BURLINGTON ELECTRIC DEPARTMENT

2017 Energy Efficiency Annual Report

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1 Introduction & Summary

The Burlington Electric Department (BED) is pleased to submit the following report to the Burlington Electric Commission, the Vermont Public Utilities Commission and the Vermont Department of Public Service, summarizing the implementation of energy efficiency programs in the City of Burlington for the year 2017. BED remains committed to offering its customers high quality and affordable energy services and a secure, environmentally sound supply of electricity into the future. Energy efficiency continues to play a major role in achieving this goal, and is the cornerstone of the BED resource acquisition strategy.

Energy efficiency has been clearly shown to be Vermont's least expensive future energy supply resource over time, and is every day a greater environmental imperative. The Burlington Electric Department is owned by all the citizens of Burlington, who have been unequivocally clear that the option for future supply that they prefer above all others is the pursuit of additional cost-effective energy efficiency.

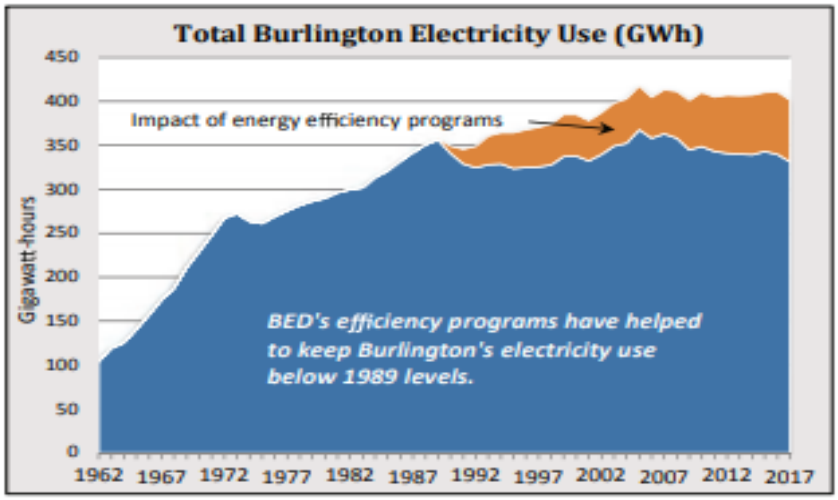
Burlington voters in 1990 approved an 11.3 million dollar bond to fund energy efficiency programs that supported successful program activities through 2002. Since 2003, BED customers (like all other Vermont electric customers) pay a small monthly charge that supports these "Energy Efficiency Utility" programs. When these funding sources are considered along with customers' direct investment, almost $63.7 million has been invested in energy efficiency efforts sponsored by BED over the last 28 years. This is comprised of about $31.2 million spent by BED on all of its energy efficiency efforts during that period, combined with another $32.5 million in matching expenditures by its customers. The willingness to invest their private funds in these investments is a testament to the value that BED customers place on these services.

As Figure 1 indicates, the overall effect has been dramatic. Energy Efficiency has essentially flattened BED's energy load requirement since the 1990's. Overall electricity use in 2017 was about 4.0% lower than in 1989. In other words, we are meeting the

needs of a growing local economy with less electricity than we used a quarter century ago. The consistent delivery of affordable energy efficiency services has helped to meet the needs of a growing local economy over the last 28 years with less electricity than was used then!

Energy efficiency expenditures are made almost entirely locally, typically in the form of professional services, skilled trades employment, and equipment purchases. Not only is the value of the City's building and energy-using equipment improved, but locally-retained dollars are "multiplied" many times over by subsequent consumer spending. Absent these energy efficiency expenditures, these funds would have gone toward the purchase of electricity and enhanced infrastructure to satisfy increased demands on the City's electrical system. Most of these dollars would have been exported out of state, and many out of the country. Energy efficiency is a win-win situation for the city of Burlington through increased local economic activity, and through the avoidance of increasingly costly electricity purchases, their associated infrastructure growth and capital expenses, and their environmental impacts.

Figure 1: Impact of DSM on Total City Electricity Sales



During 2017 alone, BED saved 7,022 Megawatt hours (MWh) of energy from efficiency measures installed, which will result in 88,436 MWh of savings over the useful life of the installed measures (2017 measures have a weighted average lifetime of about 13 years).

This is equivalent to providing energy to about 1,457 average Burlington residential customers for 13 years.

BED met 94% of 2017 MWh savings projections. BED projected 7,456 MWh savings and achieved 7,022 MWh. BED's projected budget for 2017 was $3,130,107 and $2,398,250 was expended, about 23% less than budgeted. It is important to note that BED carried over $467,000 of committed EEU funds from 2017 to 2018. There are several new construction projects that will be completed in 2018 where BED has committed incentives to customers based on the agreed upon project designs.

Burlington continues to experience a relatively large increase in new construction activity. There is close to 1.6 million square feet of new construction that will be completed between 2018 and 2022 which includes about 1,068 new apartments.

Annual fluctuations in any energy efficiency program's performance depend on a variety of human and business cycle dimensions that are hard to quantify and even harder to predict with precision. The decision to move forward with an energy efficiency project is ultimately the individual customer's. Customers consider a wide variety of factors in their decision-making process, including their perceptions of local and national economic conditions and trends, their availability of funds and competing interests for the use of those funds, fluctuations in their business functions and volumes, and the opinion of off-site consultants and decision makers. The decision to move forward with an energy efficiency project is ultimately the individual customer's. Given the relatively small size of BED's system, the loss of only a few commercial new construction projects, for example, can have a dramatic impact on its annual budgets and savings estimates.

Year-to-year fluctuations in program results reflect the relative unpredictability of energy efficiency program timing, and support the notion that *annual* projections are no more than carefully-crafted estimates. In the long run, the performance of BED's energy efficiency programs continues to meet the expectations laid out in BED's Integrated Resource Plans and prior planning documents dating back more than 28 years. Energy

efficiency has essentially flattened BED's energy load requirement since the 1990's and BED's consistent investment in energy efficiency will continue to have lasting benefits in the City by helping to reduce non-strategic load growth for the foreseeable future.

This report includes coverage of BED's program activities related to the eighteenth year of operation of the State's — and the nation's — first Energy Efficiency Utility (EEU). Statewide energy efficiency programs are today operated by the non-profit service provider "Efficiency Vermont" (EVt). Thanks to a long history of successful program implementation, BED serves as the City's own EEU and delivers these programs within the City of Burlington, continuing to build on its past success in helping Burlington's consumer-owners achieve energy efficient electric use.

BED recognizes that much of its success comes from effective working relationships not only with EVt, but also with its partners Vermont Gas Systems (VGS) and the Champlain Valley Weatherization Service (CVWS). A cooperative relationship with the VGS has helped both organizations promote efficiency services. About 95% of Burlington's building use natural gas for space heating and about 85% use it for domestic hot water. VGS reports that about fifty-percent of all their total weatherization program completions have happened in Burlington. VGS's willingness to work with BED to promote electrical energy efficiency programs to its natural gas customers has been a noteworthy strength of its joint energy efficiency program offerings. As described in more detail on page 49, BED looks forward to continuing the ***energyChamp*** program with VGS in 2018 and beyond.

BED also continues to perform substantial analysis of energy efficiency and demand response impacts on its system as part of the BED Integrated Resource planning and reporting process. BED updates all of its energy efficiency and demand response planning assumptions on a 3-year basis. BED is responsible for reacting with appropriate program design modifications to the changing market conditions that impact customers' decisions about undertaking energy efficiency upgrades.

There are a number of factors that inform BED's planning projections that "traditional" electric energy efficiency savings will become more expensive to obtain. The largest factor is due to increasing efficiency baselines. Baselines are increasing due to more stringent state energy codes and federal appliance and lighting standards. This results in declining increments of potential savings to pursue through advanced technology upgrades driven by program activities. BED estimates that higher incentives may be necessary to encourage higher levels of overall participation and deeper savings per project.

Other major forces continue to shape BED's approach to energy program design and delivery as well. The on-going transformation of the utility industry (utility 2.0 as called by some), Vermont's ACT 56 (Renewable Energy Standard) strategic electrification provision and BED's net-zero energy city strategic direction. All of these forces now require BED to play nimbly and strategically in two worlds: the historic distribution utility/EEU world and the new energy transformation world. As both a distribution utility, and an energy efficiency utility, BED is in a unique and strong position to offer our customers a full suite of efficiency and strategic electrification solutions. BED continues to explore and adopt new strategies for electric efficiency as well as much deeper expansion into the renewable, thermal and transportation arenas.

2018 Outlook

As BED describes in its **2018-2020 Triennial Energy Efficiency Utility Plan** (filed with the VT-PUC November 16, 2017) BED will continue to test all program design assumptions and pursue all strategies to make programs as cost-effective, and as easy to participate in, as possible.

BED's role in helping to establish Burlington as a *2030 District* member is a prime of example of this planning. BED's commercial class uses 75% of total annual electric sales. As with the residential class, BED strives to develop program strategies to help customers take a complete look at their electric, thermal and transportation opportunities. Working with private sector partners, staring in 2016, BED has helped to

establish Burlington as a 2030 District member. 2030 Districts are unique private/public partnerships in designated urban areas across North America committed to reducing energy use, water and transport emissions.

Overseen by Architecture 2030, 2030 Districts are in the vanguard of grassroots collaborative efforts to renovate existing buildings and construct high-performance infill development and redevelopment. BED sees the 2030 District effort as a unique and attractive, peer-driven, vehicle for property-owners who have not historically participated fully in our programs. The program is still in the early stages but over 6-million square feet of Burlington building space is committed and several energy efficiency products are on-going. More information is available at: http://www.2030districts.org/burlington

The remaining pages on this report provide details on BED's delivery of the following EEU services in 2017:

- **Business New Construction**
- **Business Existing Facilities**
- **Residential New Construction**
- **Existing Homes**
- **Efficient Products**
- **Thermal Energy and Process Fuels (Residential and Commercial)**

Table 1: All Business & Residential DSM History*

	-------- Participants -----	---------- Costs ----------						---------- Savings ----------			
		Admin	Services	Incentive	Evaluation	Participant	Program Total	Mwh	Lifetime Mwh	Winter Kw	Summer Kw
1991	392	$356,563	$0	$273,437	$6,015	$1,091,190	$1,727,205	3,703	52,103	1,224	0
1992	330	$334,066	$0	$264,615	$14,711	$1,104,050	$1,717,442	3,595	72,723	1,385	0
1993	1,343	$344,326	$0	$501,991	$107,646	$2,052,045	$3,006,008	9,198	133,079	2,634	0
1994	734	$367,600	$0	$197,054	$46,172	$927,802	$1,538,628	3,304	32,558	991	0
1995	827	$255,770	$0	$149,865	$16,666	$1,584,811	$2,007,112	6,764	31,402	1,650	0
1996	774	$215,329	$0	$118,006	$44,318	$500,363	$878,016	2,285	38,654	0	358
1997	735	$143,184	$0	$122,189	$6,011	$848,380	$1,119,764	2,665	39,091	0	714
1998	692	$204,588	$0	$107,140	$353	$731,707	$1,043,788	3,202	43,971	0	822
1999	675	$214,782	$0	$101,224	$1,529	$331,985	$649,520	1,300	14,174	0	358
2000	1,364	$334,762	$97,067	$148,162	$0	$761,673	$1,341,664	3,130	37,211	443	387
2001	1,410	$425,123	$129,955	$208,178	$59,637	$609,115	$1,432,008	3,094	41,258	398	341
2002	1,824	$469,263	$192,143	$407,057	$2,352	$1,178,695	$2,249,510	4,438	63,159	444	520
2003	1,897	$305,283	$365,691	$236,762	$19,006	$538,589	$1,465,331	3,346	56,332	346	361
2004	1,484	$253,037	$302,017	$271,856	$19,067	$638,819	$1,484,796	3,500	46,856	625	557
2005	1,977	$242,385	$351,009	$260,806	$5,904	$970,437	$1,830,541	4,948	69,570	630	630
2006	2,188	$221,862	$352,886	$381,706	$42,057	$702,575	$1,701,086	6,254	83,951	813	891
2007	2,045	$255,856	$375,480	$441,352	$52,025	$1,353,651	$2,478,364	9,679	128,022	1,206	1,158
2008	6,392	$447,867	$412,037	$578,245	$65,159	$1,187,671	$2,690,979	7,299	72,402	1,178	889
2009	1,181	$317,257	$371,233	$452,901	$67,667	$1,959,977	$3,169,035	5,679	64,416	765	811
2010	1,638	$378,153	$339,569	$1,102,597	$54,283	$781,528	$2,656,130	6,492	75,954	1,223	1,148
2011	1,027	$310,536	$381,043	$1,372,682	$69,742	$1,020,842	$3,154,845	7,191	68,153	1,333	1,000
2012	1,244	$296,104	$425,616	$1,035,051	$63,671	$1,968,113	$3,788,555	6,428	75,050	1,118	957
2013	1,229	$289,056	$472,270	$1,228,561	$77,562	$1,793,534	$3,860,982	7,007	82,273	1,267	910
2014	988	$380,161	$577,196	$1,246,484	$63,671	$3,277,600	$5,545,111	5,399	64,811	959	785
2015	1,021	$329,612	$570,899	$1,291,414	$67,289	$2,025,393	$4,284,606	6,025	80,842	849	628
2016	1,427	$383,409	$511,696	$1,367,951	$69,644	$2,292,047	$4,624,747	6,102	72,043	745	529
2017	1,559	$529,382	$561,806	$1,307,062	$69,646	$2,477,247	$4,945,143	7,022	88,436	899	709
Total	38,396	$8,605,316	$6,789,612	$15,174,346	$1,111,803	$34,709,839	$66,390,917	139,049	1,728,494	23,125	15,464

