completion) can help address these challenges, plus offer a number of other benefits, by:

- Reducing downstream uncertainty on site-specific realization rates via early agreement between implementer and evaluator on baseline characterization
- Inspecting pre-retrofit conditions and characteristics that might not be accessible or recalled post-installation
- Educating the implementer about evaluation methods and savings considerations
- Reviewing the EM&V plan and making suggestions to gather desired data (for projects with implementer EM&V)
- Obtaining timely insights to customer motivations and decision making for NTG gross assessment

Custom projects, therefore, will increasingly have the option to be brought in as part of an ex-ante review, particularly for projects with significant savings and/or complex baselines. At the time of this SEP, this process is being piloted and the exact details of this process are still being developed, but the PAs expect that the exact steps and details of the ex-ante review will be more clearly documented prior to 2019. These details include:

- Establishing a method for selecting projects for ex-ante review
- Expediting the review process so as to not cause delays with implementation, as well as to minimize customer burden
- Determining which aspects of the ex-ante review process are binding during the ex-post evaluation process, and which are not
- Developing a method for ex-post evaluation to properly sample and weight projects that received ex-ante review, so as to not bias the final realization rates

4. REPORTING POLICIES

4.1 REPORTING IMPROVEMENT

This section intentionally blank for the April draft. Content will be included for the October version.

4.2 RECOMMENDATIONS TEMPLATE

Evaluation studies produce several types of results that are used to help estimate savings, suggest program improvements, and identify potential future research. Often these results are reported as two types: recommendations and considerations. Recommendations for PAs should serve one of three functions: 1) to clearly describe actionable steps that can be taken to improve programs based on strong evidence from the evaluation findings; 2) to update quantitative parameters used to estimate program savings; or 3) to improve program evaluability, e.g., by improving program tracking. Policy recommendations may be included in the evaluation report in a separate section; the EMC will not track status of their

implementation. Policy recommendations should be addressed to the policy makers with the relevant authority for acting on the recommendation. Considerations should be used to document possible actions that could be taken to improve programs in cases where study findings are not as robust or do not clearly point to the needed course of action.

Historically there have not been guidelines for how and when evaluation contractors should develop recommendations. This lack of guidance has led to a large number of recommendations, some of which are not clear or actionable. The EMC has defined expectations and guidelines for recommendations to ensure they service the functions described above and to clarify the difference between a recommendation and a consideration.

The EMC suggests that evaluation contractors use the following guidelines when developing recommendations.

- Recommendations should be based on strong factual evidence from the evaluation study report. Ideally, recommendations will draw from multiple sources of data when available. If a single source of data is the basis for a recommendation, it should be high-quality data. When crafting the recommendation, the evaluators should point to the specific finding(s) from which the recommendation stems. Not all findings in the report need to have a recommendation.
- Recommendations should be specific and actionable. Each recommendation should be clear about what problem it is seeking to solve or the parameter it will update. Recommendations focused on program improvement should also specify who should take what action to address what finding. If the suggested action is to keep the status quo, this decision should be categorized as a conclusion.
- Recommendations should have consequences. To the extent possible, each recommendation should specifically articulate what desired outcome would be achieved by acting on the recommendation, such as increasing program participation; increasing per-unit savings; or addressing a prominent program or Benefit Cost Ratio (BCR) gap, inconsistency, or discrepancy, and conversely, what is at stake by not acting on the recommendation, such as a low realization rate, loss of customer participation, or a health/safety risk.
- Recommendations should be short and to the point. Recommendations should be bulleted in the executive summary, and they should have a one sentence summary in bold with supporting text that briefly, but explicitly, links the recommendation with the relevant study finding(s) or conclusion(s).

When an evaluation report produces an impact factor or other numerical value that is intended to be incorporated into the Technical Reference Library and/or BCR model, these values will be clearly summarized in the executive summary, and a recommendation describing the new values should be included in the list of recommendations.

These guidelines are intended to lead to recommendations that PAs can effectively implement to achieve meaningful program improvements. To the extent that potential recommendations do not meet these criteria, evaluators should consider alternative approaches to reporting the information. For example, evaluators may continue to use considerations in the report for potential actions that do not rise to the level of a recommendation, or in cases when it is not clear what course of action would best address a finding. Considerations should also be used to identify areas of potential future research, unless there is a gap in essential knowledge that must be addressed to improve the program or update a quantitative parameter, in which case undertaking the research could be considered a recommendation. Considerations will be presented to implementers alongside the recommendations but will not be tracked in the evaluation tracking spreadsheet.

