BURLINGTON ELECTRIC DEPARTMENT

2021 Energy Efficiency Utility Annual Report

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1 Introduction & Summary

The Burlington Electric Department (BED) is pleased to submit the following report to the Burlington Electric Commission, the Vermont Public Utility Commission (PUC), and the Vermont Department of Public Service (DPS), summarizing the implementation of energy efficiency programs in the City of Burlington for the year 2021. 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 significant role in achieving this goal.

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. BED is owned by all the citizens of Burlington, who have been very supportive of BED's pursuit of additional cost-effective energy efficiency.

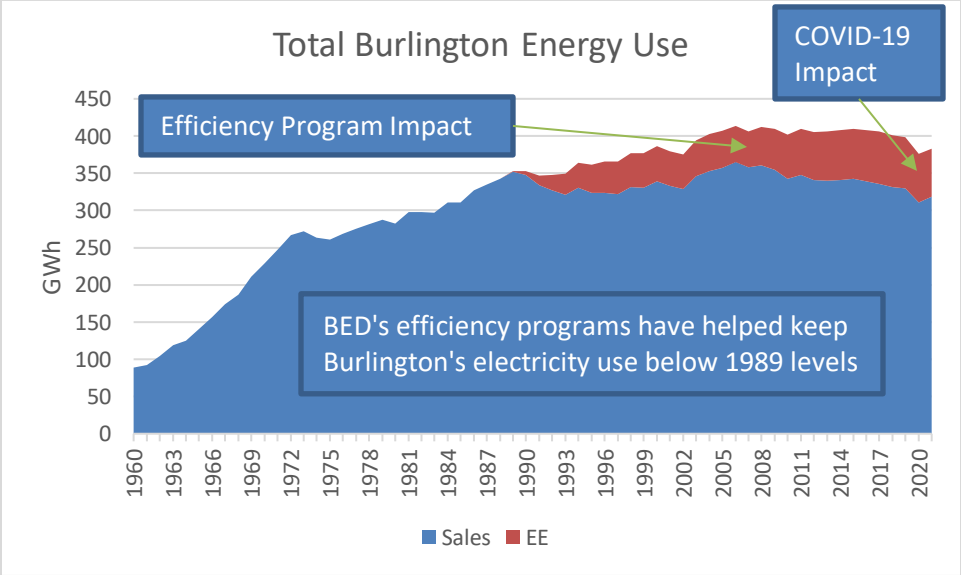
Burlington voters in 1990 approved an 11.3-million-dollar bond to fund energy efficiency programs that supported successful program activities through 2002. Since 2003, BED customers (like all other Vermont electric customers) pay a small monthly charge that supports these "Energy Efficiency Utility" (EEU) programs. When these funding sources are considered along with customers' direct investment, about $79 million has been invested in energy efficiency efforts sponsored by BED over the last 32 years. This is comprised of about $41 million spent by BED on all of its energy efficiency efforts during that period, combined with another $38.5 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. Energy efficiency investments in Burlington are saving our customers approximately $10 million annually on electric bills, including avoided energy and transmission and capacity costs.

As Figure 1 indicates, the overall effect has been dramatic. Energy Efficiency has flattened BED's energy load requirement since the 1990's. As of year-end 2021, electricity consumption in Burlington is approximately 8% lower today than in 1989

when adjusted to remove COVID-19 impacts. Actual electric consumption in 2021 was about 12% lower than in 1989, when including COVID-19 impacts. From 1989-2018, statewide electric consumption increased more than 10%. Over same period, U.S. electric consumption increased more than 30%. In other words, we are meeting the needs of a growing local economy with less electricity than we used over a quarter century ago. The consistent delivery of affordable energy efficiency services has helped to meet the needs of a growing local economy over the last 32 years with less electricity than was used then.

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

Figure 1: Impact of DSM on Total City Electricity Sales



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 customers. 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. Given the relatively small size of BED's system, the loss of only a few commercial new construction projects, for example, can have a dramatic impact on its annual budgets and savings estimates.

