

BURLINGTON ELECTRIC DEPARTMENT

2013 Energy Efficiency Annual Report



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1 Introduction & Summary

2013 Highlights & Overview

The Burlington Electric Department (BED) is pleased to submit the following report to the Burlington Electric Commission, the Vermont Public Service Board and the Vermont Department of Public Service, summarizing the implementation of energy efficiency programs in the City of Burlington for the year 2013. 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 that is described in its 2012 Integrated Resource Plan.

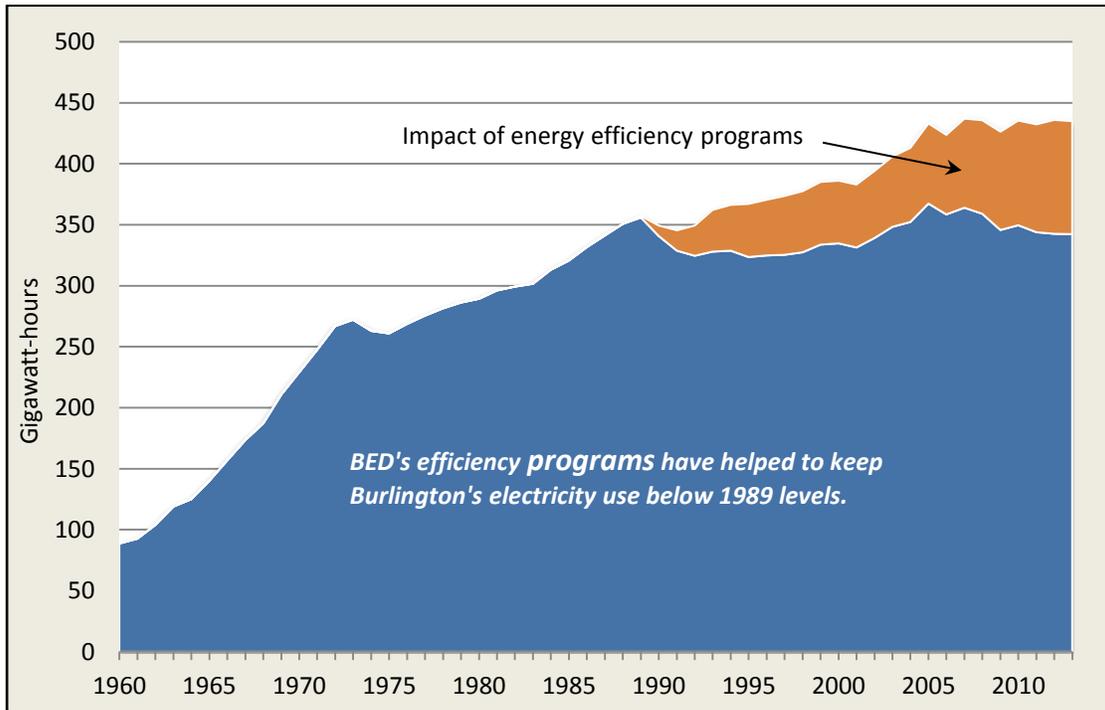
Energy efficiency has been clearly shown to be Vermont's least expensive future energy supply resource over time, and is every day a greater environmental imperative. The Burlington Electric Department is owned by all the citizens of Burlington, who have been unequivocally clear that the option for future 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 \$45 million has been invested in energy efficiency efforts sponsored by BED over the last 24 years. This is comprised of about \$21.2 million spent by BED on all of its energy efficiency efforts during that period, combined with another \$23.5 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. Annual electricity consumption in 2013 was about 5.3% lower than in 1989 (it was 5.3% lower than 1989 in 2012, 4.7% lower in 2011 and 2% greater in 2010 and 2009). During the same 2013 period, statewide use of electricity increased by 9%. It is important to recognize that population growth was similar for Burlington and the state (8% v. 11% respectively), but statewide job growth was greater than Burlington's (17% v. 5%) which can explain some portion of the variance. However, the consistent delivery of affordable energy efficiency services has helped to meet the needs of a growing local economy over the last 24 years with less electricity than was used then! As a result, energy efficiency investments save Burlington consumers about \$10 million of retail electric costs annually.

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 2013 alone, BED saved 7,006 Megawatt hours (MWh) of energy from efficiency measures installed, which will result in 82,273 MWh of savings over the useful life of the installed measures (2013 measures have a weighted average lifetime of 12 years). This is equivalent to providing energy to about 1,350 average Burlington residential customers for 12 years. During 2013, total BED program spending was \$1,989,886 and participating customers spent an additional \$1,793,500 of their own to fund energy efficiency investments in their homes and businesses.

Harder to quantify, but of increasing importance to the ratepayers of Burlington are the environmental impacts avoided by decreasing the need for electricity. Thanks to the energy savings (7,006 MWh) generated by energy efficiency programs in 2013 alone, Burlington will have avoided the release of about 45,745 tons of carbon dioxide (CO₂).

Considering the difficult economic conditions that customers have been experiencing over the past several years, BED is encouraged that it met 95% of savings projections in 2013. BED projected 7,334 MWh savings and achieved 7,006 MWh. BED's projected budget for 2013 was \$2,059,624 and \$1,989,886 was spent, about 3% less than projected.

BED's cost for saved energy was slightly higher than projections. BED estimated it would spend \$280 per annualized MWh saved, and instead spent \$284 per annualized MWh. BED's administrative costs as a percentage of total program costs remained consistent with historical performance; about 15% of the budget was used to defray program operation costs. 85% was spent on direct technical assistance and incentives to customers.

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 small size of BED's system, the loss of only a few new construction projects 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 Plan of 2012 and prior planning documents dating back more than 20 years.

This report includes coverage of BED's program activities related to the fourteenth 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 the majority of 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.

Since the inception of the EEU concept in 2000, BED has shared planning and program design work with EVt. This relationship has helped to shape a seamless and transparent set of programs to the mutual benefit of both organizations and Vermont ratepayers. BED and EVt annually update a detailed coordination plan that seeks to maximize the benefits of synergism to both organizations. The marketing and outreach power of Efficiency Vermont over the past fourteen years has helped to heighten the awareness of energy efficiency and building performance issues among all Vermonters, including Burlingtonians.

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 very cooperative relationship with the VGS has helped to develop a complete suite of thermal energy efficiency measures available to Burlington customers, and 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. BED looks forward to continuing this partnership in 2013 and beyond. CVWS continues to successfully and cooperatively provide a comprehensive set of energy efficiency services to their customer base. BED and VGS will continue to work with CVWS in the coming years to gain more program participation from the always-challenging private landlord rental market, which comprises a large percentage of low-income housing in the Burlington area.

As part of BED's EEU responsibilities since 2010, the PSB has directed BED to offer technical assistance and incentives for weatherization improvements for BED customers that heat with oil, propane gas and wood (unregulated heating fuels). The program funds come from BED's direct participation in the ISO-NE Forward Capacity Market and a portion of the statewide RGGI auction funds (FCM / RGGI). Based on Vermont statute, these funds are limited to energy efficiency projects.

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.

2014 Program Development Outlook

As BED reflects on the past several years and looks to 2014 and beyond, there are a number of factors that inform BED's estimate that yield rates will be declining in coming years. The largest factor is due to increasing efficiency baselines. Baselines, a term used to describe a state of energy efficient construction required by law, 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 will be necessary in 2014, and beyond, to encourage higher levels of overall participation and deeper savings per project.

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.

As a result of changing market conditions, BED performed a great deal of planning and preparation in 2011 and 2012 that allowed BED to launch several efforts in earnest in 2013 including: the Property Assessed Clean Energy (PACE) loan program for owner-occupied residential buildings, on-bill financing for eligible electric energy efficiency measures for commercial customers, the Energy Engage web-presentment portal so customers can view their 15-minute data, and BED's collaboration with UVM on the Energy Minder peer exchange behavior study.

For a number of years BED has investigated financing options for customers to help them more easily participate in our energy efficiency programs and comprehensively

treat their energy footprint, including electric energy efficiency, fossil-fuel based weatherization, and the installation of renewable generation. BED has heard from its customers that, while they appreciate the technical assistance and cash incentives from BED to make electrical efficiency improvements, up-front capital is not always available to move forward with recommended efficiency projects.