In addition to developing sound recommendations, evaluation contractors will work with PA evaluation staff to communicate recommendations to program implementers before the evaluation report is finalized. This interaction will allow evaluation contractors to get feedback on the feasibility of implementing the recommendations and allow implementers to understand and ask questions about what the evaluators recommend. At a minimum, draft

recommendations will be included in a slide deck shared with program implementers, and PA evaluation staff will arrange an on-line meeting where evaluation contractors and implementers can discuss the recommendations and ask questions. Regardless of feedback from implementers, recommendations included in the report are ultimately up to the independent evaluation team. If an evaluation does not directly impact program implementers (e.g., it is an evaluation focused on evaluation methodologies), this step may be skipped.

The EMC currently works with the RMC and C&IMC to ensure that implementation of each recommendation is considered and will continue to do so. EMC will continue to track the status of all recommendations, specifically whether they have been implemented (and if not why not) and will file this information with the Term Year Report. As is current practice, the EMC will ensure that an individual is assigned to track the status of each recommendation and follow up until it is clear whether the recommendation will be implemented (or if not why not). The EMC will continue to review the status of recommendations under consideration on a quarterly basis at the Tri-Management Committee so that representatives from evaluation and implementation can jointly resolve the status of recommendations as needed.

4.3 REPORTING COLLABORATION WITH IMPLEMENTATION

This section intentionally blank for the April draft. Content will be included for the October version.

5. RESIDENTIAL RESEARCH AREA

5.1 SCOPE OF RESEARCH AREA

The Residential research area consists of four separate topic areas: Residential Retrofit and HVAC, Residential Retail Products, Residential New Construction, and Residential Behavior. The residential evaluation research area includes the following initiatives:

- Residential New Homes and Renovations
- Residential Coordinated Delivery
- Residential Retail
- Residential Behavior and Demand Management[10]
- Income-Eligible Coordinated Delivery

The work in this research area is currently led by Navigant Consulting (Retrofit, HVAC, and Behavior) and the NMR Group, Inc. (Retail Products and New Construction). The Navigant evaluation contractor team also includes Cadeo and ILLUME Advising. The NMR Group, Inc. evaluation contractor team also includes DNV-GL and Dorothy Conant.

The evaluation teams were selected through a competitively-procured joint RFP process conducted in the fall of 2015. The current Navigant and NMR teams have been awarded the contract through June 2019. Each research area and study has an assigned PA staff member and EM&V Consultant covering it.

[10] Demand Management evaluation studies are included in the SCC research area.

This research area is currently led by a National Grid employee (i.e., the Research Area Lead). Ten employees representing three PA organizations currently lead studies in this area.

5.2 RESEARCH COMPLETED DURING 2016–2018 PLAN

From 2016 to 2018, the PAs and EM&V Consultants supported over 50 residential evaluation studies in four major study types: impact evaluations, process evaluations, NTG evaluations, and market characterization (see below). In the residential sector, many evaluations include components of each of the four study types, as indicated below. These studies seek to quantify program impacts and provide focused, actionable recommendations to improve the performance and efficiency of residential programs.

1. Impact Evaluations

Impact evaluations provide an independent assessment of the energy savings achieved by a specific population of energy efficiency measures and provide recommendations focused on improving the program and the accuracy of its savings estimates. Sixteen residential impact evaluations were recently completed[11] or are currently on-going (see list below). This work includes assessments of incremental costs, baselines, and impact factors such as realization rates, in-service rates, and hours of use.

1. Ductless Mini-Split Impact
2. Heat Pump Water Heater Impact
3. Home Energy Services (HES) Impact
4. Multi-Family Lighting Impact (*includes NTG component*)
5. Mini-Split Heat Pump Incremental Cost
6. HVAC and Water Heating Incremental Cost
7. Single Family Code Compliance Baseline (*includes market characterization component*)
8. Massachusetts Multi-Family High-Rise Baseline (*includes market characterization component*)
9. Residential New Construction (RNC)/Code Compliant Support Initiative (CCSI) Attribution (*includes NTG component*)
10. Massachusetts RNC Incremental Cost
11. Lighting Hours of Use
12. Lighting Interactive Effects
13. Lighting Incremental Cost
14. Smart Power Strip Metering
15. Smart Power Strip Literature Review & Customer Survey (*includes process and NTG components*)
16. Assessment of Combined Behavior and Wi-Fi Thermostat Program (*includes process component*)

2. Process Evaluations

Process evaluations analyze information on a program's operations and, based on that analysis, identify practical approaches to improve the program in relation to program goals. Nine residential process evaluations were undertaken from 2016–2018 (see list below). This work included an expansion of a 2014 High Efficiency Heating Equipment Impact Evaluation to examine reasons why condensing boilers were not condensing and also studies that focused on HES and Low-Income programs and code compliance training.