Year-to-year fluctuations in program results reflect the relative unpredictability of energy efficiency program timing and support the notion that *annual* projections are no more than carefully crafted estimates. In the long run, the performance of BED's energy efficiency programs continues to meet the expectations laid out in BED's Integrated Resource Plans (IRP) and prior planning documents dating back more than 32 years. Energy efficiency has flattened BED's energy load requirement since the 1990's and BED's consistent investment in energy efficiency will continue to have lasting benefits in the city. Burlington's Net Zero Energy City by 2030 efforts will change historic electric energy usage pattern in the coming years but it will not change BED's continuing commitment to incorporate cost-effective energy efficiency practices in all programs where possible.

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

BED recognizes that much of its success comes from effective working relationships not only with EVT, but also with its partners VGS, Champlain Valley Weatherization Service (CVWS) and the Burlington 2030 District. A cooperative relationship with VGS helps both organizations promote EEU services. About 95% of Burlington's buildings use natural gas for space heating and about 90% use it for domestic hot water. 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 and VGS have also created a process to share weatherization program and incentives costs for, an emerging number of, customers who are partially natural gas heated and partially electric heat pump heated.

BED also continues to perform substantial analysis of energy efficiency and demand response impacts on its system as part of the IRP and EEU Demand Resource Plan (DRP) processes. BED updates all of its energy efficiency and demand response planning assumptions on a 3-year basis. BED will continue to test all program design assumptions and pursue all strategies to make programs as cost-effective, and as easy to participate in, as possible. BED remain responsible for reacting with appropriate program design modifications to the changing market conditions that impact customers' decisions about undertaking energy efficiency upgrades.

2022 & 2023 Outlook -

As described in Section 2 (starting on page 15), 2021 overall program activity was very sluggish, and continues to be the same in 2022 in both new construction and commercial existing facilities, in-particular, as was the case in 2020.

The commercial sector represents about 75% of BED's annual savings goal. Through discussions with our Community Economic Development Office (CEDO), and other partners, we continue to learn that many business customers are still proceeding cautiously due to the pandemic, and with many of their employees still working from home. There is uncertainty about the future of their business survival, viability of current business model, cash-flow concerns, and reluctance to take on more debt. Workforce shortages and supply chain disruptions are also compounding issues.

As we have previously reported, activity remains relatively strong with residential cold climate heat pump, and also increased activity with some Energy Star home appliances, due to the EEU Green Stimulus (GS) bonus incentives. Heat pumps are bolstered by Tier 3, traditional EEU, EEU GS, and now Act 151 pilot funds combined rebates. All of these products offer higher incentives for our low-income customers. For 2022 and 2023, the Act 151 pilot budget will allow us to continue offering some of these bonus incentives. While BED is pleased with this customer activity, the electric savings from these measures are relatively low so, alone, they do not contribute enough towards meeting the 2021-2023 MWH goals.

Several of the on-going new construction projects, that we have been reporting on for several years now, are in the final energy model calibration phase where BED will be able to claim savings in 2022 or 2023 and also pay the remaining fifty percent of the incentives. These are buildings that are now occupied and represent about 1,500 MWH of potential savings. If these projects complete in time for 2022 and 2023 reporting, then they will also help to improve the overall portfolio yield rate as these yield rates are more in-line with historic performance.

Unfortunately, the level of overall EEU program activity in 2022 is a challenge to predict today as our local economy is still in the recovery stage and most area employees are still working from home. The coming months will be telling, especially, in terms of commercial customer activity and the "return to work" positions businesses take. Consumer comfort levels with retail shopping and visiting food establishments will also play a key role. New construction activity for 2022 and 2023 is also not looking strong as few new projects have been introduced to the City's Planning and Zoning permitting process. Any new major buildings projects starting the permitting process in early to mid-2022 will not be finished construction by the end of 2023. BED will inform the PUC and DPS of any on-going concerns that will impact the 2021-2023 DRP and if a mid-point savings and budget adjustment request is prudent.

BED continues to use multiple communication channels to inform customers and contractors about all our EEU and Tier 3 program efforts including:

- Website
- Social media
- Press conferences
- Press releases
- E-Newsletter
- Podcast
- Videos (internal & external)
- Front Porch Forum
- North Avenue News articles
- Print ads
- Photos
- Yard signs
- Radio ads

The next section below highlights some of the outreach, engagement, and staff awareness activities, including an increased focus on our BIPOC and income-eligible customers. More information on these efforts is also included in some of the program descriptions below.