BED has tackled a portion of this problem with an On-Bill financing (OBF) service for business customers to make electric energy efficiency upgrades. A \$1 million dollar grant to BED from the U.S. Department of Commerce Economic Development Agency to start a revolving loan fund was made available with the assistance of Senator Sanders and his staff. OBF gives BED's business customers the option to finance electric energy efficiency improvements, and repay the loan on the electric bill. Many smaller and medium sized commercial customers historically have struggled to participate in "rebate-style" programs that require their own investment. OBF is structured so that monthly repayment amounts are less than the anticipated energy savings from the project. This provides the participant with immediate positive cash flow that persists over the lifetime of the improvement. The repayments populate the "revolving fund" that ensures sustainability of the program into the indefinite future.

The PACE program for residential customers is finally available. Since 2009, BED collaborated with Vermont Energy Investment Corporation (VEIC) and a coalition of energy efficiency advocates statewide to launch the PACE program allowing customers to finance eligible all-fuels energy efficiency and renewable energy projects and repay the loans through their property tax bills. For a number of administrative, financial and political reasons, PACE was delayed throughout most of the Vermont, and, for that matter, nationwide. The statutory rules governing Vermont's PACE opportunity today have limited the program to owner-occupied residential buildings with a \$30,000 project maximum and very strict underwriting guidelines.

As approved by the PSB, BED can use a portion of its FCM /RGGI dollars (up to \$175,000) to offer the PACE option to eligible residential customers that use unregulated fuels for space heating, and that meet PACE underwriting criteria.

BED is also pleased that it identified an additional (non-EEU) funding source that allows PACE-eligible customers to pursue eligible renewable energy and efficiency projects. With this in place, PACE is a program that can address all of our customers' energy upgrade issues in one comprehensive financing program. BED offers the repayment of the PACE loans on the BED electric bill, much in the same way as is done for the OBF commercial program.

BED is also pleased to see a continually growing amount of photo-voltaic (PV) systems in Burlington. This technology helps to alleviate the summer peak issues. Currently, there is about 1,400 KW of installed PV capacity through net-metering, standard offer or direct purchase power agreements. There are currently thirty-seven customers taking advantage of BED's solar rider tariff that was approved by the PSB in November 2011.

As part of BED's advanced metering infrastructure (AMI), smart grid project, BED launched its customer energy education web presentment software (Energy Engage) during the early summer of 2013. This software includes "dashboards" that present energy usage details and energy efficiency-related technical advice and efficiency program opportunities to customers. More information about Energy Engage is available starting on page 36. BED is excited to explore the extensive possibilities for enhanced interaction with its customers and the potential benefits and capabilities Smart Grid technology like Energy Engage will bring them.

Energy Minder (EM) was also launched in 2013. BED has been working with UVM's Engineering School on a consumer behavior study enabled by the advanced meter deployment. Energy Minder is a three-year collaboration between UVM and BED to integrate a social networking tool with BED's meter data management and web presentment systems. The goal of this experimental program is to evaluate the utility of energy efficiency-based software in which energy efficiency results modeling and feedback to participants are derived from interactions (questions and answers) among participants within a web-based social network, without the intervention of "expert" advice, such as would be typical in most information-based energy efficiency programs.

Social networks are known to be an important driver of behavior change. The advent of tools for social networking has shown some impact on behavior, but much of their use to date has been limited to leisure activities, and has not been extensively evaluated as a means of meeting energy efficiency goals. Energy Minder will test the hypothesis that a web-based social network can assist electricity consumers in identifying relationships between energy consumption and information exchanged within the network, modifying their behavior in order to save energy, and then sharing their results with their network counterparts.

Long lasting energy efficiency benefits enabled by smart-grid investments are largely speculative at this early stage, but are clearly worth exploration and continued trial.

A video that explains the Energy Minder project is available on the BED website:

<https://www.burlingtonelectric.com/page.php?pid=1>

The remaining pages on this report provide details on BED's delivery of the following EEU services in 2013:

- 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	391	\$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
Total	33,401	\$6,982,752	\$4,568,016	\$9,961,437	\$841,553	\$24,637,552	\$46,991,309	114,501	1,422,362	19,673	12,813

(*Note: 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
Total	3,538	\$3,699,920	\$3,091,220	\$6,557,570	\$505,141	\$17,231,457	\$31,085,308	71,033	934,015	9,157	8,761

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
Total	29,863	\$3,282,832	\$1,476,795	\$3,403,867	\$336,412	\$7,406,095	\$15,906,001	43,468	488,347	10,516	4,052

2 Overview of EEU Services Results

2013 proved to be a challenge for achieving savings goals in all markets but overall BED achieved 97% of the total annual MWh goal and 91% of the summer coincident –peak KW goal. BED projected 7,344 annualized MWh savings and achieved 7,066 annualized MWh. BED projected 1,000 coincident-peak summer KW savings and achieved 910 KW.

BED spent \$1,989,886 in 2013, which is about 3% less than the projected budget of \$2,059,624. In total, BED's EEU Services implementation saved 7,006 MWh of energy annually from installed measures that will result in 82,273 MWh savings over the equipment's useful life; 2013 measures have a weighted lifetime of about 12 years.

In the first fourteen 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 \$.03 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 impact Vermont and the region.

Table 4: EEU Business & Residential - Total Resource Benefits

Avoided costs of Electricity	\$8,974,165.64
Fossil Fuel Savings	(\$162,267.99)
Water Savings	<u>\$163,685.10</u>
TRB Total	\$8,975,583.01

	<u>Annualized</u>	<u>Lifetime</u>
Meter MWh	7,026	79,466
Generation MWh	7,006	82,273
Meter Demand Kw	4,050	43,021
Generation Peak Summer Kw	910	10,370
Generation Peak Winter Kw	1,267	14,571
Water Savings	1,465	19,684
Fuel Increase	-2,088	-11,953
O+M Savings	\$408,746	\$3,666,360

Table 5: EEU Business & Residential - Summary

	<u>Prior Year</u> 2012	<u>Current</u> 2013	<u>Program</u> <u>to date</u>
Participants	1,386	1,229	25,043
--- Program Costs ---			
BED Administration Costs			
General	\$250,020	\$237,904	\$3,863,345
Implemntation	\$18,547	\$28,064	\$1,998,731
Planning	\$1,650	\$0	\$106,711
Marketing	\$25,860	\$23,088	\$796,186
IT Development	<u>\$0</u>	<u>\$0</u>	<u>\$211,957</u>
	\$296,077	\$289,056	\$6,976,930
BED Service Costs			
Participants	\$425,616	\$472,270	\$4,553,599
Trade Allies	<u>\$0</u>	<u>\$0</u>	<u>\$11,761</u>
	\$425,616	\$472,270	\$4,565,360
BED Incentive Costs			
Participants	\$1,032,200	\$1,216,007	\$9,892,644
Trade Allies	<u>\$2,850</u>	<u>\$12,553</u>	<u>\$63,783</u>
	\$1,035,050	\$1,228,561	\$9,956,426
BED Total Costs	\$1,756,743	\$1,989,886	\$21,498,716
Evaluation Costs	\$63,671	\$77,562	\$841,462
Participant	\$1,964,714	\$1,793,534	\$24,551,910
Total Program Costs	<u>\$3,785,127</u>	<u>\$3,860,983</u>	<u>\$46,892,088</u>
--- Benefits ---			
Annualized mWh	6,424	7,007	114,514
Lifetime mWh	74,975	82,273	1,422,141
Winter peak Kw	1,117	1,267	19,647
Summer Peak Kw	951	910	12,875
mWh / Participant	5	6	5
Weighted Lifetime	12	12	12

Table 6: EEU Business & Residential - End Use Summary

Description	Participants	Gross Mwh	Net Mwh	Lifetime Net	Winter Net Kw	Summer Net Kw	MMBTU	CCF
Air Conditioning	91	182.49	197.45	3,017.69	9.37	65.20	0.00	0.00
Clothes Drying	4	3.91	3.86	53.99	0.80	0.61	-13.32	0.00
Clothes Washing	243	29.13	37.56	525.84	5.07	3.82	37.38	1,275.50
Consumer Electronics	1926	201.49	229.63	1,274.17	25.35	25.12	0.00	0.00
Dishwashing	3	0.84	0.95	12.32	0.12	0.06	3.24	31.05
Hot Water	76	211.10	170.77	2,413.10	106.59	54.28	-1,057.96	158.15
Lighting	6122	5,022.77	4,895.24	53,722.73	939.95	655.17	-3,273.51	0.00
Motors	15	126.15	135.94	2,068.11	9.36	1.09	0.00	0.00
Refrigeration	125	101.94	108.60	1,414.37	11.74	10.78	0.00	0.00
Space Heating	16	250.33	276.60	3,608.03	73.17	0.19	703.63	0.00
Ventilation	33	895.36	949.21	14,162.97	85.27	93.80	1,513.00	0.00
Total		7,025.52	7,005.81	82,273.33	1,266.78	910.12	-2,087.54	1,464.70

2.1 Non Resource Acquisition

The following section highlights BED's Non Resource Acquisition (NRA) activities for 2013. 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 and EVT as part of the Demand Resource Plan Process and approved by the Public Service Board.