*** All tables in this report reflect a reduction in MWh savings claims as a result of the final VT-DPS annual savings verification process.**

Table 2: All Business DSM History

	Participants	Costs						Savings			
		Admin	Services	Incentive	Evaluation	Participant	Program Total	Mwh	Lifetime Mwh	Winter Kw	Summer Kw
1991	3	$130,784	$0	$1,849	$0	$2,157	$134,790	31	93	30	0
1992	16	$149,138	$0	$119,535	$4,063	$454,104	$726,840	246	24,388	227	0
1993	164	$162,366	$0	$305,473	$35,559	$1,308,524	$1,811,922	5,587	72,218	1,421	0
1994	104	$238,153	$0	$163,733	$21,690	$630,639	$1,054,215	2,242	14,970	626	0
1995	163	$199,835	$0	$142,342	$9,480	$1,368,954	$1,720,611	6,137	21,386	1,615	0
1996	151	$151,409	$0	$50,423	$28,498	$355,217	$585,547	1,233	16,150	0	334
1997	160	$78,321	$0	$96,959	$5,612	$757,774	$938,666	2,300	33,565	0	669
1998	164	$141,258	$0	$65,048	$50	$615,144	$821,500	2,767	37,930	0	734
1999	162	$150,772	$0	$71,501	$0	$270,056	$492,329	1,051	10,895	0	338
2000	145	$176,552	$56,070	$80,108	$0	$613,597	$926,327	2,438	28,712	309	334
2001	127	$255,082	$99,310	$84,729	$43,248	$384,763	$867,132	2,064	26,581	240	240
2002	113	$284,826	$112,447	$238,866	$252	$912,280	$1,548,671	2,888	43,183	224	392
2003	144	$154,937	$243,386	$148,306	$9,503	$254,905	$811,037	2,193	32,975	122	162
2004	142	$115,796	$192,327	$140,234	$3,928	$507,253	$959,538	2,505	35,419	335	394
2005	133	$133,542	$208,860	$202,143	$0	$814,001	$1,358,546	3,751	57,787	342	397
2006	150	$112,917	$240,425	$261,310	$24,533	$575,467	$1,214,652	5,094	73,084	503	652
2007	151	$125,761	$244,030	$280,213	$33,320	$977,132	$1,660,456	6,530	104,174	482	763
2008	115	$113,641	$250,666	$304,252	$43,576	$904,640	$1,616,775	3,264	48,407	386	386
2009	105	$173,789	$224,900	$305,352	$44,608	$1,743,182	$2,491,831	3,781	51,336	336	555
2010	228	$168,765	$249,094	$849,801	$35,630	$458,549	$1,761,839	3,489	52,358	511	673
2011	220	$162,357	$277,034	$972,032	$47,704	$335,095	$1,794,222	2,787	37,950	421	521
2012	323	$153,822	$307,898	$721,047	$49,516	$1,667,503	$2,899,786	4,215	54,786	494	680
2013	355	$166,097	$384,773	$952,314	$64,371	$1,320,521	$2,888,076	4,440	55,668	533	537
2014	365	$193,375	$434,315	$846,835	$47,753	$3,006,372	$4,528,650	3,559	43,676	526	524
2015	382	$159,179	$430,188	$746,424	$50,467	$1,709,721	$3,095,979	3,691	50,912	332	382
2016	512	$166,511	$406,350	$893,142	$51,990	$1,659,634	$3,177,627	4,074	39,361	361	397
2017	508	$232,740	$463,676	$907,098	$50,198	$2,183,380	$3,837,092	4,645	53,336	420	544
Total	5,305	$4,451,725	$4,825,749	$9,951,068	$705,549	$25,790,564	$45,724,655	87,002	1,121,300	10,796	10,608

Table 3: All Residential DSM History

	Participants	Costs						Savings			
		Admin	Services	Incentive	Evaluation	Participant	Program Total	Mwh	Lifetime Mwh	Winter Kw	Summer Kw
1991	388	$225,779	$0	$271,588	$6,015	$1,089,033	$1,592,415	3,672	52,010	1,194	0
1992	314	$184,928	$0	$145,080	$10,648	$649,946	$990,602	3,349	48,335	1,158	0
1993	1,179	$181,960	$0	$196,518	$72,087	$743,521	$1,194,086	3,611	60,861	1,213	0
1994	630	$129,447	$0	$33,321	$24,482	$297,163	$484,413	1,062	17,588	365	0
1995	664	$55,935	$0	$7,523	$7,186	$215,857	$286,501	627	10,016	35	0
1996	623	$63,920	$0	$67,583	$15,820	$145,146	$292,469	1,052	22,504	0	24
1997	575	$64,863	$0	$25,230	$399	$90,606	$181,098	365	5,526	0	45
1998	528	$63,330	$0	$42,092	$303	$116,563	$222,288	435	6,041	0	88
1999	513	$64,010	$0	$29,723	$1,529	$61,929	$157,191	249	3,279	0	20
2000	1,219	$158,210	$40,997	$68,054	$0	$148,076	$415,337	692	8,499	134	53
2001	1,283	$170,041	$30,645	$123,449	$16,389	$224,352	$564,876	1,030	14,677	158	101
2002	1,711	$184,437	$79,696	$168,191	$2,100	$266,415	$700,839	1,550	19,976	220	128
2003	1,753	$150,346	$122,305	$88,456	$9,503	$283,684	$654,294	1,153	23,357	224	199
2004	1,342	$137,241	$109,690	$131,622	$15,139	$131,566	$525,258	995	11,437	290	163
2005	1,844	$108,843	$142,149	$58,663	$5,904	$156,436	$471,995	1,197	11,783	288	233
2006	2,038	$108,945	$112,461	$120,396	$17,524	$127,108	$486,434	1,160	10,867	310	239
2007	1,894	$130,095	$131,450	$161,139	$18,705	$376,519	$817,908	3,149	23,848	724	395
2008	6,277	$334,226	$161,371	$273,993	$21,583	$283,031	$1,074,204	4,035	23,995	792	503
2009	1,076	$143,468	$146,333	$147,549	$23,059	$216,795	$677,204	1,898	13,080	429	256
2010	1,410	$209,388	$90,475	$252,796	$18,653	$322,979	$894,291	3,003	23,596	712	475
2011	807	$148,179	$104,009	$400,650	$22,038	$685,747	$1,360,623	4,404	30,203	912	479
2012	921	$142,282	$117,718	$314,004	$14,155	$300,610	$888,769	2,213	20,264	624	277
2013	874	$122,959	$87,496	$276,247	$13,191	$473,013	$972,906	2,567	26,605	734	373
2014	623	$186,786	$142,880	$399,649	$15,918	$271,228	$1,016,461	1,840	21,135	433	261
2015	639	$170,433	$140,711	$544,989	$16,822	$315,672	$1,188,627	2,334	29,930	517	246
2016	915	$216,898	$105,346	$474,809	$17,654	$632,413	$1,447,121	2,028	32,682	384	132
2017	1,051	$296,642	$98,130	$399,964	$19,448	$293,867	$1,108,051	2,377	35,100	479	165
Total	33,091	$4,153,591	$1,963,863	$5,223,278	$406,254	$8,919,275	$20,666,261	52,047	607,194	12,329	4,856

2 Overview of EEU Services Results

2017 proved to be a challenge for achieving savings goals in all programs but overall BED achieved 94% of the total annual MWh goal, 67% of the summer coincident –peak KW goal and 81% of the winter coincident –peak KW goal.

BED projected 7,456 annualized MWh savings and achieved 7,022 annualized MWh which will result in 88,436 MWh of savings over the useful life of the installed measures (2017 measures have a weighted average lifetime of about 13 years). BED projected 1,066 coincident-peak summer KW savings and achieved 709 KW. BED projected 1,105 coincident-peak winter KW savings and achieved 899 KW. Business New Construction and Retail Products had strong years and exceeded savings projections.

BED's projected budget for 2017 was $3,130,107 and $2,398,250 was expended, about 23% less than budgeted. BED's cost for saved energy was lower than projections. BED estimated it would spend about $420 per annualized MWh saved, and instead spent $342 per annualized MWh. This decrease was mostly driven by several cost–effective business retrofit and new construction projects and strong performance from the Retail Products Program.

BED's general administrative costs as a percentage of total program costs remained consistent with historical performance; about 22% of the budget was used to defray program operation costs in 2017. 78% of the 2017 budget was spent on direct technical assistance and cash incentives to customers; 23% of this on direct technical assistance and 55% on customer incentives.

2015-2017 Three-year Performance Period Results –

For the 2015-2017 three-year EEU performance cycle, BED met 86% of MWh savings projections. BED projected 22,365 MWh savings and achieved 19,138 MWh. BED also met 58% of the summer coincident-peak savings goal. 3,205

coincident-peak KW was projected and BED achieved 1,866 KW. BED met 76% of the winter coincident-peak savings goal. 3,273 coincident-peak KW was projected and BED achieved 2,493 KW. BED's budget for the 2015-2017 cycle was $8,468.878 and $7,488,253 was expended, about 12% less than budgeted. BED's cost for saved energy was slightly higher than projections. BED estimated it would spend about $379 per annualized MWh saved, and instead spent $391 per annualized MWh.

Table 32 (page 65) show BED's overall results for the 2015-2017 "Minimum Performance Requirements" and the "Quantifiable Performance Indicators" as approved by the PUC.

In the first eighteen years of Vermont's Energy Efficiency Utility structure both BED and EVt have exceeded savings estimates in most years and have done so at a lower cost per MWh than anticipated. Energy efficiency is now being delivered at a total utility cost of about $.037 per kilowatt-hour statewide. When compared with other energy sources, energy efficiency remains the state's best bargain for future supply and the expenditures stay largely in the Vermont economy. Avoiding electric generation also avoids the associated air emissions and other environmental impacts that effect Vermont and the region.