[11] http://ma-eeac.org/studies/

1. Low-Income Program Process (single and multi-family)
2. Mini-Split Heat Pump Survey – Follow Up
3. Heating and Cooling Contractor Survey
4. Condensing Boiler Loss and Savings Potential
5. Condensing Heating Equipment Barriers
6. Multi-Family Program Research (*includes impact component*)
7. HES Process Evaluation
8. CCSI Residential Training
9. Understanding the Role of Weather on Air Conditioning Use Behavior and DR Program Participation

3. NTG Evaluations

NTG evaluations estimate energy savings that are specifically attributable to the program under study. Four residential NTG evaluations were undertaken in this research area in the last term. Other NTG evaluations were conducted for residential programs under the SCC research area.

1. Early Retirement HVAC NTG – Heating and Cooling equipment
2. General Products Consumer NTG
3. Sales Data LED NTG Modeling – Lighting
4. Consensus NTG Study – Lighting

4. Market Characterization

Market characterizations assess changes in market conditions for energy efficiency products and provide information to help PAs influence those markets to increase energy savings. Twenty-one residential market characterizations were undertaken in the last contract period, as follows.

1. Moderate Income Market Characterization
2. Heat Loan Analysis
3. WiFi Thermostat Technology and Literature Review
4. Census of Multi-Family Properties
5. HVAC Contractors Interviews *(includes process component)*
6. Residential Baseline Study *(includes impact component)*
7. Residential Single-Family Building Department Document Review
8. Stretch Code Market Effects Study
9. Single-Family Stretch Code Update Compliance and Potential
10. Massachusetts Mini-Baseline Study
11. Lighting Shelf Stocking
12. Lighting Supplier Interviews *(includes process and NTG components)*
13. Lighting Market Scans
14. Lighting On-Sites and Consumer Surveys *(includes process and NTG components)*
15. Lighting Sales Data Analysis *(includes NTG component)*
16. Lighting Logic and Market Model *(includes process component)*
17. Lighting Decision Making
18. Lighting Web Scraping *(includes impact component)*
19. Lighting Distribution Model
20. Lighting Market Adoption Models *(includes impact component)*
21. What's Next for Products

5.3 NEAR-TERM PRIORITIES

Near-term priorities may include:

- Revisiting past impact evaluations to determine appropriate impact factors to apply to the new initiatives until impact evaluation on the new initiatives can be completed. Due to the new structure of the residential initiatives, there will need to be some focus on developing gross savings estimates and impact factors based on the updated design (e.g., single-family detached vs. high-rise multi-family vs. low-rise multi-family, direct install vs. retail). Full impact evaluations will be a longer-term priority as the residential initiatives will need to operate for some time before undergoing evaluation.
- Conducting process evaluations of the new initiatives to measure if the objectives of the new program design are being achieved and provide recommendations to improve the program design and performance.
- Exploring opportunities for new measures and/or services to offer, including emerging technologies, electric vehicles, and new delivery mechanisms.
- Better understanding the characteristics of non-participants and what would motivate them to participate.
- Understanding how evaluation can help with upcoming lighting transitions, determination of sunset years, differences between upstream and downstream lighting programs, and opportunities for lighting controls.
- Understanding where product baselines may be needed and maximizing the opportunities in the current baseline study.
- Considering programs where market effects could and should be tracked, starting early in the lifecycle process.
- Considering new construction evaluation needs, including net-zero energy building practices, baseline measurement, and multi-family opportunities.
- Considering hard-to-reach or underserved customers, including using demographic and geographic data to target customers and considering research for the rental market, community-based organizations and municipal outreach.
- Increasing consistency with the C&I research area in terms of approach to baselines, where relevant.
- Developing estimates of demand savings, including the timing of the savings (load shapes) and ability to control the energy efficiency.
- Understanding the purposes and activities of QA/QC to see if they can be leveraged for evaluation purposes.

5.4 LONGER-TERM PRIORITIES

This section intentionally blank for the April draft. Content will be included for the October version.

5.5 PLANNED RESEARCH AND STRATEGIC ISSUES

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6. C&I RESEARCH AREA

6.1 SCOPE OF RESEARCH AREA

This research area consists of four separate topic areas: Impact, Process, NTG and Market Characterization. The C&I evaluation research area includes the following initiatives:

- C&I New Buildings and Major Renovations
- C&I Existing Buildings Retrofit
- C&I New and Replacement Equipment
- Active Demand[12]

The work in this research area is currently led by DNV-GL for all topic areas. The DNV-GL evaluation contractor team also includes Tetra Tech, NMR, ERS, DMI, SBW, Apprise, ILLUME Advising, and Itron.