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 is excited to explore the extensive 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, and 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.

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

<u>Program</u>	<u>Year to Date Costs</u>	<u>Annual Budget</u>	<u>% of Annual Budget</u>
Education and Training	\$40,205	\$38,943	103%
Smart Grid and AMI	\$10,868	\$62,957	17%
Applied R & D	\$7,431	\$14,664	51%
Planning and Reporting	\$42,510	\$36,711	116%
Evaluation	\$28,766	\$29,876	96%
Policy and Public Affairs	\$14,106	\$15,584	91%
Information Technology	\$27,182	\$25,900	105%
General Administration	\$24,501	\$23,818	103%
Total	\$195,568	\$248,513	79%

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, 2013 results in business services exceeded savings projections. BED projected 4,153 megawatt-hour (MWh) savings while achieving actual annual energy savings of 4,440 MWh, 7% over projections. BED's cost to deliver EEU business services in 2013 was \$1,503,184, below the budgeted amount of \$1,642,317 by 8%.

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.

As we enter 2014, commercial lighting technologies continue to improve. Higher quality LED products are becoming more widely available and cost-effective lighting control systems are also emerging. BED will continue to advance the new and exciting benefits of these technologies. BED hosted several meetings in 2013 for our customers to see the technology up close and to talk with vendors and manufacturers. These efforts paid off in 2013 with several installed projects and more planned in 2014.

BED will also continue to partner with EVt on a study which is evaluating the operating efficiency of different roof-top heating and cooling units (RTU's). RTU's are a very common method for heating, cooling and ventilating commercial buildings. The purpose of the study is to understand more fully how effectively these packaged units are performing in typical installations. If problems are found with the units, they are repaired, and then performance evaluated once more. Finally, the equipment will be upgraded with several types of advanced controls, with additional logging to determine the level of improved efficiency. It is felt that RTUs in the 5 ton to 30 ton range are an important untapped area for more focused energy efficiency measures.

BED will also continue field testing continuous building monitoring tools to help determine the implementation costs and the potential for preserving savings and/or finding further savings opportunities. The long term goal is to ensure that buildings continue to operate in an energy efficient mode long after the final building functional testing is completed and the installation contractors have departed. Tools that help to ensure the persistence of the energy savings over the life of equipment is well worth exploring.

It is not uncommon to find larger commercial buildings that suffer from energy performance issues that could have been quickly resolved if the building had the correct automated processes in place to monitor energy usage trends, equipment failures or operator errors made to the energy management system. Often building operators, in an attempt to address occupant comfort issues negatively and needlessly impact the systems' energy efficiency performance. The correct set-up and monitoring of the building energy management system and provision of the appropriate feedback mechanisms to the building operators could help to optimize the balance between occupant comfort and energy performance.

BED is currently working with four customers who have deployed monitoring and feedback platforms. The basic concept is to monitor and present energy data from selected electrical meters, or building energy management systems, to help facility managers more promptly and accurately look at energy usage and trends. Key features include: benchmarking, load shedding, monthly energy analysis, real-time energy alerts and alarms. The potential is to help reduce simultaneous energy demand and to find low-cost or no-cost opportunities to shed usage in areas using excessive electricity, and to monitor the usage over time to ensure that energy savings stay in place.

Table 8: EEU Business - Total Resource Benefits

Avoided costs of Electricity	\$5,221,226.59
Fossil Fuel Savings	\$52,055.05
Water Savings	<u>\$0.00</u>
TRB Total	\$5,273,281.80

	<u>Annualized</u>	<u>Lifetime</u>
Meter MWh	4,078	51,289
Generation MWh	4,439	55,667
Meter Demand Kw	1,080	13,024
Generation Peak Summer Kw	537	6,535
Generation Peak Winter Kw	533	6,621
Water Savings	0	0
Fuel Increase	-72	5,210
O+M Savings	\$272,744	\$2,574,132

Table 9: EEU Business - Summary

	<u>Prior Year</u> 2012	<u>Current</u> 2013	<u>Program</u> <u>to date</u>
Participants	322	355	1,872
--- Program Costs ---			
BED Administration Costs			
General	\$122,413	\$125,207	\$1,997,235
Implementation	\$13,880	\$25,297	\$1,259,856
Planning	\$834	\$0	\$62,003
Marketing	\$16,695	\$15,592	\$265,519
IT Development	<u>\$0</u>	<u>\$0</u>	<u>\$110,564</u>
	\$153,822	\$166,097	\$3,695,177
BED Service Costs			
Participants	\$307,899	\$384,773	\$3,082,264
Trade Allies	<u>\$0</u>	<u>\$0</u>	<u>\$6,780</u>
	\$307,899	\$384,773	\$3,089,044
BED Incentive Costs			
Participants	\$719,997	\$940,360	\$6,694,745
Trade Allies	<u>\$1,050</u>	<u>\$11,953</u>	<u>\$30,661</u>
	\$721,047	\$952,314	\$6,725,406
BED Total Costs	\$1,182,767	\$1,503,184	\$13,509,627
Evaluation Costs	\$49,516	\$64,371	\$503,767
Participant	\$1,664,103	\$1,320,521	\$16,250,242
Total Program Costs	<u>\$2,896,386</u>	<u>\$2,888,076</u>	<u>\$30,263,636</u>
--- Benefits ---			
Annualized mWh	4,211	4,440	71,045
Lifetime mWh	54,711	55,668	933,794
Winter peak Kw	493	533	9,131
Summer Peak Kw	674	537	8,723
mWh / Participant	13	13	38
Weighted Lifetime	13	13	13

Table 10: EEU Business - End-Use Summary

Description	Participants	Gross Mwh	Net Mwh	Lifetime Net	Winter Net Kw	Summer Net Kw	MMBTU	CCF
Air Conditioning	10	167.09	183.00	2,759.45	8.97	38.61	0.00	0.00
Lighting	1018	2,590.20	2,845.26	32,581.39	374.94	397.29	-1,584.93	0.00
Motors	15	126.15	135.94	2,068.11	9.36	1.09	0.00	0.00
Refrigeration	19	71.58	74.85	941.06	8.18	6.54	0.00	0.00
Space Heating	3	231.46	255.39	3,236.09	46.34	0.19	0.00	0.00
Ventilation	8	891.34	944.82	14,081.26	84.78	93.30	1,513.00	0.00
Total		4,077.83	4,439.26	55,667.37	532.58	537.01	-71.93	0.00

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 the City of Burlington's required Guidelines for Energy Efficient Construction (which adopted the statewide CBES energy code as of January 1, 2007). By working directly and early in the process with designers and owners, BED assists in the choice of energy efficient systems and construction techniques 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 addresses all energy (especially electricity) consuming equipment, components or practices, including 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 all projects. 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. See the Design Review Guide (Attachment A) for an example of our coordinated efforts.

BED continues to support enforcement and provide administration of the Guidelines for Energy Efficient Construction for the City of Burlington, VT (adopted CBES), the energy code for all new construction and renovation in the City. The benefits of the Business New Construction program have evolved into an important facet of the city's economic development efforts. Because BED is involved in the very earliest stages of project development, the benefits of energy efficiency are packaged along with other attractive elements that entice businesses to locate facilities in the city, enhancing employment growth and economic development in Burlington.