Table 4: EEU Business & Residential - Total Resource Benefits

Avoided costs of Electricity	$7,613,434.93
Fossil Fuel Savings	$254,721.66
Water Savings	$256,662.99
TRB Total	$8,124,819.50

	Annualized	**Lifetime**
Meter MWh	6,330	79,794
Generation MWh	7,022	88,436
Meter Demand Kw	2,439	34,424
Generation Peak Summer Kw	710	9,532
Generation Peak Winter Kw	899	12,602
Water Savings	2,193	32,324
Fuel Increase	839	24,184
O+M Savings	$128,993	$1,235,043

Table 5: EEU Business & Residential - Summary

	Prior Year 2016	Current 2017	Program to date
Participants	1,433	1,559	30,060
--- Program Costs ---			
BED Administration Costs			
General	$364,423	$488,432	$5,346,662
Implemntation	$2,302	$3,003	$2,020,743
Planning	$0	$0	$106,711
Marketing	$16,685	$37,947	$901,483
IT Development	$0	$0	$224,662
	$383,409	**$529,382**	**$8,600,261**
BED Service Costs			
Participants	$511,696	$561,806	$6,775,195
Trade Allies	$0	$0	$11,761
	$511,696	**$561,806**	**$6,786,956**
BED Incentive Costs			
Participants	$1,367,951	$1,305,900	$15,095,721
Trade Allies	$0	$1,162	$73,615
	$1,367,951	**$1,307,062**	**$15,169,336**
BED Total Costs	**$2,263,056**	**$2,398,250**	**$30,556,554**
Evaluation Costs	**$69,644**	**$69,646**	**$1,111,712**
Participant Costs	**$2,334,355**	**$2,477,247**	**$35,474,103**
Total Program Costs	**$4,667,055**	**$4,945,143**	**$67,142,368**
--- Benefits ---			
Annualized mWh	6,179	7,022	139,541
Lifetime mWh	72,032	88,436	1,751,588
Winter peak Kw	757	899	23,340
Summer Peak Kw	555	709	15,843
mWh / Participant	4	5	5
Weighted Lifetime	12	13	13

Table 6: EEU Business & Residential - End Use Summary

Description	Participants	Gross Mwh	Net Mwh	Lifetime Net Mwh	Winter Net Kw	Summer Net Kw	MMBTU	CCF
Air Conditioning	109	1,135.73	1,228.90	15,031.85	40.44	74.68	1,715.30	1,800.00
Clothes Drying	6	5.86	4.63	64.79	0.91	0.69	-19.98	0.00
Clothes Washing	134	25.86	30.07	391.10	4.02	3.03	13.57	354.15
Consumer Electronics	434	43.13	48.85	384.88	2.54	16.97	0.00	0.00
Custom	51	0.64	0.69	12.38	0.46	0.09	0.00	0.00
Dishwashing	4	0.12	0.14	1.83	0.02	0.01	0.48	4.60
Hot Water	63	79.38	75.68	987.56	11.68	5.95	-135.99	34.01
HVAC	95	173.04	170.83	3,074.20	33.19	0.00	-45.44	0.00
Lighting	2355	4,305.44	4,841.90	63,928.52	781.51	602.17	-1,269.34	0.00
Motors	1	1.94	2.18	2.18	0.44	0.00	0.00	0.00
Other Efficiency	1	1.87	1.06	10.55	0.12	0.12	0.00	0.00
Refrigeration	122	52.74	51.42	783.66	4.81	6.04	0.00	0.00
Space Heating	104	128.14	142.47	2,673.01	18.01	0.06	159.45	0.00
Ventilation	25	375.87	422.91	1,089.64	0.56	0.56	421.00	0.00
Total		6,329.74	7,021.73	88,436.16	898.69	710.35	839.05	2,192.76

2.1 Non Resource Acquisition

The following section highlights BED's Non Resource Acquisition (NRA) activities for 2017 (now renamed as Development and Support Services going forward from 2018). NRA activities are those that do not directly achieve immediate energy savings but are essential to the operation and administration of BED's EEU services and to the long-term success of future efficiency savings and innovation. The NRA categories were developed collaboratively with the DPS as part of the EEU Demand Resource Plan Process and approved by the PUC.

BED's NRA activities include: education, smart grid and AMI, applied research and development, planning and reporting, evaluation, policy and public affairs, information technology and general administration.

Education- This category captures BED's work throughout the year on general energy efficiency education that is geared toward building awareness that leads customers to take action to reduce energy use through efficiency or conservation. BED provides education to – builders and contractors, real estate professionals, K-12 students and teachers, college and universities and the general public.

Advanced Metering Infrastructure (AMI) - Smart Grid- Advanced metering infrastructure (AMI), smart grid and a new realm of potential customer energy use empowerment tools are being deployed in most of Vermont. BED continues to explore the possibilities for enhanced interaction with its customers and the potential benefits and capabilities AMI technology will bring them.

Applied Research and Development- This work includes BED's collaboration with EVt and other entities on applied research and development activities designed to optimize the creation of cost-effective solutions to meeting BED's long-term resource acquisition goals.

The main focus of applied R&D is in the following three areas:

- Field-testing new implementation strategies such as social networking
- Technology demonstrations
- Research of emerging technologies and innovative efficiency implementation strategies

Planning and Reporting- To help keep the Vermont Public Service Board, the Department of Public Service, and other stakeholders, informed about BED's EEU activities, BED submits monthly, quarterly, annual reports and an annual plan to the Board and DPS.

Evaluation- Determining the accuracy of BED's savings claims, evaluation is a critical aspect of BED's responsibilities as an EEU to Burlington rate payers. There are several evaluation activities that BED participates in to help BED continually improve savings quantification methods.

Policy and Public Affairs- This NRA activity captures BED's participation in discussions about energy efficiency and EEU related issues that typically occur throughout the year with regulators and other stakeholders.

Information Technology (IT) - BED's on-going IT initiative mainly consists of continuing the support of and improvement to the DSM database system for the collection and processing of project data and program information critical to tracking, reporting and planning functions. There is a fairly regular need to alter measure savings characterization, existing tools or add new tools and functionality to the system which helps us to better understand and respond to changes in the Burlington marketplace.

General Administration- This NRA category captures BED's annual activities and costs for the overall management of EEU programs not specific to the individual programs and includes: general staff meetings, coordination of program implementation across all program functions and managing and monitoring overall performance and spending.

Table 7: Non-Resource Acquisition

Program	Year End Costs	Annual Budget	% of Annual Budget
Education and Training	$25,593	$43,100	70%
Smart Grid and AMI	$2,292	$21,300	11%
Applied R & D	$13,831	$19,300	72%
Planning and Reporting	$84,108	$53,100	158%
Evaluation	$16,575	$25,713	64%
Policy and Public Affairs	$21,378	$20,100	106%
Information Technology	$16,745	$25,500	66%
General Administration	$75,446	$41,500	182%
Total	$260,060	$249,613	104%

2.2 Business Services Overview

This section of the report contains information on BED's Business EEU Services: Business New Construction and Business Existing Facilities (Market Opportunities & Retrofit).

Overall, 2017 results in business services did not meet savings projections. BED projected 5,592 megawatt-hour (MWh) savings while achieving actual annual energy savings of 4,628 MWh, 83% of the projection. BED's cost to deliver EEU business services in 2017 was $1,603,514 below the budgeted amount of $2,256,090 by 29%.

It is often difficult to forecast savings and expenses in the C&I sector in Burlington. This is due to the potential for completion of a few large unexpected projects by one or two customers, dramatically exceeding projections and budgets. On the other hand, savings goals may just as unpredictably be missed due to delays or cancellations of planned significant projects.

BED continues to explore how to move beyond lighting as the dominant savings measure in the commercial market. Long-lasting LED technology continues to be widely adopted so HVAC, and other measures, are beginning to play more prominent roles. However, with about 70% of BED's commercial customer leasing their spaces, HVAC improvements present strong challenges that BED will need to overcome.

Table 8: EEU Business - Total Resource Benefits

Avoided costs of Electricity	$4,657,678.90
Fossil Fuel Savings	$188,426.11
Water Savings	$213,748.63
TRB Total	$5,059,853.56

	Annualized	**Lifetime**
Meter MWh	4,171	47,906
Generation MWh	4,645	53,336
Meter Demand Kw	916	11,979
Generation Peak Summer Kw	544	7,037
Generation Peak Winter Kw	420	5,445
Water Savings	1,800	27,000
Fuel Increase	526	17,816
O+M Savings	$80,141	$559,172

Table 9: EEU Business - Summary

	Prior Year 2016	Current 2017	Program to date
Participants	515	508	3,645
--- Program Costs ---			
BED Administration Costs			
General	$157,265	$223,613	$2,676,926
Implementation	$0	$2,243	$1,273,976
Planning	$0	$0	$62,003
Marketing	$9,246	$6,884	$314,552
IT Development	$0	$0	$120,291
	$166,511	**$232,740**	**$4,447,749**
BED Service Costs			
Participants	$406,350	$463,676	$4,816,793
Trade Allies	$0	$0	$6,780
	$406,350	**$463,676**	**$4,823,573**
BED Incentive Costs			
Participants	$893,142	$906,577	$10,080,236
Trade Allies	$0	$521	$38,669
	$893,142	**$907,098**	**$10,118,905**
BED Total Costs	**$1,466,003**	**$1,603,514**	**$19,390,227**
Evaluation Costs	**$51,990**	**$50,198**	**$704,175**
Participant Costs	**$1,700,895**	**$2,183,380**	**$25,650,802**
Total Program Costs	**$3,218,888**	**$3,837,092**	**$45,745,204**
--- Benefits ---			
Annualized mWh	4,150	4,645	87,565
Lifetime mWh	39,335	53,336	1,144,169
Winter peak Kw	372	420	11,025
Summer Peak Kw	423	544	10,896
mWh / Participant	8	9	24
Weighted Lifetime	9	11	13

Table 10: EEU Business - End-Use Summary

Description	Participants	Gross Mwh	Net Mwh	Lifetime Net Mwh	Winter Net Kw	Summer Net Kw	MMBTU	CCF
Air Conditioning	30	1,120.78	1,214.69	14,819.28	40.39	57.88	1,715.30	1,800.00
HVAC	14	35.27	34.82	626.71	6.97	0.00	-9.64	0.00
Lighting	1026	2,561.52	2,887.61	35,278.11	360.96	485.88	-1,600.20	0.00
Motors	1	1.94	2.18	2.18	0.44	0.00	0.00	0.00
Other Efficiency	1	1.87	1.06	10.55	0.12	0.12	0.00	0.00
Refrigeration	4	3.29	2.18	19.89	0.23	0.26	0.00	0.00
Space Heating	28	75.02	84.52	1,583.38	11.25	0.06	0.00	0.00
Ventilation	3	371.30	417.97	995.75	0.00	0.00	421.00	0.00
Total		4,170.99	4,645.03	53,335.85	420.36	544.20	526.46	1,800.00

2.2.1 Business New Construction

Program Description

This service helps commercial and industrial builders and developers incorporate the most energy efficient products and systems possible when building or renovating. It is designed to help customers exceed Vermont's Commercial Energy Code (CBES). By working directly and early in the process with designers and owners, BED assists in the choice of energy efficient systems and construction practices that meet business and energy needs.

The program offers financial incentives for the installation of cost effective efficiency measures. Eligible participants gain technical assistance, verification services and financial incentives to help with efficient equipment costs. BED's Business New Construction service (BNC) addresses all energy (especially electricity) consuming equipment, components or practices, including thermal envelope, motors, lighting, heating, ventilation, air-conditioning (HVAC) and control packages.

Natural gas is almost universally available in Burlington. To insure comprehensiveness in building and system designs, BED coordinates with Vermont Gas Systems (VGS) on projects when appropriate. The two utilities notify each other when projects are identified or when major changes are considered by the developers or the design teams. This partnership is mutually beneficial to both organizations and the ratepayers.

BED maximizes the adoption of energy efficient systems and techniques through proactive outreach and recruitment. As both an electric distribution utility and a municipal department with a role in the City's design review process, BED is in a unique position to identify new construction and major renovation before significant design efforts begin. BED coordinates this effort with other city agencies including the city's Planning & Zoning Department and its Department of Public Works.

After several years of offering a fairly prescriptive based program, BED, starting in 2014, began to offer an "energy model/tiered incentive" based option for larger projects. The primary motivation was to gain deeper savings per project across more end uses. Historically, BED had been successful with lighting but not as much with thermal envelope, integrated design approaches and HVAC controls. With baselines increasing due to energy code revisions, and with electric heating and cooling technology options increasing (coupled with BED's net–zero city strategic direction), BED embarked on a new approach.

BED's tiered incentive approach pays 50% of the incentive at project completion and then the remaining incentive after about one year of comparing actual usage data to the building energy model. In order to best estimate the energy efficiency potential of larger buildings, energy modeling software is used to compare the energy performance of an energy code compliant design to a model of the final "more efficient" building design. The original energy model assumptions are fine-tuned, as needed, with actual operating hours, set-points and plug loads.

It often takes about a year for larger commercial buildings to be fully occupied, equipped and debugged of any performance issues. This approach allows for deeper BED involvement, more accurate savings claims and ensures that building operators are encouraged to optimize the performance of buildings. This approach has been well received by customers and the design community. BED starts to monitor the energy usage data shortly after occupancy and provides feedback to the project team.

Project Highlights

The annualized megawatt-hour (MWh) savings for 2017 were 1,513, about 80% higher than the projection of 839 MWh. Total BED program costs were $457,910, 1% greater than the budgeted amount of $453,317.