The evaluation teams were selected through a competitively-procured joint Request for Proposal (RFP) process conducted in the fall of 2014. The current DNV-GL team has been awarded the contract through June 2018. The EMC recently sent out an RFP for this research area. The winning bidder(s) will start in July 2018 and run through June 2021. Each research area and study have an assigned PA staff member and EM&V Consultant covering them.

This research area is currently led by an Eversource employee. Seven employees representing three PA organizations currently lead studies in this area.

6.2 RESEARCH COMPLETED DURING 2016–2018 PLAN

Since 2016, the PAs and EM&V Consultants have supported over 30 C&I evaluation studies in four major research areas: impact evaluations, process evaluations, NTG evaluations, and market characterizations (see below).

1. Impact Evaluations

Impact evaluations provide an independent assessment of the energy savings achieved by a specific population of energy efficiency measures, and provide recommendations focused on improving the program and the accuracy of its savings estimates. Thirteen impact evaluations were recently completed or are currently ongoing (see list below). This work includes assessments of operating characteristics, including, but not limited to, baselines, hours of use, and in-service rates. These inputs are generally captured and/or reported as realization rates. While all of the studies below pertain to impact work, not all produced impact factors. For instance, some of these were scoped for purposes of policy development related to impact work.

1. Impact Evaluation of 2013 Prescriptive Gas Installations (Steam Traps and Programmable Thermostats)
2. Impact Evaluation of 2013 Custom Electric Installations
3. Impact Evaluation of Upstream Lighting Initiative
4. Prescriptive/Custom Gas Steam Trap Measure Phase II Evaluation

[12] Active Demand evaluation studies are included in the SCC research area.

5. Refinements of Gross Impact Evaluation Framework
6. Articulating Baseline Policy and Practice
7. Custom Comprehensive Design Approach Gas and Electric Evaluation
8. Small Business Impact Evaluation
9. Prescriptive C&I Loadshape of Savings Study
10. Baseline Transition Planning
11. Upstream Water Heater Deemed Savings Impact Evaluation
12. Impact Evaluation of Custom Gas Installations
13. Impact Evaluation of Custom Electric Installations

2. Process Evaluations

Process evaluations analyze information on a program's operations and, on the basis of that analysis, identify practical approaches to improve that program in relation to program goals. Three C&I process evaluations were undertaken in the last contract period (see list below). While work in this segment was relatively scarce during 2016–2018, it was somewhat intentional as stakeholders worked through considerations of a more standardized approach to process evaluation planning.

1. Process Evaluation of Upstream HVAC Initiative
2. Combined Heat and Power Process Evaluation
3. Process Evaluation of C&I Upstream Lighting Initiative

3. NTG Evaluations

NTG evaluations estimate energy savings that are specifically attributable to the program under study. Although some NTG evaluations were conducted for C&I programs under the SCC research area, two C&I NTG evaluations were undertaken in this research area in the last term.

1. Drivers of NTG
2. Upstream LED NTG Analysis

4. Market Characterization

Market characterizations assess changes in market conditions for energy efficiency products and provide information to help PAs influence those markets to increase energy savings. Sixteen C&I market characterizations were undertaken in the last contract period (see list below).

1. Existing Buildings Market Characterization: C&I Customer On-Site Assessments
2. Phase II: Gas Boiler Market Characterization
3. Existing Buildings Market Characterization: Market Share and Sales Trend Study
4. 2015 PA Differences Evaluation
5. 2016 PA Differences Evaluation
6. Upstream HVAC Distributor Data Collection
7. Assessment of the Share of Incentivized High Efficiency Equipment
8. 2015 C&I Customer Profile Study
9. Lighting and Controls Market Effects Study
10. Enhanced Customer-Level Database Capabilities Evaluation
11. 2011–2016 C&I Mid-Sized Customer Needs Assessment
12. C&I Code Compliance Follow-Up Study

13. Methods Development and Evaluation of Controls Measures
14. 2016 C&I Customer Profile Study and Associated Deep Dives (Advanced Lighting, HVAC)
15. LED Market Monitor Study
16. C&I Injection Molding Machine Market Assessment Baseline Study

6.3 NEAR-TERM PRIORITIES

For 2019–2021, near-term priorities may include:

- Further discussion and finalization of a more systematic approach to study planning, which will include adoption of a screening tool and/or process to vet ideas prior to studies moving forward, consistent with the prioritization framework in Section 3.2 .
- Continued focus on market effects from the perspective of understanding principles to identify, what areas are in need of quantification, and, more broadly, how program efforts influence the adoption of new technologies both inside and outside the program.
- Understanding of the NTG rates as they relate to large and/or memorandum of understanding (MOU) customers, as well as determination of what is an appropriate timeframe for considering NTG rates applicable.
- Consideration of specific market sectors with rapidly shifting baselines warranting further research, as well as sectors that stakeholders need to understand better.
- Investigation of potential sources of future program savings due to factors such as new product offerings, gaps in program strategy, or generally just low market penetration.
- Additional understanding of customer characteristics, customer barriers, customer decision making, and customer engagement to improve program execution and the customer experience.
- For baseline analyses, determination of when and for how long ISPs should be applied, key factors triggering ISP/baseline research, defining what constitutes unique vs. non-unique measures, and increasing coordination between evaluation and other stakeholders on ISP/baseline research and implementation in program assumptions.
- Further examination and vetting of measure lives for program offerings.
- Improved coordination on all evaluation activities and results with external stakeholders