Project Highlights

The annualized megawatt-hour (MWh) savings for 2013 were 629, about 43% higher than the projection of 439 MWh. Total BED program costs were \$204,996, 32% less than the budgeted amount of \$302,317.

2013 saw an improvement in the economy and subsequent new construction permits. UVM's Redstone Lofts Apartment complex (147,000 square feet) was the largest completed project in 2013 followed by FAHC's Clinical Research Center relocation.

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. Both Business and Residential New Construction programs have outpaced 2012-2014 savings projections to date. These projections were made by BED in 2011 during a period of very uncertain economic conditions.

Program Changes

For 2014, BED will continue to advance the "building energy model" approach option for new construction projects. In order to best estimate the energy efficiency potential of

a project, building energy modeling software is used to compare the energy performance of a building that just meets CBES to a model of the final building design. The energy savings claimed for a project is a result of comparing the two building model runs along with final inspections of the buildings. This approach assumes that the efficient model correctly knows the occupancy rates, hours of operation, set-points for temperature, lighting control schedules and plug-loads from various equipment.

BED will also continue to utilize a tiered incentive approach for larger projects that pays part of the incentive at project completion and then the remaining incentives after about one year of comparing actual billing history data to the energy efficient model. It often takes about a year for larger commercial buildings to be fully occupied, equipped and debugged of any performance issues. This approach will allow for more accurate savings claims and ensure that the building operator is encouraged to optimize the performance of the building.

Table 11: EEU Business New Construction - Total Resource Benefits

Avoided costs of Electricity	\$999,648.53
Fossil Fuel Savings	(\$51,829.40)
Water Savings	<u>\$0.00</u>
TRB Total	\$947,819.13

	<u>Annualized</u>	<u>Lifetime</u>
Meter MWh	558	7,713
Generation MWh	629	8,696
Meter Demand Kw	269	3,566
Generation Peak Summer Kw	122	1,781
Generation Peak Winter Kw	97	1,300
Water Savings	0	0
Fuel Increase	-338	-4,551
O+M Savings	\$0	\$0

Table 12: EEU Business New Construction - Summary

	<u>Prior Year</u> 2012	<u>Current</u> 2013	<u>Program</u> <u>to date</u>
Participants	15	18	180
--- Program Costs ---			
BED Administration Costs			
General	\$42,635	\$40,974	\$358,721
Implementation	\$0	\$0	\$126,485
Planning	\$205	\$0	\$15,847
Marketing	\$8,906	\$8,874	\$165,347
IT Development	<u>\$0</u>	<u>\$0</u>	<u>\$41,038</u>
	\$51,746	\$49,848	\$707,438
BED Service Costs			
Participants	\$44,906	\$47,320	\$866,233
Trade Allies	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
	\$44,906	\$47,320	\$866,233
BED Incentive Costs			
Participants	\$148,724	\$107,828	\$1,169,214
Trade Allies	<u>\$0</u>	<u>\$0</u>	<u>\$336</u>
	\$148,724	\$107,828	\$1,169,550
BED Total Costs	\$245,377	\$204,996	\$2,743,221
Evaluation Costs	\$0	\$0	\$34,579
Participant	\$487,397	\$145,797	\$3,852,384
Total Program Costs	<u>\$732,774</u>	<u>\$350,793</u>	<u>\$6,630,184</u>
--- Benefits ---			
Annualized mWh	622	629	14,471
Lifetime mWh	8,989	8,696	228,373
Winter peak Kw	59	97	1,193
Summer Peak Kw	202	122	1,912
mWh / Participant	41	35	80
Weighted Lifetime	14	14	16

Table 13: EEU Business New Construction - End Use Summary

Description	Participants	Gross Mwh	Net Mwh	Lifetime Net	Winter Net Kw	Summer Net Kw	MMBTU	CCF
Air Conditioning	2	70.44	79.14	1,187.16	0.00	30.79	0.00	0.00
Lighting	37	424.90	479.23	6,456.32	84.10	89.72	-338.16	0.00
Space Heating	1	45.82	51.66	774.87	10.17	0.00	0.00	0.00
Ventilation	1	16.37	18.50	277.44	2.63	1.08	0.00	0.00
Total		557.53	628.53	8,695.80	96.90	121.59	-338.16	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 and financial incentives 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. BED and EVt also participate jointly in the Northeast Energy Efficiency Partnership to further the market transformation of motors, lighting and HVAC equipment. Incentives for above-average energy efficient equipment are supplied to wholesalers, contractors, and customers at the time of equipment replacement.

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 is committed to bringing appropriate projects to each other's

attention. This partnership is mutually beneficial to both organizations and our mutual ratepayers.

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. Given BED’s long history of delivering this service, the program has reached a high level of maturity and customer acceptance. Facility managers have learned to rely on the program benefits and the technical assistance offered by BED staff.

Program Highlights

The annualized megawatt-hour (MWh) savings for 2013 were 3,811, about 3% higher than the projection of 3,714 MWh. Total BED program costs were \$1,298,188, 3% under the budgeted amount of \$1,340,000.

The Business Existing Facilities 2013 End-Use Activity table shows diversity in the end use savings but lighting and controls was once again the leader. Commercial lighting measures are strongly coincident with summer loads and thus provide significant avoided peak energy costs to BED. BED projected 515 coincident-peak KW savings and achieved 415 coincident-peak KW, 81% of the 2013 goal.

Variance Discussion

Overall, the Business Existing Facilities services performed well in 2013. As close to 75% of all kWh sales are to the commercial class these 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 projections in the years to come.

Table 14: EEU Business Existing Facilities - Total Resource Benefits

Avoided costs of Electricity	\$4,221,578.06
Fossil Fuel Savings	\$103,884.45
Water Savings	<u>\$0.00</u>
TRB Total	\$4,325,462.67

	<u>Annualized</u>	<u>Lifetime</u>
Meter MWh	3,520	43,577
Generation MWh	3,811	46,972
Meter Demand Kw	811	9,457
Generation Peak Summer Kw	415	4,754
Generation Peak Winter Kw	436	5,321
Water Savings	0	0
Fuel Increase	266	9,761
O+M Savings	\$272,744	\$2,574,132

Table 15: EEU Business Existing Facilities - Summary

	<u>Prior Year</u> 2012	<u>Current</u> 2013	<u>Program</u> <u>to date</u>
Participants	307	337	1,692
--- Program Costs ---			
BED Administration Costs			
General	\$79,777	\$84,233	\$1,638,515
Implementation	\$13,880	\$25,297	\$1,133,371
Planning	\$629	\$0	\$46,156
Marketing	\$7,790	\$6,719	\$100,172
IT Development	<u>\$0</u>	<u>\$0</u>	<u>\$69,526</u>
	\$102,076	\$116,249	\$2,987,739
BED Service Costs			
Participants	\$262,992	\$337,453	\$2,216,031
Trade Allies	<u>\$0</u>	<u>\$0</u>	<u>\$6,780</u>
	\$262,992	\$337,453	\$2,222,811
BED Incentive Costs			
Participants	\$571,273	\$832,532	\$5,525,532
Trade Allies	<u>\$1,050</u>	<u>\$11,953</u>	<u>\$30,325</u>
	\$572,323	\$844,486	\$5,555,857
BED Total Costs	\$937,391	\$1,298,188	\$10,766,406
Evaluation Costs	\$49,516	\$64,371	\$469,188
Participant	\$1,176,706	\$1,174,724	\$12,397,858
Total Program Costs	<u>\$2,163,613</u>	<u>\$2,537,283</u>	<u>\$23,633,452</u>
--- Benefits ---			
Annualized mWh	3,589	3,811	56,574
Lifetime mWh	45,722	46,972	705,421
Winter peak Kw	434	436	7,938
Summer Peak Kw	472	415	6,811
mWh / Participant	12	11	33
Weighted Lifetime	13	12	12

Table 16: EEU Business Existing Facilities - End Use Summary

Description	Participants	Gross Mwh	Net Mwh	Lifetime Net	Winter Net Kw	Summer Net Kw	MMBTU	CCF
Air Conditioning	8	96.65	103.86	1,572.29	8.97	7.82	0.00	0.00
Lighting	981	2,165.30	2,366.02	26,125.07	290.85	307.57	-1,246.76	0.00
Motors	15	126.15	135.94	2,068.11	9.36	1.09	0.00	0.00
Refrigeration	19	71.58	74.85	941.06	8.18	6.54	0.00	0.00
Space Heating	2	185.65	203.74	2,461.21	36.17	0.19	0.00	0.00
Ventilation	7	874.98	926.32	13,803.82	82.15	92.22	1,513.00	0.00
Total		3,520.30	3,810.73	46,971.57	435.68	415.43	266.24	0.00

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 2013, BED projected 3,191 annualized MWh residential savings while achieving annual energy savings of 2,567 MWh or 80% of the projected goal. BED's cost to deliver residential services in 2013 was \$486,702 which was 16% over budget for the year's projected spending of \$417,307.