Variance Discussion

Customers make business decisions independent of BED's program budgeting efforts, and we fully anticipate that year to year efforts will be "lumpy", and show dramatic swings in performance. Long-term average results are a better indicator of what can be expected on an annual basis than any given year's data.

For 2018, BED will continue to explore the potential benefits of commercial building envelope commissioning. BED continues to see a growing number of heat pump heated and cooled buildings coming on line so high performance building shells are an increased focus.

With the help of Vermont based, thermal envelope specialists, BED is working with Architects, owners and contractors to encourage building envelops that are being designed and constructed utilizing higher performance thermal envelope techniques.

Table 11: EEU Business New Construction - Total Resource Benefits

Avoided costs of Electricity	$1,264,750.03
Fossil Fuel Savings	$76,115.80
Water Savings	$0.00
TRB Total	$1,340,865.83

	Annualized	**Lifetime**
Meter MWh	1,369	11,000
Generation MWh	1,513	12,092
Meter Demand Kw	294	3,932
Generation Peak Summer Kw	163	2,086
Generation Peak Winter Kw	117	1,474
Water Savings	0	0
Fuel Increase	256	6,862
O+M Savings	$0	$0

Table 12: EEU Business New Construction - Summary

	Prior Year 2016	Current 2017	Program to date
Participants	20	21	272
--- Program Costs ---			
BED Administration Costs			
General	$45,722	$45,609	$530,904
Implementation	$0	$0	$126,485
Planning	$0	$0	$15,847
Marketing	$2,832	$2,146	$180,745
IT Development	$0	$0	$43,673
	$48,554	**$47,755**	**$897,653**
BED Service Costs			
Participants	$91,200	$144,289	$1,262,261
Trade Allies	$0	$0	$0
	$91,200	**$144,289**	**$1,262,261**
BED Incentive Costs			
Participants	$260,516	$265,866	$2,350,989
Trade Allies	$0	$0	$3,313
	$260,516	**$265,866**	**$2,354,302**
BED Total Costs	**$400,269**	**$457,910**	**$4,514,217**
Evaluation Costs	**$10,024**	**$10,086**	**$71,173**
Participant Costs	**$325,858**	**$789,243**	**$8,164,621**
Total Program Costs	**$736,152**	**$1,257,239**	**$12,750,011**
--- Benefits ---			
Annualized mWh	582	1,513	19,219
Lifetime mWh	7,795	12,092	285,476
Winter peak Kw	74	117	1,808
Summer Peak Kw	94	163	2,555
mWh / Participant	29	72	71
Weighted Lifetime	13	8	15

Table 13: EEU Business New Construction - End Use Summary

Description	Participants	Gross Mwh	Net Mwh	Lifetime Net Mwh	Winter Net Kw	Summer Net Kw	MMBTU	CCF
Air Conditioning	11	419.58	443.40	4,025.61	26.85	43.54	585.50	0.00
HVAC	2	14.78	14.59	262.59	3.16	0.00	-4.14	0.00
Lighting	17	605.40	683.63	7,114.07	85.40	119.64	-325.63	0.00
Refrigeration	1	0.62	0.67	6.00	0.05	0.06	0.00	0.00
Space Heating	3	14.63	16.48	329.55	1.96	0.01	0.00	0.00
Ventilation	1	314.30	353.77	353.77	0.00	0.00	0.00	0.00
Total		1,369.30	1,512.53	12,091.60	117.41	163.24	255.73	0.00

2.2.2 Business Existing Facilities
(Market Opportunities & Retrofit Services)

Program Description

Business Existing Facilities, Market Opportunity Service (MOP) targets naturally-occurring equipment changeovers to secure energy savings in the equipment replacement market. Targeted equipment includes lighting, heating, ventilation, cooling, water heating, refrigeration, motors and drives, controls and industrial process applications. This program offers prescriptive and custom tracks, with technical assistance, financial incentives and on-bill financing that encourage the adoption of cost effective, high efficiency alternatives to standard efficiency equipment.

BED and EVt offer prescriptive incentives (fixed incentives for specific eligible measures) for building lighting, refrigeration economizers and controls, motors, unitary HVAC equipment and dual enthalpy economizers for unitary HVAC units.

Non-prescriptive cost-effective measures or combinations of measures are eligible for custom incentives. Custom incentives are designed to capture as many potential lost opportunity resources as possible, while maximizing program delivery resources. BED staff and trade allies serving Burlington (including: equipment vendors, manufacturers, suppliers, contractors, architects and engineers) market the program to potential participants.

As natural gas is the predominant heating fuel in Burlington, BED works closely with Vermont Gas Systems (VGS) to encourage a comprehensive approach to energy savings. BED and VGS staff are committed to bringing appropriate projects to each other's attention. As described in the residential section below, BED and VGS continue to look for ways to better coordinate services by building upon the ***energyChamp*** platform.

Business Existing Facilities, Retrofit Service offers energy efficiency services that have been provided by BED staff for over two decades. Building retrofit entails BED staff and/or trade allies examining customer buildings and systems to identify energy efficiency opportunities for the customer. When promising projects are identified, BED staff prepares analyses for the customer showing the costs and benefits of potential energy efficiency measures. This service is offered to all business customers – from the smallest retail store to the largest commercial and industrial facility.

Program Highlights

The annualized megawatt-hour (MWh) savings for 2017 were 3,132, about 34% lower than the projection of 4,753 MWh. Total BED program costs were $1,145,604, 36% under the budgeted amount of $1,802,773.

As BED's largest program in most years (this market consumes about 75% of total annual kWh sales), BEF program managers are responsible for delivering services across a very diverse population of institutions and businesses; from extremely large hospitals and colleges to tiny book stores, restaurants and clothing boutiques. BED's largest customers consume between 1,000 and 57,000 MWh per year and typically exceed peak demand of 100 kWs. Many smaller customers, on the other hand, have the energy profile of large residential homes, consuming about 8,000 to 20,000 kWh annually. Such diversity requires a multi-prong implementation strategy.

Variance Discussion

2016 and 2017 have been relatively low savings years for BEF. Part of the issue is that the 2016 and 2017 savings goals were ambitious relative to other years as more savings were assigned to BEF from BNC. This decision was made during the 2014 DRP process as the new construction market had been very sluggish in recent years.

As mentioned in other sections of this report, BED has explored how to move beyond lighting as the dominant measure in this market. HVAC, and other measures, need to play a more prominent role but with about 70% of BED's commercial customer leasing

their spaces, HVAC improvements present strong challenges. As a response, BED issued, in mid-2015, an RFP seeking Energy Engineering companies to work with BED staff to help identify cost-effective HVAC related improvements.

BED requested quotes from energy engineering professionals, with proven project histories, to conduct, in partnership and coordination with BED, initial high level energy surveys on commercial buildings. The primary purpose of the high level audit is to quickly identify energy waste and prioritize potential energy efficiency opportunities and provide summary estimates of project costs and savings – both electric and thermal. BED's goal is to provide customers with initial high-level energy efficiency audit reports and recommendations as soon as practical from the date of the customer's request.

BED is using this initial information to present customers with estimated energy savings, potential maintenance and/or building comfort benefits, estimated BED incentives and on-bill financing details. With this information, customers may be persuaded to pursue additional (deeper-level) energy analysis, beyond the initial high-level survey, to finalize savings estimates and overall project cost.

When combined with BED's on-bill-financing service (OBF), the energy engineering approach has leverage close to $850,000 of energy efficiency projects in this market over the past few years.

As close to 75% of all kWh sales are to the commercial class, this is an important market to work effectively with. Strategies that encourage these customers to pursue energy efficiency improvements are crucial to helping BED meet savings goals in the years to come. BED is hopeful that the excitement caused by the 203 District program will drive more customers to program participation.

Table 14: EEU Business Existing Facilities - Total Resource Benefits

Avoided costs of Electricity	$3,392,928.87
Fossil Fuel Savings	$112,310.31
Water Savings	$213,748.63
TRB Total	$3,718,987.73

	Annualized	**Lifetime**
Meter MWh	2,802	36,906
Generation MWh	3,132	41,244
Meter Demand Kw	623	8,047
Generation Peak Summer Kw	381	4,951
Generation Peak Winter Kw	303	3,971
Water Savings	1,800	27,000
Fuel Increase	271	10,955
O+M Savings	$80,141	$559,172

Table 15: EEU Business Existing Facilities - Summary

	Prior Year 2016	Current 2017	Program to date
Participants	495	487	3,373
--- Program Costs ---			
BED Administration Costs			
General	$111,543	$178,004	$2,146,023
Implementation	$0	$2,243	$1,147,491
Planning	$0	$0	$46,156
Marketing	$6,414	$4,738	$133,808
IT Development	$0	$0	$76,619
	$117,957	**$184,985**	**$3,550,096**
BED Service Costs			
Participants	$315,150	$319,387	$3,554,531
Trade Allies	$0	$0	$6,780
	$315,150	**$319,387**	**$3,561,311**
BED Incentive Costs			
Participants	$632,626	$640,711	$7,729,247
Trade Allies	$0	$521	$35,356
	$632,626	**$641,232**	**$7,764,603**
BED Total Costs	**$1,065,733**	**$1,145,604**	**$14,876,010**
Evaluation Costs	**$41,966**	**$40,112**	**$633,002**
Participant Costs	**$1,375,037**	**$1,394,137**	**$17,486,182**
Total Program Costs	**$2,482,736**	**$2,579,853**	**$32,995,194**
--- Benefits ---			
Annualized mWh	3,568	3,132	68,346
Lifetime mWh	31,540	41,244	858,693
Winter peak Kw	298	303	9,217
Summer Peak Kw	329	381	8,341
mWh / Participant	7	6	20
Weighted Lifetime	9	13	13

Table 16: EEU Business Existing Facilities - End Use Summary

Description	Participants	Gross Mwh	Net Mwh	Lifetime Net Mwh	Winter Net Kw	Summer Net Kw	MMBTU	CCF
Air Conditioning	19	701.20	771.30	10,793.67	13.54	14.34	1,129.80	1,800.00
HVAC	12	20.49	20.23	364.11	3.81	0.00	-5.50	0.00
Lighting	1009	1,956.12	2,203.98	28,164.04	275.57	366.24	-1,274.57	0.00
Motors	1	1.94	2.18	2.18	0.44	0.00	0.00	0.00
Other Efficiency	1	1.87	1.06	10.55	0.12	0.12	0.00	0.00
Refrigeration	3	2.67	1.51	13.89	0.18	0.20	0.00	0.00
Space Heating	25	60.40	68.04	1,253.83	9.29	0.05	0.00	0.00
Ventilation	2	57.00	64.20	641.98	0.00	0.00	421.00	0.00
Total		2,801.69	3,132.49	41,244.25	302.95	380.96	270.73	1,800.00

2.3 Residential Service Overview

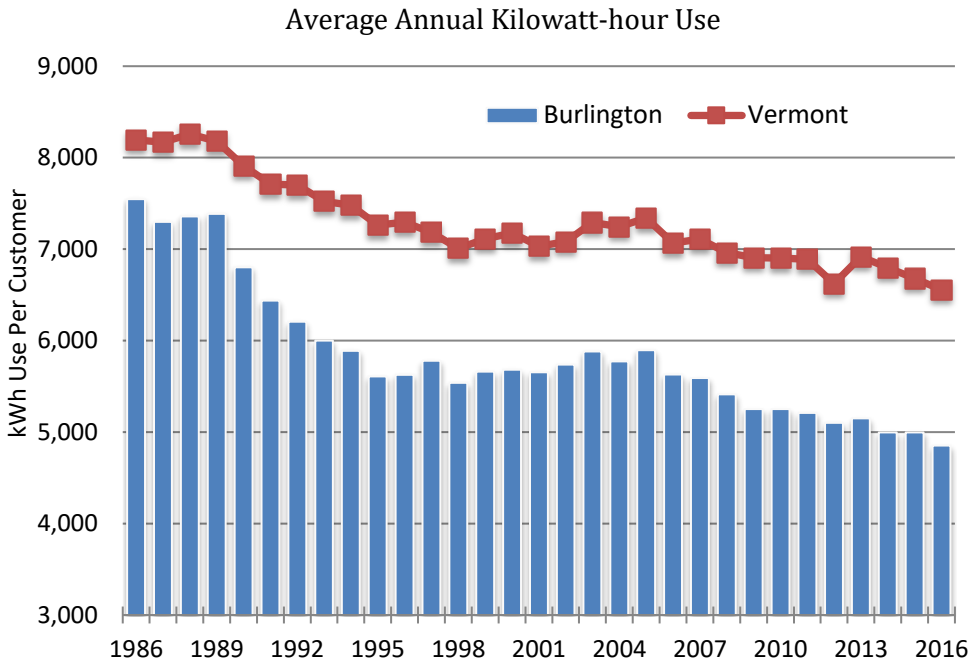
This section of the report contains information on BED's Residential EEU Services: Residential New Construction, Existing Homes, Efficient Retail Products and Thermal Energy and Process Fuels services.