6.4 LONGER-TERM PRIORITIES

This section intentionally blank for the April draft. Content will be included for the October version.

6.5 PLANNED RESEARCH AND STRATEGIC ISSUES

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7. SPECIAL AND CROSS-CUTTING (SCC) RESEARCH AREA

7.1 SCOPE OF RESEARCH AREA

The SCC research area covers topics that do not fit cleanly into either the Residential or C&I research areas, as well as additional specialized topics in which it is particularly important to ensure consistency across research areas and markets. Topics within this research area include, but are not limited to:

- Codes and Standards
- Community Mobilization Initiatives, Education, and Training
- Market Effects
- Top-Down Modeling
- Net-to-Gross (NTG)
- Non-Energy Impacts (NEIs)
- Program and Portfolio Marketing
- Customer Profile Report
- Demand Response (DR)
- Additional Work

For each cross-cutting topic area, specific planning strategies may vary. A brief overview of the current strategy for each topic area follows.

- **Codes and Standards** – The Code Compliance Support Initiative (CCSI) evaluation seeks to measure net savings attributable to the CCSI for improving code compliance in Massachusetts through various avenues over the long term, and to gather supporting evidence for those savings. Evaluation activities include implementing immediate surveys after each classroom training and reporting the findings at the end of the contract period, implementing follow-up interviews with training attendees, examining building code compliance documents, and estimating the number of Massachusetts code officials who have attended different types of trainings as a share of the population.
- **Community Mobilization Initiatives, Education, and Training** – For these two topic areas, process and impact evaluations are performed as appropriate based on the defined goals of each delivery model and the planning principles discussed above. Each new in-field effort is reviewed to determine whether a specific evaluation of the effort should occur. Evaluation efforts focus on new or changing delivery models rather than established models, but all efforts are periodically reviewed.
- **Market Effects** – Market effects studies rely on an analysis of program-qualifying equipment sales compared to all equipment sales, as well as self-report data on free-ridership and spillover. These studies measure net spillover savings from program-induced changes in the structure and functioning of the market, as well as seeking evidence of such changes. Market effects measurement recognizes that programs can drive non-participant savings through market effects that are not captured by program tracking (i.e., projects or measures) or participant NTG evaluation.
- **Top-Down Modeling** – Top-down modeling techniques use an econometric approach to estimate program impacts across all energy-efficiency programs in a given geographical region or service territory rather than running separate studies for each program (or measure/end use within a program). Top-down approaches use regression models to measure changes in energy consumption over time that are attributable to programmatic interventions by the PAs. In theory, top-down methods are capable of capturing the full portfolio-level effect, including free-ridership, spillover, market effects, and snapback across multiple programs.
- **Net-to-Gross (NTG)** – Going forward, this topic area will continue to research how NTG results should be integrated with market effects, program design, and claiming savings. It will re-examine the most appropriate approaches for estimating NTG under different circumstances and with different types of customers/program models. Additionally, it will research what is driving the differences in NTG ratios by end-use and over time and repeat NTG studies as needed.
- **Non-Energy Impacts (NEIs)** – Similar to NTG, initial work in the NEI area focused on developing methods for quantifying NEIs attributable to the PA programs. Research in this area continues to quantify appropriate NEIs for

the Multi-Family and Low-Income programs. This topic area also examines additional NEIs that may be appropriate to either study for the first time or further update and/or refine.