As BED explains in more detail 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 also turns over about 35% of residential accounts each year due to the high percentage of students. About 85% of residential buildings use natural gas for space heating and domestic hot water. BED's residential consumption is about 24% less than the average Vermont residential customer, 34% less than the average New England residential customer and 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 is now able to offer a PACE financing service which we hope will encourage some customers to take a more comprehensive approach to improving the energy performance of their buildings. The energy consumption information, and guidance, that is now available through BED's smart grid web presentment tool (Energy Engage) may also help encourage more customers to take steps to reduce usage.

This software includes “dashboards” that present 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 potential platform to launch other energy efficiency offerings from. Pictured below are examples of the types of information that our customers now 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](#)

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

09/03/13 - 09/30/13

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](#)
Green Button 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](#)

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

Sep 27

Date	Tail Block	Total
Sep 27, 2013	9.5	9.5

Note: Totals may not add up due to rounding.

[Download](#)
Green Button 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	\$3,752,939.05
Fossil Fuel Savings	(\$214,323.04)
Water Savings	<u>\$163,685.10</u>
TRB Total	\$3,702,301.21

	<u>Annualized</u>	<u>Lifetime</u>
Meter MWh	2,948	28,176
Generation MWh	2,567	26,606
Meter Demand Kw	2,970	29,997
Generation Peak Summer Kw	373	3,835
Generation Peak Winter Kw	734	7,949
Water Savings	1,465	19,684
Fuel Increase	-2,016	-17,163
O+M Savings	\$136,003	\$1,092,228

Table 18: EEU Residential - Summary

	<u>Prior Year</u> 2012	<u>Current</u> 2013	<u>Program</u> <u>to date</u>
Participants	1,064	874	23,171
--- Program Costs ---			
BED Administration Costs			
General	\$127,607	\$112,696	\$1,866,110
Implemntation	\$4,668	\$2,766	\$738,875
Planning	\$815	\$0	\$44,709
Marketing	\$9,164	\$7,496	\$530,668
IT Development	<u>\$0</u>	<u>\$0</u>	<u>\$101,393</u>
	\$142,254	\$122,959	\$3,281,753
BED Service Costs			
Participants	\$117,717	\$87,496	\$1,471,335
Trade Allies	<u>\$0</u>	<u>\$0</u>	<u>\$4,981</u>
	\$117,717	\$87,496	\$1,476,316
BED Incentive Costs			
Participants	\$312,203	\$275,647	\$3,197,898
Trade Allies	<u>\$1,800</u>	<u>\$600</u>	<u>\$33,121</u>
	\$314,003	\$276,247	\$3,231,020
BED Total Costs	\$573,975	\$486,702	\$7,989,089
Evaluation Costs	\$14,155	\$13,191	\$337,695
Participant	\$300,611	\$473,013	\$8,301,668
Total Program Costs	<u>\$888,741</u>	<u>\$972,906</u>	<u>\$16,628,452</u>
--- Benefits ---			
Annualized mWh	2,213	2,567	43,469
Lifetime mWh	20,264	26,605	488,347
Winter peak Kw	624	734	10,516
Summer Peak Kw	277	373	4,152
mWh / Participant	2	3	2
Weighted Lifetime	9	10	11

Table 19: EEU Residential - End Use Summary

Description	Participants	Gross Mwh	Net Mwh	Lifetime Net	Winter Net Kw	Summer Net Kw	MMBTU	CCF
Air Conditioning	81	15.40	14.45	258.24	0.39	26.59	0.00	0.00
Clothes Drying	4	3.91	3.86	53.99	0.80	0.61	-13.32	0.00
Clothes Washing	243	29.13	37.56	525.84	5.07	3.82	37.38	1,275.50
Consumer Electronics	1926	201.49	229.63	1,274.17	25.35	25.12	0.00	0.00
Dishwashing	3	0.84	0.95	12.32	0.12	0.06	3.24	31.05
Hot Water	76	211.10	170.77	2,413.10	106.59	54.28	-1,057.96	158.15
Lighting	5104	2,432.56	2,049.99	21,141.34	565.00	257.88	-1,688.58	0.00
Refrigeration	106	30.36	33.75	473.31	3.56	4.24	0.00	0.00
Space Heating	13	18.87	21.20	371.94	26.83	0.00	703.63	0.00
Ventilation	25	4.02	4.39	81.71	0.49	0.50	0.00	0.00
Total		2,947.69	2,566.55	26,605.97	734.20	373.10	-2,015.61	1,464.70

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 20% 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 local monthly Technical Review meetings where all new construction and virtually all substantial renovation 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.

- BED receives monthly “Development Case Load” updates from the Department of Planning and Zoning that track the progress of each of the development projects in Burlington.
- 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. DPW requires a compliance memo from BED Energy Services before issuing the building permit.

Program Highlights

In 2013, the savings came from a mix of small multi-family projects and single-family major gut rehabilitation projects. Both market rate and affordable multi-family projects comprise the vast majority of housing development in Burlington. The single-family new construction market is constrained due to limited open land.

Variance Discussion

The RNC service achieved 40 MWh in annualized electricity savings for the year which was 21% higher than the projected 33 MWh goal. At \$106,789, spending was 19% higher than the projected spending of \$90,000.

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. 2012 was a very strong year due to savings from three large multi-family affordable housing projects. There are currently 46 units enrolled in the program that should be completed in 2014 resulting in another strong year.

Program Changes

In 2014, 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 we will continue to develop strategies to work effectively with both of these markets.

Table 20: EEU Residential New Construction - Total Resource Benefits

Avoided costs of Electricity	\$171,555.15
Fossil Fuel Savings	\$160,000.83
Water Savings	<u>\$7,946.39</u>
TRB Total	\$339,502.38

	<u>Annualized</u>	<u>Lifetime</u>
Meter MWh	39	508
Generation MWh	40	544
Meter Demand Kw	52	971
Generation Peak Summer Kw	26	624
Generation Peak Winter Kw	6	86
Water Savings	70	955
Fuel Increase	624	15,543
O+M Savings	\$312	\$2,429

Table 21: EEU Residential New Construction - Summary

	<u>Prior Year</u> 2012	<u>Current</u> 2013	<u>Program</u> <u>to date</u>
Participants	52	4	424
--- Program Costs ---			
BED Administration Costs			
General	\$26,753	\$30,693	\$236,934
Implementation	\$0	\$0	\$96,638
Planning	\$132	\$0	\$11,195
Marketing	\$3,442	\$3,218	\$83,543
IT Development	<u>\$0</u>	<u>\$0</u>	<u>\$34,241</u>
	\$30,327	\$33,911	\$462,550
BED Service Costs			
Participants	\$32,457	\$32,819	\$472,968
Trade Allies	<u>\$0</u>	<u>\$0</u>	<u>\$2,700</u>
	\$32,457	\$32,819	\$475,668
BED Incentive Costs			
Participants	\$49,863	\$40,059	\$353,392
Trade Allies	<u>\$0</u>	<u>\$0</u>	<u>\$2</u>
	\$49,863	\$40,059	\$353,394
BED Total Costs	\$112,646	\$106,789	\$1,291,612
Evaluation Costs	\$3,048	\$2,845	\$46,163
Participant	\$35,821	(\$540)	\$272,085
Total Program Costs	<u>\$151,515</u>	<u>\$109,094</u>	<u>\$1,609,860</u>
--- Benefits ---			
Annualized mWh	237	40	1,229
Lifetime mWh	3,938	544	20,064
Winter peak Kw	39	6	303
Summer Peak Kw	15	26	234
mWh / Participant	5	10	3
Weighted Lifetime	17	14	16