In 2017, BED projected 1,864 annualized MWh residential savings while achieving annual energy savings of 2,377 MWh or 27% above the projected goal. BED's cost to deliver residential services in 2017 was $794,736 which was 83% of the projected spending of $874,017.

As BED explains in each program below, there are a number of factors that influence year to year budgets and savings projections in Burlington's residential markets.

The residential class presents particular challenges as about 60% of BED's residential customers are renters and about 85% of these customers pay their electric and natural gas heating bills directly. Rental apartments are typically smaller with fewer appliances and lighting opportunities. BED's most recent information indicates that about 95% of residential buildings use natural gas for space heating and about 85% use natural gas for domestic hot water.

BED also turns over about 35% of residential accounts each year due to the high percentage of students. Also, BED's average annual usage per residential customer (2017 monthly average was 390 kWh) continues to decline. BED's residential consumption is about **24**% less than the average Vermont residential customer, about **34**% less than the average New England residential customer and about **55**% less than the national average.



BED will continue to test all program design assumptions and pursue all strategies to make programs as cost-effective as possible. BED will also continue to focus on energy education efforts. The energy consumption information, and guidance, that is available through BED's smart grid web presentment tool (Energy Engage) is designed to encourage customers to take steps to reduce usage. The tool continues to be invaluable in helping BED staff more effectively assist customers with high bill concerns.

This software includes "dashboards" that presents energy usage details and energy efficiency- related technical advice, and efficiency program opportunities, to customers. EEU funds were not used for Energy Engage but BED believes that it provides a platform to launch other energy efficiency offerings from. Pictured below are examples of the types of information that our customers have access to:

Cut Costs

Weatherproof your windows

Re-glaze leaky, broken window panes.

More Ways to Cut Costs

Be Efficient

Manage your energy usage

Install a programmable thermostat to maintain a comfortable temperature in your home and to manage usage during the winter and summer months.

More Ways to Use Less

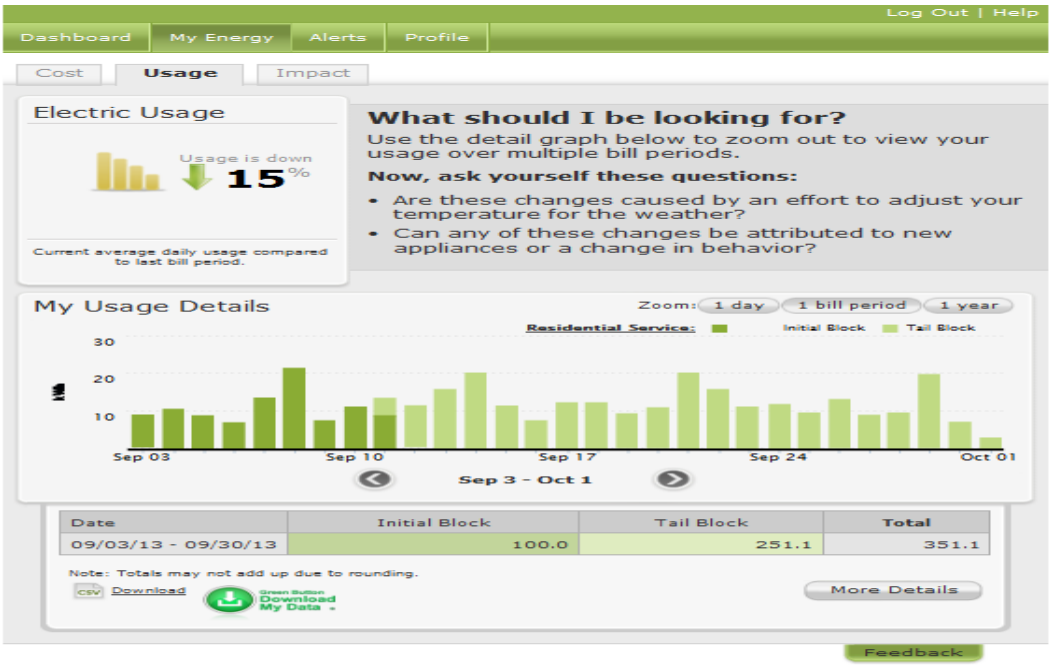
Reduce Your Impact

Plant some deciduous trees

Reduce your heating and cooling costs with an energy-efficient landscape design

.

More Ways to Go Green


Log Out | Help
Dashboard
My Energy
Alerts
Profile
Cost
Usage
Impact
Electric Usage
Usage is down
15%
Current average daily usage compared to last bill period.
What should I be looking for?
Use the detail graph below to zoom out to view your usage over multiple bill periods.
Now, ask yourself these questions:
• Are these changes caused by an effort to adjust your temperature for the weather?
• Can any of these changes be attributed to new appliances or a change in behavior?
My Usage Details
Zoom: 1 day 1 bill period 1 year
Residential Service: Initial Block Tail Block
30
20
10
Sep 03
Sep 10
Sep 17
Sep 24
Oct 01
Sep 3 - Oct 1
Date | Initial Block | Tail Block | Total
09/03/13 - 09/30/13 | 100.0 | 251.1 | 351.1
Note: Totals may not add up due to rounding.
Download
Download My Data
More Details
Feedback
Cut Costs
Tune up your heating and cooling system
Hire a qualified professional to inspect and maintain your heating and cooling system.
More Ways to Cut Costs
Be Efficient
Manage your energy usage
Install a programmable thermostat to maintain a comfortable temperature in your home and to manage usage during the winter and summer months.
More Ways to Use Less
Reduce Your Impact
Plant some deciduous trees
Reduce your heating and cooling costs with an energy-efficient landscape design
.
More Ways to Go Green

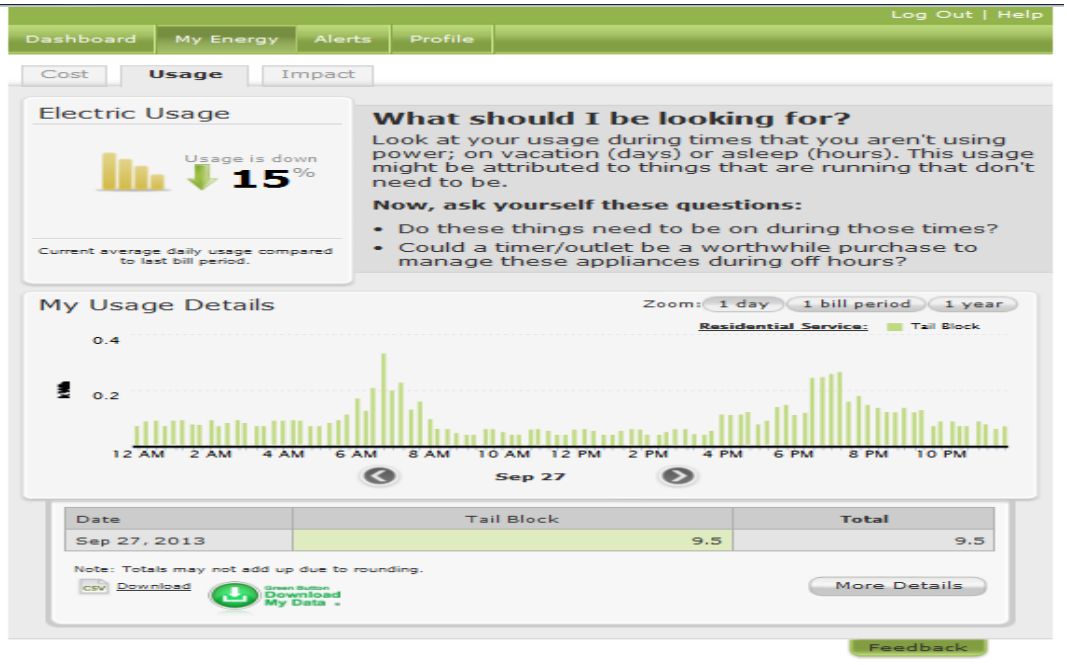

Log Out | Help
Dashboard
My Energy
Alerts
Profile
Cost
Usage
Impact
Electric Usage
Usage is down
15%
Current average daily usage compared to last bill period.
What should I be looking for?
Look at your usage during times that you aren't using power; on vacation (days) or asleep (hours). This usage might be attributed to things that are running that don't need to be.
Now, ask yourself these questions:
• Do these things need to be on during those times?
• Could a timer/outlet be a worthwhile purchase to manage these appliances during off hours?
My Usage Details
Zoom: 1 day 1 bill period 1 year
Residential Service: Tail Block
0.4
0.2
12 AM
2 AM
4 AM
6 AM
8 AM
10 AM
12 PM
2 PM
4 PM
6 PM
8 PM
10 PM
Sep 27
Date | Tail Block | Total
Sep 27, 2013 | 9.5 | 9.5
Note: Totals may not add up due to rounding.
Download
Download My Data
More Details
Feedback
Cut Costs
Hang dry your clothes
Run your dryer less and save energy by installing and using a clothes line for drying clothes.
More Ways to Cut Costs
Be Efficient
Practice daylighting
Use windows and skylights to bring natural light into your home and help reduce the need for artificial light.
More Ways to Use Less
Reduce Your Impact
Plant some deciduous trees
Reduce your heating and cooling costs with an energy-efficient landscape design
.
More Ways to Go Green

Table 17: EEU Residential - Total Resource Benefits

Avoided costs of Electricity	$2,955,756.03
Fossil Fuel Savings	$66,295.55
Water Savings	$42,914.36
TRB Total	$3,064,965.94

	Annualized	**Lifetime**
Meter MWh	2,159	31,887
Generation MWh	2,377	35,100
Meter Demand Kw	1,523	22,445
Generation Peak Summer Kw	166	2,495
Generation Peak Winter Kw	478	7,157
Water Savings	393	5,324
Fuel Increase	313	6,368
O+M Savings	$48,853	$675,871

Table 18: EEU Residential - Summary

	Prior Year 2016	Current 2017	Program to date
Participants	918	1,051	26,415
--- Program Costs ---			
BED Administration Costs			
General	$207,158	$264,819	$2,669,736
Implementation	$2,302	$760	$746,767
Planning	$0	$0	$44,709
Marketing	$7,439	$31,064	$586,930
IT Development	$0	$0	$104,371
	$216,898	**$296,642**	**$4,152,512**
BED Service Costs			
Participants	$105,346	$98,130	$1,958,403
Trade Allies	$0	$0	$4,981
	$105,346	**$98,130**	**$1,963,384**
BED Incentive Costs			
Participants	$474,809	$399,323	$5,015,485
Trade Allies	$0	$641	$34,946
	$474,809	**$399,964**	**$5,050,431**
BED Total Costs	**$797,054**	**$794,736**	**$11,166,327**
Evaluation Costs	**$17,654**	**$19,448**	**$407,537**
Participant Costs	**$633,460**	**$293,867**	**$9,823,301**
Total Program Costs	**$1,448,168**	**$1,108,051**	**$21,397,164**
--- Benefits ---			
Annualized mWh	2,029	2,377	51,976
Lifetime mWh	32,697	35,100	607,419
Winter peak Kw	385	479	12,315
Summer Peak Kw	132	165	4,947
mWh / Participant	2	2	2
Weighted Lifetime	16	15	12

Table 19: EEU Residential - End Use Summary

Description	Participants	Gross Mwh	Net Mwh	Lifetime Net Mwh	Winter Net Kw	Summer Net Kw	MMBTU	CCF
Air Conditioning	79	14.94	14.20	212.57	0.05	16.79	0.00	0.00
Clothes Drying	6	5.86	4.63	64.79	0.91	0.69	-19.98	0.00
Clothes Washing	134	25.86	30.07	391.10	4.02	3.03	13.57	354.15
Consumer Electronics	434	43.13	48.85	384.88	2.54	16.97	0.00	0.00
Custom	51	0.64	0.69	12.38	0.46	0.09	0.00	0.00
Dishwashing	4	0.12	0.14	1.83	0.02	0.01	0.48	4.60
Hot Water	63	79.38	75.68	987.56	11.68	5.95	-135.99	34.01
HVAC	81	137.77	136.01	2,447.49	26.22	0.00	-35.80	0.00
Lighting	1329	1,743.92	1,954.30	28,650.41	420.54	116.29	330.86	0.00
Refrigeration	118	49.45	49.24	763.78	4.58	5.78	0.00	0.00
Space Heating	76	53.12	57.95	1,089.63	6.76	0.00	159.45	0.00
Ventilation	22	4.57	4.94	93.89	0.56	0.56	0.00	0.00
Total		2,158.75	2,376.71	35,100.30	478.33	166.15	312.59	392.76

2.3.1 Residential New Construction

Program Description

This service aims to improve the efficiency of all new homes, and buildings undergoing substantial renovation. This includes single-family homes, multi-family homes and low-income multi-family projects. It addresses all major end uses: space heating, water heating, central cooling (if applicable), ventilation, major appliances and lighting for high use areas. Residential New Construction (RNC) encourages builders and consumers to build to the Vermont Energy Star Home standard. This standard specifies that homes meet the Energy Star performance standard (representing over 25% savings in heating, cooling and hot water consumption relative to the Vermont Residential Building Energy Standard (RBES).