- **Program and Portfolio Marketing** – Currently, this area focuses on determining the effectiveness of each statewide marketing campaign. Each year, a post-survey has been completed to measure the impact of the campaign in raising brand and program awareness. Additional work will measure brand effectiveness, as well as support marketing efforts with specific smaller scale evaluations as necessary.
- **Customer Profile Report** – The C&I Customer Profile report has been completed on an annual basis since 2012. The Residential Custom Profile study has been completed on an annual basis since 2015. Each year presents an analysis of Massachusetts PAs' billing and tracking data, which allows the EMC to accurately quantify and report on trends and time series evolution in the Massachusetts landscape. The reports also develop narratives about these trends and their implications for a variety of stakeholder interests and help to formulate testable hypotheses for future process, market, and impact assessment studies. Finally, the customer profile reports allow the PAs to assess how their standardized data compares to other PAs' data and to statewide data.
- **Demand Response (DR)** – The PAs continue to explore new demonstration offerings to determine if DR should be implemented on a statewide scale, as a full program or as an element within a program. These demonstration projects are being deployed to assess new technologies and strategies, with PAs using the evaluation findings to improve upon their existing program offerings. The current approach of focusing on broad "umbrella" programs creates the opportunity to refine efforts quickly based on the lessons learned during the demonstration project.
- **Additional Work** – Work in SCC may cross multiple topics to identify overarching market trends and consumer behavior. Some additional cross-cutting work is typically developed on a short turnaround, ad hoc basis. This work may include literature reviews or surveys of programs in other jurisdictions and other smaller scale work designed to inform implementation efforts or program strategy.

In addition to the topics and strategies discussed above, another priority of this research area is to retain the flexibility to respond to new efforts in the field to provide appropriate and timely evaluation support.

Currently, SCC research is served by six different EM&V contracting teams. The evaluation teams were selected through a competitively procured joint RFP process conducted in 2016. The term for this contract will end mid-2020. The research areas and contracting teams are outlined below.

- NTG, Market Effects, Top-Down Modeling, Codes and Standards, and NEIs
    - Prime Contractor: NMR Group, Inc
    - Subcontractor: DNV-GL, Tetra Tech, Three3, The Cadmus Group, EcoMetric, and RMS
- Education, Training, and Community Mobilization Initiatives
    - Prime Contractor: Opinion Dynamics
- Program and Portfolio Marketing
    - Prime Contractor: ILLUME Advising, LLC
    - Subcontractor: Diddio and Grounded Research
- Demand Reduction and Mitigation Strategy – Residential and Small C&I
    - Prime Contractor: Navigant Consulting
- Demand Reduction and Mitigation Strategy – C&I
    - Prime Contractor: Energy and Resources, Inc
    - Subcontractor: DNV-GL

A representative of Cape Light Compact JPE is currently the statewide research area manager, with seven employees from four different PA organizations leading individual study efforts.

7.2 RESEARCH COMPLETED DURING 2016–2018 PLAN

Top-down modeling, market effects, NTG, and Codes and Standards topic areas are all interrelated. In theory, the top-down evaluation area describes the net effect of all the PA programs and efforts on changes in total energy consumption. However, the underlying drivers of these net savings are better understood by using other methods to estimate net savings. These methods include participant NTG surveys, estimation of market effects, and estimation of savings attributable to codes and standards support. Taken together, these four topic areas identify program-driven savings in programs and markets in areas that overlap and provide different explanations for the net savings.

From 2016–2018, the following 12 studies have been supported in the areas of top-down, market effects, NTG, and Codes and Standards.

1. Top-Down Modeling Extended Methods Review
2. NTG Methodology Research
3. CCSI Evaluation of Classroom Trainings
4. CCSI Commercial Code Compliance Documentation Assessment
5. Immediate Surveys for the CCSI Evaluation 2018
6. C&I New Construction CCSI Attribution
7. Residential New Construction CCSI Attribution
8. Stretch Code Market Effects Study
9. Results of Spring 2016 HVAC Manufacturer Panel Maintenance and Pilot Data
10. Residential HVAC Market Share Estimates
11. Lighting Distribution Modeling
12. C&I Upstream HVAC Heat Pump Program NTG and Market Effects Study (includes market effects components)

NEIs include effects beyond energy savings that are attributable to energy efficiency programs. Examples of NEIs include reduced labor or non-labor O&M costs, health, and safety. The goal of NEI studies is to provide guidance to the EMC by quantifying participant NEIs associated with various measures through residential programs. The four studies below have been completed or are in process.

1. Low-Income Single-Family Health- and Safety-Related NEI Study
2. NEI Framework Study
3. Low-Income Health NEI Study
4. Low-Income Multi-Family NEI Study

The Program and Portfolio Marketing area has completed several research activities to evaluate the statewide marketing of energy efficiency programs since 2016. The primary evaluation activity was a series of tracking surveys with residential and commercial customers. The surveys measured customer awareness, knowledge, and associations with the Mass Save brand and the effectiveness of marketing activities. In 2017, the Massachusetts energy efficiency PAs implemented the seventh year of a statewide marketing campaign, under the trademark of Mass Save®. During this planning period, two studies have been completed or are in progress.

1. 2016 Massachusetts Statewide Marketing Campaign: Post Campaign Report
2. 2017 Massachusetts Statewide Marketing Campaign: Post Campaign Report

The Customer Profile Report serves as the vehicle to aggregate and summarize the account- and project-level details contained in the PAs' evaluation database. The Customer Profile report allows the PAs to evaluate how their standardized

data compares to other PAs' standardized data and to data for the state as a whole. The following three Customer Profile studies below have been completed.