Table 22: EEU Residential New Construction - End Use Summary

Description	Participants	Gross Mwh	Net Mwh	Lifetime Net	Winter Net Kw	Summer Net Kw	MMBTU	CCF
Air Conditioning	1	4.95	5.84	146.10	0.00	23.83	0.00	0.00
Clothes Drying	1	0.98	0.77	10.80	0.15	0.11	-3.33	0.00
Clothes Washing	3	1.71	1.99	27.90	0.33	0.25	5.56	39.40
Dishwashing	3	0.84	0.95	12.32	0.12	0.06	3.24	31.05
Lighting	4	21.45	19.86	160.57	2.53	0.70	0.00	0.00
Refrigeration	4	6.36	7.16	102.84	0.87	1.10	0.00	0.00
Space Heating	2	2.83	3.35	83.80	1.77	0.00	618.80	0.00
Total		39.13	39.93	544.33	5.77	26.06	624.27	70.45

2.3.2 Existing Homes

Program Description

This service aims to improve the efficiency of all existing residential buildings 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.

Low-income buildings are addressed by a partnership with the state's Low-income Weatherization Assistance Program (WAP). This partnership provides electric efficiency measures (including fuel switching of electric hot water and electric space heating) 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 education, appliance meter loans, technical assistance, project management and cash incentives are all part of this service. In some cases, the high usage is driven by electric domestic hot water and/or electric resistance space heating. Electric space heat and domestic hot water have been rapidly decreasing markets in Burlington but the opportunity to convert to natural gas is available to the owners of some of these housing units, providing significant energy and cost savings.

BED and EVt 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 fifteen free screw-in CFL’s per apartment.

This service provides savings directly to the tenant but also water savings, and potentially maintenance savings via 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.

BED continues to offer a robust energy education service for customers that includes on-site energy audits, lending of appliance meters and custom billing history analysis. BED also continues to provide energy efficiency information in a variety of forums. BED staff also visited several classrooms in the Burlington School District to discuss energy efficiency with faculty and schoolchildren.

Program Highlights

In 2013, 74 fuel switch projects were completed. 70 electric hot water tanks were switched to natural gas, 4 dwelling replaced electric heat with natural gas space heating equipment and 3 electric clothes dryers were switched to natural gas units. 13 customers and their contractors took advantage of rebates for ENERGY STAR furnaces with ECM fans and 5 more customers took advantage of incentives for ENERGY STAR central AC systems. 35 refrigerators were retired early and replaced with ENERGY STAR models, 2,990 CFL’s were provided and 45 automatically controlled ENERGY STAR bathroom exhaust fan systems were installed.

BED offers incentives to the contractor and the building owner to install this equipment. Vermont Gas Systems offers additional incentives to install high efficiency space and water heating equipment along with thermal shell upgrades.

Variance Discussion

The Existing Homes service achieved 314 MWh in annualized electricity savings for the year, about 23% less than the projected 409 MWh. At \$158,564 spending was 4% above BED's projected spending of \$152,307.

It is worth noting that electric resistance space and water heating are disappearing markets (helped by many years of technical assistance incentives from BED to fuel switch to natural gas) in Burlington along with the savings from screw-in CFL's as the Federal energy standards take effect. In 2013, these measures accounted for about 87% of the total savings. BED will continue to work with its partners to explore technologies and services that leverage as much cost-effective total resource benefit as possible in an increasingly challenging market.

BED will continue with the market-rate rental housing campaign as about 60% of BED's residential customers live in rental housing and about 85% pay their electric and heating costs directly. Over 90% of BED's residential rental customers use natural gas for space heating and domestic hot water. We will continue to leverage common area energy savings, building water savings, ice dam and moisture damage solutions for property-owners as part of the service to help develop long-term relationships with building owners.

BED will also continue working with UVM's office of off-campus services. BED and VGS conducted energy workshops for students, staff and faculty living off-campus in 2011, 2012 and 2013 and they will be offered again in 2014.

Table 23: EEU Residential Existing Homes - Total Resource Benefits

Avoided costs of Electricity	\$820,673.10
Fossil Fuel Savings	(\$156,196.06)
Water Savings	<u>\$13,339.21</u>
TRB Total	\$677,816.26

	<u>Annualized</u>	<u>Lifetime</u>
Meter MWh	352	4,695
Generation MWh	314	4,276
Meter Demand Kw	508	6,788
Generation Peak Summer Kw	68	946
Generation Peak Winter Kw	169	2,338
Water Savings	164	1,510
Fuel Increase	-983	-13,742
O+M Savings	\$4,180	\$31,061

Table 24: EEU Residential Existing Homes - Summary

	<u>Prior Year</u> 2012	<u>Current</u> 2013	<u>Program</u> <u>to date</u>
Participants	423	433	8,402
--- Program Costs ---			
BED Administration Costs			
General	\$60,547	\$38,332	\$1,221,349
Implementation	\$4,668	\$2,766	\$551,981
Planning	\$697	\$0	\$19,067
Marketing	\$2,029	\$1,869	\$309,322
IT Development	<u>\$0</u>	<u>\$0</u>	<u>\$45,049</u>
	\$67,940	\$42,967	\$2,146,768
BED Service Costs			
Participants	\$85,196	\$52,435	\$675,078
Trade Allies	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
	\$85,196	\$52,435	\$675,078
BED Incentive Costs			
Participants	\$79,173	\$62,563	\$1,587,748
Trade Allies	<u>\$1,800</u>	<u>\$600</u>	<u>\$33,093</u>
	\$80,973	\$63,163	\$1,620,842
BED Total Costs	\$234,109	\$158,564	\$4,442,688
Evaluation Costs			
Participant	\$47,746	\$73,384	\$4,924,891
Total Program Costs	<u>\$287,036</u>	<u>\$236,762</u>	<u>\$9,567,276</u>
--- Benefits ---			
Annualized mWh	230	314	20,560
Lifetime mWh	2,895	4,276	317,703
Winter peak Kw	64	169	5,741
Summer Peak Kw	34	68	955
mWh / Participant	1	1	2
Weighted Lifetime	13	14	15

Table 25: EEU Residential Existing Homes - End Use Summary

Description	Participants	Gross Mwh	Net Mwh	Lifetime Net	Winter Net Kw	Summer Net Kw	MMBTU	CCF
Air Conditioning	5	0.50	0.51	7.43	0.00	1.12	0.00	0.00
Clothes Drying	3	2.93	3.09	43.20	0.65	0.49	-9.99	0.00
Clothes Washing	1	0.19	0.25	3.43	0.03	0.03	0.08	6.20
Hot Water	76	211.10	170.77	2,413.10	106.59	54.28	-1,057.96	158.15
Lighting	359	104.24	103.52	1,225.41	34.87	9.64	0.00	0.00
Refrigeration	23	12.52	13.68	213.87	1.50	1.64	0.00	0.00
Space Heating	11	16.04	17.85	288.14	25.06	0.00	84.83	0.00
Ventilation	25	4.02	4.39	81.71	0.49	0.50	0.00	0.00
Total		351.55	314.05	4,276.29	169.20	67.70	-983.04	164.35

2.3.3 Retail Products

Program Description

The Efficient Products (EP) service aims to increase sales of ENERGY STAR® qualified lighting products, compact fluorescent (CFL) screw-in bulbs, CFL hardwired fixtures, LED lighting products and ENERGY STAR® appliances such as clothes washers, refrigerators, freezers, and ceiling fans with CFL or LED lights, 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 2013 alone, BED customers purchased 60,210 CFL and LED bulbs, 189 CFL or LED lighting fixtures, 169 ENERGY STAR® clothes washers, 69 ENERGY STAR® refrigerators and freezers, 49 ENERGY STAR® dehumidifiers, 372 internal power supply units, 69 ultra-efficient LCD computers monitors and 956 efficient televisions.

Variance Discussion

Savings of 2,213 annualized MWh was under the projection of 2,749 annualized MWh for 2013 by 20%. Annual expenditures were \$221,349 which is about 26% higher than the projected budget of \$175,000.