The Vermont Energy Star Homes (VESH) standard is promoted to developers, architects, builders, building supply centers, equipment suppliers and consumers through a combination of marketing, technical assistance to builders, provision of energy ratings, and a package of incentives for efficient lighting fixtures, major appliances and ventilation equipment.

EVT and Vermont Gas Systems continue to do great work promoting VESH which has had direct benefits to BED. As most of the trade allies mentioned above build inside and outside of Burlington it has been helpful to have a joint program with identical participation requirements.

BED uses several additional methods to encourage participation in this sometimes difficult to influence market. These include:

- BED staff attends monthly Technical Review meetings where all new construction projects are introduced to the Burlington Planning and Zoning Department staff as part of the City's local project approval process. At these meetings BED explains the RNC program to the permit applicant and gives them

program literature. BED then forwards the project information to Vermont Wise Energy Services to follow-up with the customer. For larger multi-family projects BED staff (in partnership with Vermont Gas Systems) work directly with the property owner.

- New and revised electric service and line extension applications help us track smaller renovation projects that may have bypassed the City's permit approval process. All "ability to serve" letters from BED include information about energy efficiency services.
- BED receives a weekly electronic report from the Department of Public Works-Building Inspection Division (DPW) listing all trades permits issued.
- The Burlington DPW refers projects to BED to help them ensure compliance with RBES (and CBES) and to assess opportunities for exceeding requirements.

Program Highlights

In 2017, the majority of the savings came from smaller renovation and three single-family projects. BED has been providing technical assistance to two multi-family projects scheduled to complete in 2018.

Variance Discussion

In 2017, the RNC service achieved 17 MWh in annualized electricity savings for the year which was 22% of the projected 75 MWh goal. At $95,968, spending was 57% lower than the projected spending of $221,327.

The timing of a number of on-going new construction projects played a major role in the 2017 variance. For example, in 2016, the RNC service achieved 244 MWh in annualized electricity savings for the year which was 225% greater than the projected 75 MWh goal. At $243,590, spending was 53% higher than the projected spending of $155,873.

As BED has reported in previous Annual Reports, RNC is a difficult market to predict year to year as it only takes a few projects in Burlington to adjust savings projections and

budgets dramatically. 2017 was a relatively weak year due to a number of smaller project completions but 2018 is estimated to be a stronger year.

Program Changes

In 2018, BED, EVT and VGS will continue to assist the residential market with exceeding RBES and will also promote low-load and net-zero building practices. BED's residential new construction market is dominated by multi-family structures and most of the single-family work is with gut-rehabilitation projects so BED will continue to develop strategies to work effectively with both of these markets.

CcHP's are becoming a popular technology for market-rate multi-family new construction projects as they provide heating and cooling at a low first installation cost, especially when the owner desires to have each apartment individually metered. CCHP's are becoming a significant new program market opportunity when coupled with highly efficient thermal envelopes. But BED maintains that the technology still requires careful attention and on-going analysis. BED will continue to study the energy usage of the ccHP buildings to evaluate the pros and cons of installing ccHP systems in new construction, including whether these systems are cost effective and if peak load requirements begin to rise, especially when electric resistance baseboard heat is used as a back-up heating source.

BED also continues to promote high performance thermal envelope approaches such as Passive House. Passive House is a different approach to cost-efficiently reducing heating and cooling loads through super-tight building envelopes. In 2015 and 2016, BED hosted three separate workshops on the Passive House (PH) design approaches.

Table 20: EEU Residential New Construction - Total Resource Benefits

Avoided costs of Electricity	$125,794.07
Fossil Fuel Savings	$36,773.44
Water Savings	$3,273.27
TRB Total	$165,840.77

	Annualized	**Lifetime**
Meter MWh	16	284
Generation MWh	17	302
Meter Demand Kw	50	872
Generation Peak Summer Kw	15	372
Generation Peak Winter Kw	4	62
Water Savings	29	407
Fuel Increase	140	3,717
O+M Savings	($66)	($1,290)

Table 21: EEU Residential New Construction - Summary

	Prior Year 2016	Current 2017	Program to date
Participants	5	12	454
--- Program Costs ---			
BED Administration Costs			
General	$28,173	$64,825	$397,629
Implementation	$0	$0	$96,638
Planning	$0	$0	$11,195
Marketing	$2,207	$1,099	$93,264
IT Development	$0	$0	$34,345
	$30,380	**$65,924**	**$633,070**
BED Service Costs			
Participants	$39,016	$24,539	$643,925
Trade Allies	$0	$0	$2,700
	$39,016	**$24,539**	**$646,625**
BED Incentive Costs			
Participants	$174,195	$5,505	$610,958
Trade Allies	$0	$0	$2
	$174,195	**$5,505**	**$610,960**
BED Total Costs	**$243,590**	**$95,968**	**$1,890,655**
Evaluation Costs	**$4,160**	**$4,925**	**$62,096**
Participant Costs	**$33,295**	**$10,529**	**$349,643**
Total Program Costs	**$281,045**	**$111,421**	**$2,302,394**
--- Benefits ---			
Annualized mWh	244	17	1,658
Lifetime mWh	4,955	302	28,585
Winter peak Kw	21	4	340
Summer Peak Kw	8	15	300
mWh / Participant	49	1	4
Weighted Lifetime	20	18	17

Table 22: EEU Residential New Construction - End Use Summary

Description	Participants	Gross Mwh	Net Mwh	Lifetime Net Mwh	Winter Net Kw	Summer Net Kw	MMBTU	CCF
Air Conditioning	8	2.93	3.46	86.45	0.00	14.10	0.00	0.00
Clothes Drying	6	5.86	4.63	64.79	0.91	0.69	-19.98	0.00
Clothes Washing	4	0.76	0.98	13.73	0.14	0.10	0.32	24.80
Dishwashing	4	0.12	0.14	1.83	0.02	0.01	0.48	4.60
Lighting	5	2.03	2.16	20.46	0.77	0.21	0.00	0.00
Refrigeration	7	1.05	1.19	20.17	0.13	0.17	0.00	0.00
Space Heating	8	2.20	2.60	65.05	1.37	0.00	159.45	0.00
Ventilation	4	1.33	1.57	29.82	0.18	0.18	0.00	0.00
Total		16.28	16.72	302.28	3.52	15.46	140.27	29.40

2.3.2 Existing Homes

Program Description

This service aims to improve the efficiency of all residential existing buildings (REB) including low-income single family, market-rate single-family and all multi-family projects (market-rate and low-income). BED offers the same existing homes service as Efficiency Vermont (EVt) and also works closely with Vermont Gas Systems (VGS) and the Champlain Valley Weatherization Service (CVWS) on many of its projects.

The REB program targets both market driven and discretionary, early replacement/retrofit opportunities. Additionally, the program serves as a point of contact for customers seeking advice about electric vehicles; electric vehicle charging equipment and other transportation related measures, as well as cold climate heat pumps.

Low-income buildings are addressed by a partnership with the state's Low-income Weatherization Assistance Program (WAP). This partnership provides electric efficiency measures to Burlington's low-income electricity consumers. Electrical efficiency measures are delivered to income-eligible electric customers at the time they receive thermal shell, space heating and water heating improvements from CVWS.

This service also works closely with high usage households for energy efficiency improvements that can significantly reduce their energy bills. On-site energy audits, customer energy education, appliance meter loans, technical assistance, project management and cash incentives are all part of this service.

BED and VGS continued collaboration working with the private (market-rate) rental housing market (customers not eligible for low-income energy services) to increase both participation and the depth of savings per participant. Traditionally, renters (60% of Burlington's residential customers are renters) have not been strong participants and the same holds true for property-owners where the tenants pay the energy bills directly which is the case in about 85% of Burlington's dwellings.

The "Rental Properties Owners" service offers free tank wraps (electric tanks only), pipe insulation, water saving devices, enhanced rebates for the early retirement of eligible refrigerators, incentives for improving mechanical ventilation along with up to six free screw-in LED's per apartment.

This service provides savings directly to the tenant but also water savings, and potential maintenance savings via controlled ventilation fans to the property owner. This service allows us the opportunity to develop long-lasting relationships with property-owners to help identify further savings from refrigeration replacements, common area lighting and laundry equipment improvements, weatherization and ventilation.

Program Highlights

In 2017, 12 fuel switch projects were completed. 10 electric hot water tanks were switched to natural gas and 2 dwellings replaced electric heat with natural gas space heating equipment. Starting in 2018, BED will no longer be supporting fuel switch incentives as it runs counter to BED's net-zero energy city and Tier 3 goals.

In 2017, 394 LED lighting products were installed, 138 high efficiency circulator pumps for boilers were installed, 25 refrigerators were retired early and replaced with ENERGY STAR models and BED also provided 33 water saving devices.

Variance Discussion

REB achieved 258 MWh in annualized electricity savings for the year, 31% less than the projected goal of 373 MWh. At $208,080 spending was 25% less than BED's projected spending of $276,335.

About 95% of BED's residential customers use natural gas for space heating and about 85% use it for domestic hot water. At current electric and natural gas rates, switching to electric heat pump technology would increase most customers' annual energy costs. BED will continue to leverage common area energy savings, building water savings, and

ice dam and moisture damage solutions for property-owners as part of the service to help develop long-term relationships with building owners.