1. 2015 C&I Customer Profile
2. 2016 C&I Customer Profile
3. 2013–2015 Residential Customer Profile

DR is a relatively new area of focus for the PAs and, while it is within the statewide EM&V framework, current programming efforts are focused mainly on individual PA demonstrations, so each of the studies to date are mainly PA-specific. EM&V efforts are focused on supporting program development and working with the DR EM&V subcommittee to ensure that findings are shared. In the next program cycle, it is possible there will be more statewide programs, in which case EM&V efforts will more likely resemble current statewide energy efficiency efforts. Four DR studies have been completed from 2016 to 2018.

1. Evaluation Report for Cape Light Compacts 2016 DR Demonstration Offering
2. 2016 Residential Wi-Fi Thermostat DR Evaluation
3. 2017 Seasonal Savings Evaluation
4. 2017 Residential Wi-Fi Thermostat DR Evaluation

7.3 NEAR-TERM PRIORITIES

Over time, program implementers have turned increasingly to integrated-programming efforts that are not specific to either customer sector. Examples include community-based programs, umbrella marketing, and integrating behavioral aspects into existing programs. The SCC research area has been the focal point for evaluation of these efforts. The PAs anticipate leveraging research in the SCC area to help increase program effectiveness and meet aggressive savings goals.

The near-term priorities for SCC are as follows:

Non-Energy Impacts (NEIs):

- Understanding how to best communicate and market NEIs.
- Updating and expanding the C&I Retrofit and New Construction NEIs studies to other measures and characteristics.
- Completing the low-income multifamily health study.
- Quantifying additional market-rate multifamily NEIs.

Program and Portfolio Marketing:

- Understanding the success indicators for energy-efficiency marketing efforts. Is Mass Save effective? Possible indicators include brand awareness, program participation, and energy savings. What is the appropriate timeline for moving from simple customer awareness of the Mass Save brand to energy-efficient action?
- Understanding how PAs should define customer segments. Should it be by demographics, attitudes, community?

NTG and Market Effects:

- Understanding how to use findings from NTG and market effects studies for program planning and design.
- Updating baselines: How do baseline levels of efficiency of energy-using equipment affect NTG and market effects? How do non-energy efficiency market trends affect baselines? Should upstream impacts be measured comprehensively?
- Studying market effects for other types of equipment besides HVAC and lighting.

- Understanding changes in new construction market, including the opportunity to understand program influence on low-energy buildings.
- Assessing the degree to which more consistent methodologies should be developed for self-reported residential NTG and algorithms/methods specific to Massachusetts.

Codes and Standards:

- Establishing a framework for the evaluation of PA influence in advancing state and/or federal standards for high efficiency equipment
- Determining of program viability and evaluability.
- Determining opportunity for Regional Collaboration Effort to spread the cost.

7.4 LONGER-TERM PRIORITIES

This section intentionally blank for the April draft. Content will be included for the October version.

7.5 PLANNED RESEARCH AND STRATEGIC ISSUES

This section intentionally blank for the April draft. Content will be included for the October version.

A. RESIDENTIAL STAGE ONE PLANS

This section intentionally blank for the April draft. Content will be included for the October version.

B. C&I STAGE ONE PLANS

This section intentionally blank for the April draft. Content will be included for the October version.

C. SCC STAGE ONE PLANS

This section intentionally blank for the April draft. Content will be included for the October version.

D. STAGE ONE TEMPLATE

Study Name: Clear descriptive title as to what the study is

Study Champion: Each study will be assigned a supportive Study Champion to promote and justify moving forward with the study. This person does not necessarily need to be the study lead. Can be either PA Evaluation Staff or EM&V Consultant

Research Area: Defines which Research Area will complete the Study

Type of Study: Baseline, Cost, Impact, Market Characterization, Market Effects, Measure Life, NEIs, NTG, Process,

Study Lead: Person responsible for leading the study on behalf of the PAs. This person will work with the evaluation team on keeping the study moving forward to meet deadlines and respond to questions that do not need approval from all PAs. Normally, this is "TBD" until after approval of the Stage 1 plan and would be PA Evaluation Staff.

Prioritization: Overall Score from Prioritization Framework

Applicable Fuel(s): Electric/Gas/Electric + Gas/Oil/Propane

Underlying Program/Initiative:

Overall Study Goal:

This section should describe the goals and objectives that define targets for your research in a clear, concise manner that is understandable to the reader. It should be defined in terms of goal(s) and the expected final product, result, or application of the process. This section should be high level, followed by a succinct list of the research questions the study is intended to answer.