BED believes that the large disparity in savings and costs from year to year in this program can be attributed to a number of factors including: economic conditions for

customers, the high percentage of renters (60%) in Burlington where specialty bulb and appliance opportunities are more limited and the decrease in savings claims for CFL measures due to gross to net adjustments in the Technical Resource Manual calculations.

Program Changes

2014 will see a continued focus on promoting specialty bulbs, rapidly developing LED products and appliances that are the most efficient within the ENERGY STAR rating. These products include: refrigerators, clothes washers, dehumidifiers, pool pumps and consumer electronics. 2014 will also see the continued promotion of high efficiency circulator pumps. The program will also continue to research the viability of air source heat pump water heaters and clothes dryers.

Table 26: EEU Efficient Products - Total Resource Benefits

Avoided costs of Electricity	\$2,760,710.79
Fossil Fuel Savings	(\$218,127.81)
Water Savings	<u>\$142,399.50</u>
TRB Total	\$2,684,982.58

	<u>Annualized</u>	<u>Lifetime</u>
Meter MWh	2,557	22,974
Generation MWh	2,213	21,785
Meter Demand Kw	2,410	22,239
Generation Peak Summer Kw	279	2,265
Generation Peak Winter Kw	559	5,525
Water Savings	1,230	17,219
Fuel Increase	-1,657	-18,964
O+M Savings	\$131,511	\$1,058,738

Table 27: EEU Efficient Products - Summary

	<u>Prior Year</u> 2012	<u>Current</u> 2013	<u>Program</u> <u>to date</u>
Participants	589	437	14,345
--- Program Costs ---			
BED Administration Costs			
General	\$40,307	\$43,672	\$407,826
Implementation	\$0	\$0	\$90,256
Planning	(\$13)	\$0	\$14,447
Marketing	\$3,694	\$2,410	\$137,802
IT Development	<u>\$0</u>	<u>\$0</u>	<u>\$22,103</u>
	\$43,988	\$46,081	\$672,435
BED Service Costs			
Participants	\$65	\$2,243	\$323,289
Trade Allies	<u>\$0</u>	<u>\$0</u>	<u>\$2,281</u>
	\$65	\$2,243	\$325,570
BED Incentive Costs			
Participants	\$183,168	\$173,025	\$1,256,758
Trade Allies	<u>\$0</u>	<u>\$0</u>	<u>\$26</u>
	\$183,168	\$173,025	\$1,256,784
BED Total Costs	\$227,220	\$221,349	\$2,254,789
Evaluation Costs	\$5,927	\$5,532	\$91,835
Participant	\$217,043	\$400,169	\$3,104,692
Total Program Costs	<u>\$450,190</u>	<u>\$627,050</u>	<u>\$5,451,316</u>
--- Benefits ---			
Annualized mWh	1,746	2,213	21,680
Lifetime mWh	13,431	21,785	150,580
Winter peak Kw	521	559	4,472
Summer Peak Kw	228	279	2,963
mWh / Participant	3	5	2
Weighted Lifetime	8	10	7

Table 28: EEU Efficient Products - End Use Summary

Description	Participants	Gross Mwh	Net Mwh	Lifetime Net	Winter Net Kw	Summer Net Kw	MMBTU	CCF
Air Conditioning	75	9.95	8.10	104.71	0.39	1.63	0.00	0.00
Clothes Washing	239	27.23	35.32	494.51	4.71	3.55	31.74	1,229.90
Consumer Electronics	1926	201.49	229.63	1,274.17	25.35	25.12	0.00	0.00
Lighting	4741	2,306.87	1,926.61	19,755.36	527.60	247.54	-1,688.58	0.00
Refrigeration	79	11.47	12.91	156.61	1.18	1.50	0.00	0.00
Total		2,557.01	2,212.57	21,785.35	559.23	279.34	-1,656.84	1,229.90

3 Thermal Energy and Process Fuels Activity

(Residential and Commercial)

Program Description

The PSB has charged the EEU's with providing thermal shell and heating system energy efficiency services to customers who use unregulated fossil fuel 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.

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. The unregulated fossil fuel residential market is relatively small in Burlington due to the high saturation of natural gas (over 85% of residential buildings use natural gas for space heating and domestic hot water) but there are streets and neighborhoods that Vermont Gas Systems does not serve mostly due to rock ledge issues.
- **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 up to 10,000 square feet at time of replacement. 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 95% 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 two residential completions in 2013 with total savings of 34 MMBTU's. The projects consisted of two condominiums.

Since the program began in 2009, there have been 23 projects completed in Burlington with total savings of 652 MMBTU's. The program continues to be widely promoted by BED and EVt through a variety of channels.

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.

BED's current best estimate is that there are about 500 to 700 homes in the TEPF market. The 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. The City of Burlington's energy efficiency code (established in 1991) for new construction and renovation may also be a contributing factor in relatively higher levels of existing energy efficiency. There is a limited-potential condominium market (about 250 units heated mostly by LP-gas) but it too presents challenges as about 35% of the units are rentals. As noted earlier, the rental property owner, who does not typically pay the energy bill and will not benefit from the energy savings, will need to participate or at least approve participation in any program offering.

Condominium associations present other challenges in terms of bylaws and other restrictions regarding allowed building improvements. There are also common area issues that can require greater levels of communication outreach and project management. For example, one of the complexes that we are focused on consists of seventy-six (76) units in nineteen (19) separate buildings (picture below) and only one unit per building has an attic access hatch. The energy audits have shown that attic

bypass air sealing and added insulation will produce the greatest energy savings for these units, so access is critical.



As BED reported in the 2014 EEU Annual Plan, we began exploring different approaches in 2012 to increasing condominium participation and decided that a specific project management approach, similar to VGS's work in South Burlington with Shelter Analytics, was worth pursuing.

Shelter has been working with BED in 2013 on a variety of tasks including marketing, outreach, community workshops and contractor pricing. This focused approach has created promising activity. As of the end of March 2014, sixty-two (62) energy audits have been completed (25% of the two complexes) and customer reports delivered that explain the savings, incentives and the PACE loan option. To date, six projects have been completed.

The outreach goal is to get full buildings to participate with the messaging that individual owners will realize greater energy savings (and comfort improvements) if the entire building is done at once and that the installation costs will also be less per unit. We also message to the condominium association members that this work can reduce moisture and ice dam damage to common roofs which can be a significant cost issue as

pictured below. The roofs do not last as long and there can be costly water intrusion into the living spaces.

It costs money to make icicles.

Icicles and roof damage at **Redrocks** are caused by energy leaks in your home.





Burlington Electric and Shelter Analytics have partnered to help YOU:

- Be cooler this summer, warmer next winter
- Stop most ice and water damage
- Save money on your heating bill
- Earn a cash rebate

Call (802) 858-4420 x4; or Email: info@shelteranalytics.com for details – no obligation

Call in May to qualify for an Energy Check-up, a \$250 value for just \$99 if you sign up with a neighbor!

This message is from Shelter Analytics working on behalf of Burlington Electric to provide energy efficiency technical assistance to RedRocks and Ledgewood condominium owners. See www.shelteranalytics.com/burlington for more details

Through this work with Shelter over the past year BED has been able to establish more accurate project costs and savings estimates for the condominium units which helped to inform the accuracy of the recent DRP budget and savings recommendations for 2015-2034. BED's estimates show that the savings per unit are less than what is typically possible from a single-family home as the units are smaller and attached. Also, the total program unit cost is higher than what was estimated in the first DRP as there is a great deal of project management time required with the condominium associations to gain approval to perform the work.

There is also difficulty with predicating the actual annual customer participation rates as about 30-35% of the units are rentals. BED will learn a great deal more about its TEPF condominium efforts over the 2015-2017 performance period which will help to more accurately inform the next DRP process and potentially better align BED TEPF budgets with the available market.