Because 60% of BED's customers are renters, expanding and refining the existing homes program to actively target multifamily (MF) buildings will continue to be a priority. However, because MF electric bills are relatively small (321 kWh per month on average) compared to the cost of space and water heating with natural gas, the program will focus on a whole building, all-fuels marketing approach to motivate customers to take action. Identifying electrical opportunities alone simply won't produce the savings necessary to make the customer's effort worthwhile. Accordingly, BED and VGS will continue with the ***energyChamp*** collaboration.

energyChamp (EC) was designed to encourage more residential customers to participate in available efficiency programs. The joint effort with VGS was born from the idea that the two utilities are stronger working together than separately. EC offers customers a one-stop option to help them take a more complete look at their total energy picture including the thermal shell, HVAC, lighting, appliances along with solutions for comfort or moisture related issues. More information about the ECC is available at: https://energychamp.org/

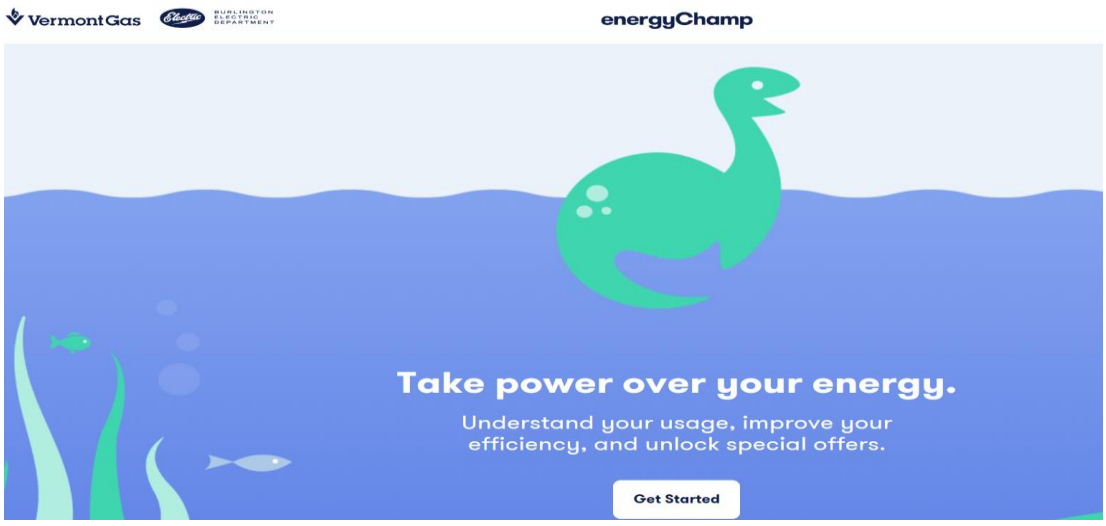


Table 23: EEU Residential Existing Homes - Total Resource Benefits

Avoided costs of Electricity	$312,038.82
Fossil Fuel Savings	($27,774.93)
Water Savings	$2,718.12
TRB Total	$286,982.01

	Annualized	**Lifetime**
Meter MWh	266	4,452
Generation MWh	258	4,353
Meter Demand Kw	72	1,128
Generation Peak Summer Kw	6	84
Generation Peak Winter Kw	43	713
Water Savings	35	317
Fuel Increase	-172	-2,495
O+M Savings	$372	$3,472

Table 24: EEU Residential Existing Homes - Summary

	Prior Year 2016	Current 2017	Program to date
Participants	141	236	9,132
--- Program Costs ---			
BED Administration Costs			
General	$36,716	$36,397	$1,362,036
Implemntation	$2,302	$477	$559,589
Planning	$0	$0	$19,067
Marketing	$1,156	$1,300	$315,325
IT Development	$0	$0	$47,283
	$40,174	**$38,174**	**$2,303,301**
BED Service Costs			
Participants	$66,276	$73,445	$985,111
Trade Allies	$0	$0	$0
	$66,276	**$73,445**	**$985,111**
BED Incentive Costs			
Participants	$59,354	$96,461	$1,838,209
Trade Allies	$0	$0	$34,277
	$59,354	**$96,461**	**$1,872,485**
BED Total Costs	**$165,803**	**$208,080**	**$5,160,897**
Evaluation Costs	**$6,747**	**$6,149**	**$224,584**
Participant Costs	**$39,292**	**$18,748**	**$5,143,410**
Total Program Costs	**$211,842**	**$232,976**	**$10,528,892**
--- Benefits ---			
Annualized mWh	226	258	21,463
Lifetime mWh	3,507	4,353	331,192
Winter peak Kw	38	43	5,911
Summer Peak Kw	9	6	1,003
mWh / Participant	2	1	2

Table 25: EEU Residential Existing Homes - End Use Summary

Description	Participants	Gross Mwh	Net Mwh	Lifetime Net Mwh	Winter Net Kw	Summer Net Kw	MMBTU	CCF
Clothes Washing	1	0.11	0.13	1.75	0.02	0.02	0.15	0.75
Consumer Electronics	25	1.99	2.21	13.34	0.11	0.26	0.00	0.00
Custom	51	0.64	0.69	12.38	0.46	0.09	0.00	0.00
Hot Water	36	34.50	19.95	263.08	3.04	1.55	-135.99	34.01
HVAC	79	137.69	135.92	2,446.57	26.18	0.00	-35.80	0.00
Lighting	109	15.15	17.76	217.22	5.12	1.42	0.00	0.00
Refrigeration	34	21.44	22.57	310.27	2.11	2.66	0.00	0.00
Space Heating	68	50.92	55.35	1,024.58	5.39	0.00	0.00	0.00
Ventilation	18	3.24	3.37	64.07	0.38	0.38	0.00	0.00
Total		265.67	257.94	4,353.25	42.79	6.37	-171.64	34.76

2.3.3 Retail Products

Program Description

The Efficient Products (EP) service aims to increase sales of ENERGY STAR® qualified lighting products, and appliances such as clothes washers, refrigerators, freezers, ceiling fans, room air conditioners, dehumidifiers and a number of consumer electronics. This is accomplished primarily through sales at retail stores with on-site and mail-in consumer rebates, but also by arranging retailer buy-downs and manufacturer mark-downs.

EP also promotes advanced power strips for home entertainment centers and controls for computers' internal power supplies. These incentives are intended to entice consumers by lowering the cost of efficient products. EP uses a variety of marketing and promotion efforts in addition to its prominently displayed in-store rebate coupons including a catalog, and an on-line purchase web site in order to build consumer awareness and participation in the program.

Program Highlights

In 2017 alone, BED customers purchased 36,471 LED and CFL bulbs, 75 ENERGY STAR® clothes washers, 41 ENERGY STAR® clothes dryers, 60 ENERGY STAR® refrigerators and freezers, 50 ENERGY STAR® dehumidifiers and 533 efficient consumer electronic devices such as ultra-efficient LCD computers monitors, efficient televisions and controlled power strips.

Variance Discussion

Savings of 2,102 annualized MWh exceeded the projection of 1,416 annualized MWh for 2017 by 48%. Annual expenditures were $490,689 which is about 30% higher than the projected budget of $376,355. EP's promotion of higher quality LED's drove the higher program spending.

Program Changes

2017 will see a continued focus on promoting specialty LED bulbs and appliances that are the most efficient within the ENERGY STAR rating. These products include: refrigerators, clothes washers, dehumidifiers, pool pumps and consumer electronics. 2017 will also see the continued promotion of high efficiency circulator pumps and air source heat pump water heaters (a limited market in Burlington due to the high saturation of natural gas).

To continue to drive demand for efficient products, BED and EVT will continue to launch various promotions designed to help raise awareness about new, innovative and emerging technologies that not only reduce energy consumption but also result in numerous non-energy benefits (i.e. improved comfort, lower operating costs and water savings). Promotions may include, for example, point of purchase marketing material, special events, co-branding and cooperative advertising, and sales force training.

Table 26: EEU Efficient Products - Total Resource Benefits

Avoided costs of Electricity	$2,517,923.14
Fossil Fuel Savings	$57,297.04
Water Savings	$36,922.97
TRB Total	$2,612,143.16

	Annualized	**Lifetime**
Meter MWh	1,877	27,151
Generation MWh	2,102	30,445
Meter Demand Kw	1,401	20,445
Generation Peak Summer Kw	144	2,039
Generation Peak Winter Kw	432	6,382
Water Savings	329	4,600
Fuel Increase	344	5,146
O+M Savings	$48,547	$673,689

Table 27: EEU Efficient Products - Summary

	Prior Year 2016	Current 2017	Program to date
Participants	772	803	16,829
--- Program Costs ---			
BED Administration Costs			
General	$142,269	$163,596	$910,071
Implementation	$0	$283	$90,539
Planning	$0	$0	$14,447
Marketing	$4,076	$28,665	$178,341
IT Development	$0	$0	$22,742
	$146,344	**$192,544**	**$1,216,141**
BED Service Costs			
Participants	$55	$146	$329,366
Trade Allies	$0	$0	$2,281
	$55	**$146**	**$331,647**
BED Incentive Costs			
Participants	$241,260	$297,357	$2,566,319
Trade Allies	$0	$641	$667
	$241,260	**$297,998**	**$2,566,986**
BED Total Costs	**$387,660**	**$490,689**	**$4,114,774**
Evaluation Costs	**$6,747**	**$8,374**	**$120,857**
Participant Costs	**$560,873**	**$264,591**	**$4,330,248**
Total Program Costs	**$955,280**	**$763,654**	**$8,565,879**
--- Benefits ---			
Annualized mWh	1,559	2,102	28,855
Lifetime mWh	24,235	30,445	247,642
Winter peak Kw	326	432	6,064
Summer Peak Kw	115	144	3,644
mWh / Participant	2	3	2
Weighted Lifetime	16	14	9

Table 28: EEU Efficient Products - End Use Summary

Description	Participants	Gross Mwh	Net Mwh	Lifetime Net Mwh	Winter Net Kw	Summer Net Kw	MMBTU	CCF
Air Conditioning	71	12.01	10.74	126.13	0.05	2.69	0.00	0.00
Clothes Washing	129	24.99	28.96	375.62	3.86	2.91	13.10	328.60
Consumer Electronics	409	41.14	46.64	371.54	2.44	16.71	0.00	0.00
Hot Water	27	44.88	55.73	724.48	8.64	4.39	0.00	0.00
HVAC	2	0.08	0.09	0.93	0.05	0.00	0.00	0.00
Lighting	1215	1,726.75	1,934.38	28,412.73	414.65	114.66	330.86	0.00
Refrigeration	77	26.95	25.49	433.34	2.34	2.95	0.00	0.00
Total		1,876.80	2,102.04	30,444.77	432.02	144.32	343.96	328.60

3 Thermal Energy and Process Fuels Activity (TEPF) (Residential and Commercial)

Program Description

This BED service provides thermal shell (aka weatherization upgrades) and heating system energy efficiency services specifically to customers who use unregulated fossil fuel (oil, LP gas and wood) for their heating energy needs. This service is funded by revenues from the ISO-NE Forward Capacity Market (FCM) and Regional Greenhouse Gas Initiative (RGGI) auction proceeds. Currently, these funds cannot be used for natural gas customers.

BED and EVT established a working partnership in early 2009 that serves BED's TEPF customers. BED customers have access to the same services and incentives as those customers in the rest of the state including:

- **Home Performance with ENERGY STAR-** The EEU's collaborate to deliver TEPF savings to residential customers through a network of Building Performance Institute (BPI) certified contractors installing comprehensive home energy thermal improvements.

- **Replacement of Commercial Heating Systems –** BED customers are eligible for the same incentives as EVt customers for the installation of oil and propane boilers and furnaces in commercial buildings. BED and EVt share the same rebate form which helps to inform all contractors and distributors that this is a statewide offer. BED estimates that this is a very small market within Burlington as over 98% of commercial buildings are served by natural gas.

- **Commercial Building Performance-** Technical assistance and incentives to assist small businesses property owners in improving the insulation and comfort of their buildings. Energy audits and improvements are performed by a participating Building Performance Institute (BPI) certified contractor.

Program Highlights

There were four residential completions in 2017 with total savings of 131 MMBTU's. The projects consisted of four single-family, owner-occupied, oil heated homes. BED achieved 30% of the residential annual savings goal. BED spent $55,655 in 2017, 55% of the $100,284 annual budget.

Since the program began in 2009, there have been sixty-two projects completed in Burlington with total savings of 1,263 MMBTU's (the eighteen units at Redrocks Phase 2 have participated twice but BED only counts the unit completions once).

Variance Discussion

The limited unregulated fossil fuel market, as well as the housing characteristics of the potential unregulated fuels market, has presented challenges in attracting participants. The unregulated fossil fuel residential market is small in Burlington due to the high saturation of natural gas. BED's newest information shows that about 95% of residential buildings use natural gas for space heating and about 85% for domestic hot water. BED has been able to recently refine the estimated TEPF market figures with the help of VGS and the City Assessor's property database.

BED's current best estimate is that there are about 400 homes in the TEPF market. This includes 110 mobile homes at the North Avenue Cooperative. The remaining market is made up of homes that are predominately located in the more affluent Burlington neighborhoods where the properties have been relatively well maintained and updated over the years.

2015-2017 Three-year Performance Period Results –

For the 2015-2017 three-year EEU performance cycle, BED met 30% of MMBTU savings projections. BED projected 1,350 MMBTU savings and achieved 408. BED's budget for the 2015-2017 cycle was $338,898 and $134,961 was expended, about 60% less than budgeted.

Table 33 (page 66) show BED's overall results for the TEFF 2015-2017 "Minimum Performance Requirements" and the "Quantifiable Performance Indicators" as approved by the PUC.

Program Changes

As BED describes in detail in its 2018-2020 Triennial Energy Efficiency Utility Plan (filed with the VT-PUC November 16, 2017), starting in 2018, BED's TEPF programs will be comprised of three main components designed to continue existing services and take advantage of new opportunities. The components include:

- Traditional programs as described above;
- District Energy Services (DES); and,
- Advanced Manufactured Homes (a/k/a Zero Energy Modular or ZEM)

Regarding DES, BED has been actively working with community leaders, businesses, residents and an internationally recognized district energy firm (Corix Utilities) to construct a District Energy System (DES) in the City. On September 28, 2016, the City of Burlington and Burlington Electric Department announced a partnership with key potential DES customers to renew efforts to bring district energy to Burlington. BED is exploring using TEPF funds to support a DES system from the McNeil bio-mass plant.