Value of Study:

This section should define the audience in an effort to align the study with the defined need. The section includes incorporates input from program staff to ensure need is adequately addressed. This section should explain what the EMC will learn from the study, as well as how and why it will help the PA's implementation and/or evaluation groups. Studies need to make sense and not duplicate of work that has already been/or being done. What are the risks (if any) to the PAs if this study is not done?

High-Level Description of Approach/Methodology:

The methodology and approach should describe in detail how the study will be conducted and the requirements of the project. It should also include the method to be used in performing the various tasks, such as survey work and on-site visits, as well as what specific kinds and age of data the study will need from the PAs. It is also important to note whether the study involves novel or untested methodologies, how to implement the study, and why it is being proposed. Tasks will be written in a clear, concise manner so that the reader will understand what they will learn from the study and why it will help inform programs. In addition, the EMC wants to be clear how the study results will be applied to the programs. This section should be a half page or less.

Implementation Review:

This section is to affirm that we have given implementation a chance to review. Implementation will have one week to respond or provide comments. If comments are received, we will incorporate the comments into the plan; otherwise, we will move forward with the plan as is.

Date sent to implementation:	Date comments due:
Budget:	High Level Estimate
Timeline:	Anticipated start and completion dates

E. PRIORITIZATION FRAMEWORK

Indicator	Type	Definition	Scoring Definition: Scale of 1-5	Weight Type		
				1*	2*	3*
Magnitude of Savings (kWh, Therms, or MMBtu-Oil)**	Relevance (Quantitative)	Percent of annual sector savings (kWh, Therms and/or MMBtu***) for most recent year from Mass Save data.	1: <1% of sector 2: 1%–<3% 3: 3%–<5% 4: 5%–<10% 5: =>10% For kWh/MMBTU: NA allowed for SCC, Gas and Demand Response studies; For Therms: NA allowed for SCC, Electric, DR, and Oil studies	10	5	0
Magnitude of Savings (kW-S)	Relevance (Quantitative)	Percent of annual sector savings (kW) for most recent year from Mass Save data.	1: <1% of sector 2: 1–-<3% 3: 3%–<5% 4: 5%–<10% 5: =>10% NA allowed for SCC, Gas, and Oil	6	3	10
Age of Most Recent Study	Relevance (Quantitative)	Age of most recent study (same program/same type), based on the year the study was finalized.	1: 2018 2: 2017 3: 2016 4: 2015 or before 5: No prior study NA allowed for Gas	7	4	7
Expected/ Potential Future Savings Trend	Relevance (Qualitative)	Expected change in percent of sector savings for study period.	*Score from 1 to 5 with following guideposts:* 1: Sharply declining 3: Similar to current levels 5: Sharply increasing (no NAs)	9	7	9
Market/ Technology/ Baseline Shifts	Uncertainty	Expected or recent market, technology, or baseline changes that would lead to need for new research.	*Score from 1 to 5 with following guideposts:* 1: No market/technology changes 3: Some changes 5: Substantial changes (no NAs)	9	9	9
Program Implementation Changes	Uncertainty	Recent or anticipated changes in program implementation that lead to need for new research (e.g. new program or new delivery mechanism)	*Score from 1 to 5 with following guideposts:* 1: No program changes 3: Some program changes 5: Substantial program changes, or new program (no NAs)	5	10	5
Impact Factors Uncertainty	Uncertainty	Concerns about uncertainty in impact factors that lead to need for new research (e.g., adjusted gross savings, deemed savings, realization rates, NEIs)	*Score from 1 to 5 with following guideposts:* 1: Very Low uncertainty (very high confidence) in current value 3: Some uncertainty 5: High uncertainty or no existing value NAs allowed for process and market characterization studies	7	5	7
Regulatory Requirement/ Political Sensitivity	Priority	Regulatory or political needs for conducting a study	1: No requirement/sensitivity 3: Medium priority requirement/ sensitivity 5: High priority requirement/sensitivity (no NAs)	6	6	6
Implementation Requests	Priority	Requests from implementation team or other internal organizational need	1: No request 3: Medium priority request 5: High priority request (no NAs)	6	6	6

*Weight 1 used for the following studies types: baseline, impact, cost, market effects, measure life, NEIs, and NTG. It is also used for combination studies if a market characterization or process component is integrated into the study. Weight 2 used for market characterization and process. Weight 3 used for DR studies.

**If both gas and electric, then maximum rating is used for savings magnitude. Oil studies are rated with electric studies, therefore magnitude of savings (% of sector MMBtu) is input in electric column. User may combine both electric and oil into MMBtu if relevant.

*** Scoring will be updated and reassessed as needed, in particular for changes to savings metrics for 2019–2021.