Table 29: Thermal Energy and Process Fuels Activity

Period Costs for TEPF Savings	<u>Residential</u>	<u>Commercial</u>	<u>Total</u>
Year to Date Costs	\$42,542	\$1,521	\$44,063
Annual Budget	\$84,190	\$35,931	\$120,121
% of Annual Budget	51%	4%	37%
Energy Savings Results			
MMBTU Year to Date	34	0	34
MMBTU Annual Goal	476	224	700
% of MMBTU Annual Goal	7%	0%	5%
Progress Towards MMBTU 3-Year Goals			
MMBTU Cumulative to Date	215	64	279
3-Year MMBTU Goal	1,428	504	1,932
% of 3-Year MMBTU Goal	15%	13%	14%

TEPF NON-RESOURCE ACQUISITION

	Year to Date Costs	Annual Budget	% of Annual Budget
Education and Training	\$6,199	\$6,000	103%
Applied Research and Development	\$200	\$500	40%
Planning and Reporting	\$3,221	\$4,300	75%
Evaluation	\$534	\$750	71%
Policy and Public Affairs	\$616	\$1,000	62%
Information Technology	\$802	\$1,000	80%
General Administration	\$5,853	\$6,775	86%
PACE Pilot	\$200	\$165,000	0%
	\$17,625	\$185,325	10%

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

	<u>Prior</u> <u>Year</u>	<u>Current</u> <u>Year</u> <u>2013</u> (1)	<u>Projected</u> <u>Year</u> <u>2013</u> (2)	<u>Projected</u> <u>Year</u> <u>2013</u>	<u>Program</u> <u>To Date</u> (3)
<u>Participants</u>	(4)				
<u>Program Costs</u>					
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)				
<u>Benefits</u>					
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

<u>Description</u>	<u>Participants</u> (33)	<u>Gross</u> <u>MWh</u> (35)	<u>Net</u> <u>MWh</u> (36)	<u>Lifetime</u> <u>MWh</u> (34)	<u>Winter</u> <u>Net KW</u> (37)	<u>Summer</u> <u>Net KW</u> (38)	<u>MMBTU</u> (39)	<u>CCF</u> (40)
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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 MMBtu 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 Design Review Guide



DESIGN REVIEW GUIDE

Energy Efficient Construction

Burlington is well known as a community with a high quality of life, small and cohesive neighborhoods, a vibrant downtown and waterfront – all within a spectacular setting on the shores of Lake Champlain. This deserving reputation is due in part to the City's small size, entrepreneurial spirit, civic-minded citizens and activist government. One of the many factors that makes Burlington such a great place to live, work and visit is the community's attention to detail, and respect for its setting, heritage and quality urban design.

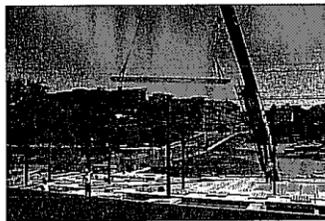
Burlington's Design Review process strives to protect the city's unique qualities and strong sense of place by carrying out citywide development and design objectives. The purpose of this *Design Review Guide* is to help applicants in preparing projects to be reviewed by the City's Design Advisory Board and Development Review Board. Through materials such as this, the Department of Planning & Zoning seeks to make information available well before the final design of a project, saving the applicant and the city, time and money.

Did you know that the initial cost of building construction represents only 1% to 2% of the total cost to build, own and operate a building over a thirty-year life? In addition, buildings are major energy users: the energy needed to heat, cool, light and ventilate buildings represents over 35% of the total national energy usage and 60% of total electricity production.

A well-planned construction project - including careful attention to energy efficiency and worker comfort - can pay dividends over time. Research indicates that buildings with energy efficient features like day-lighting and good ventilation can improve people's attitudes and productivity. Even slight gains in productivity will more than pay for the incremental cost of energy efficient design.

The City of Burlington is committed to promoting energy efficiency in buildings throughout the City. Energy-efficient buildings:

- benefit the owners and tenants by lowering costs,
- improve the lives of citizens by saving consumers money,
- lessen our demand for fossil fuels,
- decrease the need for new power generation,
- reduce pollution and,
- strengthen the local, state and national economy.



It is much cheaper to build efficiency into a new building than to retrofit an existing building later. Burlington's "Energy Efficiency Guidelines for New Construction" describes a minimum level of energy efficiency that must be designed into all new construction.



ENERGY EFFICIENT CONSTRUCTION GUIDELINES

In 1991 the Burlington City Council established an ordinance that requires that all commercial and residential construction and applicable new equipment be in compliance with the "Guidelines for Energy Efficient Construction for the City of Burlington, Vermont". (Art. VI, Energy Conservation, Sec. 8, Burlington Code of Ordinances)

Any new building, addition, renovation or equipment replacement project must meet the energy efficiency criteria of the Guidelines. The Guidelines adopt a national standard as the model energy code for Burlington. This standard is amended to suit Burlington's climate and special needs. The Guidelines contain criteria for the building's roof, exterior walls, and floors/ foundations; and the mechanical, lighting, and power systems.

Residential Construction

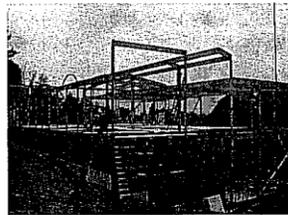
All residential construction must comply with the current edition of the Vermont Residential Building Energy Standard (RBES) and Sec. 21 V.S.A. § 266 of Vermont law as referenced in the Guidelines. The Guidelines amend RBES in Burlington to maintain application to renovation and any covered building component of RBES regardless of size and scope.

As is the case with all other development in Burlington, the Inspection Division of the Dept of Public Works (DPW) is the enforcement authority for compliance with the Guidelines. However, the BED Energy Services staff helps to administer the Guidelines and assists the Inspection Division and applicants with Guidelines applicability, interpretation and construction plan review. The Inspection Division will typically require a letter of approval from BED prior to issuing a building permit.



STEPS TO COMPLIANCE:

- Obtain a copy of the Guidelines by visiting www.burlingtonelectric.com or calling BED, Energy Services at 802-865-7342.
- Contact the DPW Inspection Division (863-9094) and BED Energy Services staff *early* in your planning process to discuss the project scope and compliance with the Energy Efficiency Guidelines.
- Request *free* consultation from BED Energy Services staff for ideas to best meet the Guidelines and cost effective design improvements that go beyond the Guidelines.
- Provide a set of design documents to BED Energy Services staff and request a Guidelines plan review and a letter of approval for DPW. This is a free service and BED will act quickly to review your project.
- BED will advise you of any building components that do not meet the Guidelines and how to make necessary design improvements.



FINANCIAL INCENTIVES

BED has a long history in helping owners, builders and developers incorporate energy efficient equipment, systems and techniques. BED will work with you to produce innovative, creative building designs that are efficient, cost effective and durable.

If you're planning a new construction project or building renovation, contact BED for assistance from permitting through inspection and occupancy. BED offers:

- technical assistance with building design and Guidelines compliance
- funding for your design team to evaluate various building system options exceeding the Guidelines
- funding assistance for third-party commissioning
- cash incentives for highly efficient equipment and systems.

BED will tailor its program to meet your individual needs - from incremental improvements in energy efficient equipment to advanced building designs incorporating energy efficiency, renewable energy systems and green building design.

ADDITIONAL INFORMATION

assistance with Burlington's Energy Efficiency Guidelines

- **Burlington Electric Dept.**
585 Pine St., Burlington, VT 05401
BED Residential Services - 802.865.7337
BED Commercial Services - 802.865.7342
www.burlingtonelectric.com
- **Energy Code Assistance Center**
255 South Champlain St., Burlington, VT 05401
888.373.2255

general information regarding city zoning permits

- **Burlington Dept. of Planning & Zoning**
149 Church St., Burlington, VT 05401
802.865.7188 www.ci.burlington.vt.us/planning/

general information regarding city building permits

- **Burlington Dept. of Public Works, Inspection Services**
645 Pine St., Burlington, VT 05401
802.863.9094 www.dpw.ci.burlington.vt.us/

In accordance with the Americans with Disabilities Act (ADA) of 1992, it is the policy of the City of Burlington not to discriminate on the basis of disability in offering benefits, services, programs, and activities.

This information can be made available in alternative media forms for people with disabilities. Reasonable accommodation shall be made upon request to insure that all benefits, services, programs, and activities offered by the City are fully accessible to all individuals. For information, call 865-7188 (865-7144 TTY). EOE.

Prepared by the Burlington Department of Planning & Zoning, 2004