Regarding ZEM, the objective of this pilot program is to utilize TEPF funds to provide financial and technical support to income qualified customers seeking to purchase hyper-efficient modular homes. The program will focus primarily on the residents/owners of the North Avenue Cooperative (NAC).

NAC is Burlington's only trailer home park and consists of about 110 homes heated by LP or kerosene. Many of the homes are very old and ready to be replaced. BED, and partners (CEDO, CVOEO, VEIC and CHT) are exploring the financial viability of introducing high performance modular homes to the residents. These homes can be net-zero energy which would eliminate fossil fuel usage and have a significant financial impact for customers when compared to existing energy costs.

Table 29: Thermal Energy and Process Fuels Activity

Period Costs for TEPF Savings	**Residential**	**Commercial**	**Total**
Year to Date Costs	$55,512	$143	$55,655
Annual Budget	$95,270	$1,254	$100,284
% of Annual Budget	58%	3%	55%
Energy Savings Results			
MMBTU Year to Date	131	0	131
MMBTU Annual Goal	400	42	442
% of MMBTU Annual Goal	33%	0%	30%
Progress Towards MMBTU 3-Year Goals			
MMBTU Cumulative to Date	408	2	410
3-Year MMBTU Goal	1,350	120	1,470
% of 3-Year MMBTU Goal	30%	2%	28%

TEPF NON-RESOURCE ACQUISITION

	Year to Date Costs	**Annual Budget**	**% of Annual Budget**
Education and Training	$1,014	$2,700	44%
Applied Research and Development	$146	$1,000	35%
Planning and Reporting	$2,661	$1,300	60%
Evaluation	$505	$800	44%
Policy and Public Affairs	$291	$1,000	35%
Information Technology	$433	$800	62%
General Administration	$1.157	$3,600	21%
	$6,207	**$11,200**	**55%**

4 Appendix

4.1 Definition and End Notes

Tables 30 and 31 are templates to help explain the appropriate footnotes for each program and summary table throughout this report.

Table 30: Summary Report Table Template

	Prior Year	Current Year 2015	Projected Year 2015	Projected Year 2015	Program To Date
		(1)	(2)		(3)
Participants	(4)				
Program Costs					
BED Administration Costs	(9)				
General	(10)				
Implementation	(11)				
Planning	(12)				
Marketing	(13)				
IT Development	(14)				
BED Service Costs	(15)				
Service to Participants	(16)				
Service to Trade Allies	(17)				
BED Incentive Costs	(18)				
Participants	(19)				
Trade Allies	(20)				
BED Total Costs	(8)				
Evaluation Costs	(23)				
Participant Costs	(21)				
Total Program Costs	(26)				
Benefits					
Annualized MWh	(27)				
Lifetime MWh	(28)				
Winter Peak KW	(29)				
Summer Peak KW	(30)				
MWh/Participant	(31)				
Weighted Lifetime	(32)				

Table 31: End Use Report Table Template

Description	Participants	Gross MWh	Net MWh	Lifetime MWh	Winter Net KW	Summer Net KW	MMBTU	CCF
	(33)	(35)	(36)	(34)	(37)	(38)	(39)	(40)

Footnotes for the report table templates:

(1) Verified activity for the current reporting year. For savings this figure will be the estimated savings for measures actually implemented and verified for the current report period. Savings should be reported in MWH, at generation and net of all approved adjustment factors, except as otherwise noted.

(2) Estimated portion of the three-year savings and costs projected for the current report year. This footnote should identify the source of the projections. Projections for categories footnoted (4) to (7), (21) to (26) and (28) to (32) will be provided if available.

(3) Program to date activity. For participation [(4) to (7)], the program to date column should count each customer (premise) only once, regardless of participation in previous years. The executive summary should count each customer (premise) only once, even if a customer was served by more than one program.

(4) Number of customers with verified installations during the current report period. Customer is defined as a unique premise as defined by the utility, with one exception. For master-metered, multifamily buildings, customer is defined as a dwelling unit.

(8) Total costs incurred by Burlington Electric Department during the current report period. All costs in nominal dollars, (9) + (15) + (18).

(9) Subtotal of all administrative costs detailed in the categories below, (10) + (11) + (12) + (13) + (14).

(10) Costs include general management, budgeting, financial management and legal costs directly associated with program implementation (such as contract review).

(11) Implementation management and administrative costs include costs related to business development and customer service, data management, and other program administrative costs directly related to implementation.

(12) Costs related to program design and planning, program screening and other similar functions.

(13) Costs related to marketing and outreach.

(14) IT development and maintenance costs do not need to be broken out by program, i.e., this category may be filled in only on the executive summary page.

(15) Subtotal reflecting total implementation costs, (16) + (17).

(16) Costs related to conducting audits or analyses, preparing the package of efficiency measures, contract management and post project follow up.

(17) Costs related to educational or other support services provided to entities other than individual program participants, such as trade allies, manufacturers, wholesalers, builders, and architects.

(18) Subtotal reflecting total incentive costs, (19) + (20).

(19) Direct payments made to participants to defray the costs of specific efficiency measures. If a program employs a shared savings mechanism or loan system, this category should include the utility share of the measure and carrying costs projected over the payment period, net of all projected participant payments.

(20) Incentives paid to manufacturers, wholesalers, builders, or other stakeholders.

(21) Total costs incurred by participants related to BED activities during the current report period. This category includes the participant contribution to the capital costs of installed measures and to specific DSM-related services, such as technical assistance or energy ratings.

(23) Evaluation costs, excluding tracking and reporting expenditures.

(24) Total program costs, (8) + (21) + (22) + (23).

(26) Total expenditures associated with the delivery of direct services to participants and trade allies, including all BED, participant and third party costs.

(27) Annualized MWH savings at generation and net of all approved adjustment factors (e.g., free riders, spill over) for measures installed and verified during the current report period.

(28) The lifetime estimated MWH savings for measures installed and verified during the current reporting year, at generation and net of all approved factors. (Estimated annualized savings times the life of the measure).

(29) Estimated impact of measures at time of winter system peak, at generation, net of adjustment factors.

(30) Estimated impact of measures at time of summer system peak, at generation, net of adjustment factors.

(31) Annualized MWH savings per participant, net at generation, i.e., (27) / (4).

(32) Average lifetime, in years, of measures in the program weighted by savings, i.e., (28)/(27).

(33) Number of customers with verified installations of measures within the end use, utility grouping.

(34) The total annualized MWH saved, at generation, net of adjustment factors, should add up to the savings reported in the line item footnoted as (27).

(35) The total lifetime MWH saved, at generation, net of adjustment factors, should add up to the savings reported in the line item footnoted as (28).

(36) The total annualized MWH saved, gross at the customer meter.

(37) The total winter coincident KW, at generation, net of adjustment factors, should add up to the savings reported in the line item footnoted as (29).

(38) The total summer coincident KW, at generation, net of adjustment factors, should add up to the savings reported in the line item footnoted as (30).

(39) Total MMus estimated to be saved (positive) or used (negative) for alternative fuels as a result of measures installed in the end use.

(40) Total water saved (CCF) (positive) or used (negative) due to measures installed in the end use.

4.2 2015-2017 Quantifiable Performance Indicators (QPI) / Minimum Performance Requirements (MPR) Results

Table 32: BED's 2015-2017 Electric QPI and MPR Results

QPI#	Title	Performance Indicator	Target	Policy Goal Advanced	Results as of 12/31/2017
1	Electricity Savings	Annual incremental net MWh expected savings	22,364	Annual incremental MWh savings indicator intended to encourage EEUs to design and implement efficiency initiatives that will maximize electrical energy savings	BED achieved 86% of the goal
2	Total Resource Benefits	Present worth of lifetime electric, fossil, and water expected benefits	25,036,087	Encourage EEUs to design and implement efficiency initiatives that will maximize the lifetime electric, fossil fuel, and water benefits	BED achieved 99% of the goal with a TRB value of $24,821,366
3	Summer Peak Demand Savings	Cumulative net summer peak demand expected savings	3,205	Cumulative summer peak demand savings indicator intended to encourage EEUs to design and implement efficiency initiatives that will maximize the capacity reduction coincident with peak summer demand	BED achieved 58% of the goal
4	Winter Peak Demand Savings	Cumulative net winter peak demand expected savings	3,311	Cumulative winter peak demand savings indicator intended to encourage EEUs to design and implement efficiency initiatives that will maximize the capacity reduction coincident with peak winter demand	BED achieved 76% of the goal
5	Long-term Market Transformation	On bill financing of electric efficiency measures and projects to commerical customers and non-owner occupied residential real estate investors	Standard OBF applications: 50 Multi-family OBF Applications: 10	Encourage EEUs to design and implement efficiency initiatives that maximize market transformation	BED did not full achieve this goal. There were 55 overalll OBF applications but only 1 Multi-family. However, OBF has leveraged about $800K of energy improvment projects.
6	Business Comprehensiveness of Savings	Increse the average kWh savings per Business Existing Facilities participant	Average depth of savings equal to 8% relative to the average BEF participant's electric load during the 12 month period ending December 31, 2014	Intended to ensure that energy efficiency initiatives are designed and implemented to acquire comprehensive savings	BED achieved 70% of the goal
7	Minimum Electric Benefits (Equity for all Electric Ratepayers)	Total electric benefits divided by total costs	Equal or greater than 1.2 benefit/cost ratio	Equity for all Vermont electric customers as a group by assuring that the overall electric benefits are greater than the costs incurred to implement and evaluate the *EEU* and the *EEC*	BED has achieved this goal with a cost benefit ratio of 3.2 over the three-year period (avoided cost of electricity / BED program costs + evaluation costs)
8	Equity for Residential Ratepayers	A minimum level of overall efficiency efforts, as reflected in spending, will be dedicated to residential customers	$1.3 million	Equity for residential customers by assuring that a minimum level of overall efficiency efforts, as reflected in spending, will be dedicated to residential customers	BED has achived this goal with $2,447,924 in spending over the three-year period
9	Equity for Low-income Customers	A minimum level of overall efficiency efforts, as reflected in spending, will be dedicated to Low-income customers	$137,000	Equity for low-income customers by assuring that a minimum level of overall efficiency efforts, as reflected in spending, will be dedicated to low-income households	BED has achived this goal with over $287,716.20 in spending over the three-year period
10	Equity for Small Business Customers	Number of total non-residential premises with annual electric use 40,000 kWh/yr or less participating in energy efficiency programs.	225	Equity for small business customers by assuring that a minimum level of overall efficiency efforts, as reflected in participation, will be dedicated to small business accounts	BED has achived this goal with 681 participants over the three-year period
11	Program Implementation Efficiency -	Meet pre-determined milestones on schedule	a.) Indentify and submit to the DPS business processes for assessment by January 31 of each year b.) Report baseline performance and target levels for improvement to the DPS by December 31 of each year in the DRP	This indicator is intended to encourage the program administrator to continually assess its operations to continue to deliver services that maximize ratepayer value	BED met pre-determined milestones on schedule

NOTES - QPIs 7 through 11 are minimum performance requirements (MPR).

Table 33: BED's 2015-2017 TEPF QPI and MPR Results

PI #	Definition	Performance Indicator	Target	Results as of 12/31/2017
1	Thermal & Mechanical Energy Efficiency Savings (Residential and Commercial)	Incremental net MMBTU savingns (3Yr total)	1470 MMBTU	BED did not achieve this goal with savings of 410 MMBTU
PI #	**Definition**	**Performance Indicator**	**Target**	
2	Residential single family comprehensiveness	1) Air leakage reduction 2) Percent if households with both shell and heating systems measures installed within contiguous calendar years	1) 34% reduction per project 2.) 16% of premises	1) 37% reduction on average over the 3-year period 2.) Did not met this target due to the high percantage of water based systems in B-ton
MPR#	**Definition**	**Performance Indicator**	**Target**	
1	Equity for Residential Customers	Minimum level of overall efficiency, as reflected in spending, is dedicated to residential customers or 95% of total budget ($294,000), less 70% performance metric cap	$195,500	BED achieved this goal as over 98% of total program spending went to the residential class