1.1 Outreach and Engagement with a Focus on BIPOC and Low- and Moderate-Income Customers (LMI)

BED continues to recognize that these are exciting times in the emerging energy transformation world for many customers and we remain committed to ensuring that all of our customers have access to our EEU and Tier 3 programs and services.

As a city department and community member, BED acknowledges the hardships that our customers have been experiencing due to COVID-19. Working toward our EEU, Tier 3 and Net Zero Energy City (NZE) goals, while also addressing and overcoming pandemic-related challenges, continues to require support and engagement from the community over an extended period. In addition, BED recognizes the continuing period of intense focus on social and racial justice issues in our community and nation as an opportunity to ensure that our programs and services are available, accessible, and affordable to all of our customers. As the bullets below indicate, BED has already embarked on some of this important work to ensure that our programs are consistently impactful.

BED also acknowledges the PUC and DPS concern regarding our low-income customer program underspending in the 2018- 2020 performance period and BED is continuing with several on-going efforts (highlights listed below), in coordination with City

partners, to enhance outreach strategies, and our 2021-2022 Strategic Direction includes the following objectives:

> *Ensure all programs are equitable and accessible, with a priority given to low-to-moderate income, rental, black, indigenous, and people of color (BIPOC), immigrant, and refugee populations.*
>
> *Proactively seek customer input, including through new community ambassador program, and listen to and hear their needs and incorporate their input into program design.*

BED is pleased to report that for CY 2021, we have surpassed the 2021-2023 low-income spending goal and continue to work on additional income-eligible projects that will further enhance spending and energy savings in this performance period. BED will report on this progress in upcoming quarterly reports. BED recognizes that to consistently surpass the goal, for all the years to come, the efforts listed below (along with other creative efforts) will need to be consistently monitored and improved upon.

- *BED staff learning & awareness city efforts*– As part of our city's commitment to racial equity, over the 2021-2023 period, the Racial Equity Inclusion and Belonging Department (REID), with support from Human Resources launched City wide Anti-Racist Training. REID has constructed a multi-level training curriculum with the goal of creating a baseline understanding of the history of institutional and systemic racism amongst all City employees, Boards and Commissions, and City Council. The modules are designed to benefit all City of Burlington employees regardless of level of knowledge regarding systemic racism. The training recognizes that all employees should be making continued efforts to learn more and increase understanding of systemic racism, how it impacts us, and how we can best combat it. Moving forward, these trainings will be a requisite part of every current and future employee's professional development.

- *BED staff learning & awareness (an outside perspective on our programs)*- BED has been utilizing the University of New Hampshire's (UNH) Sustainability Fellow program for the past several years to help BED better understand our program designs. Starting in the spring of 2020, Anu Makinde, from the University of Alabama at Birmingham embarked on a Burlington research project (for BED and VGS) intitled, "How Service Providers Understand Household Energy Burden in New American Families". The purpose of the project was to:

  > *Inform the Burlington Electric Department and Vermont Gas Systems about conversations with local community groups, state and federal agencies that work to provide New Americans with services. They have illuminated the need to create strong relationships within this community in order for their needs to be*

met. The work done by these stakeholders encounters energy burden and how it affects the New American population. Also spoken to this summer and highlighted in this paper are organizations that work to provide low-income customers with energy efficiency programs.

Anu's key recommendation is that we need to do a better job listening to community issues and strengthening the bonds with members of the New American community i.e., Immigrants, Refugees and First-Generation Americans. The report has been highly informative, and BED is happy to share a copy upon request.

- *Direct customer assistance*- BED has added a language translator engine to its website so that our New American customers have easier access to information and services.

- *Direct customer assistance* - Continue to contract with a Telelanguage.com which supports over 200 languages 24/7/365. BED's Energy Services and Customer Care teams continue to use this service to better communicate with customers on a number of topics.

- *Direct customer assistance* - As described in the TEPF section below, BED continues working with CVOEO's Mobile Home project, VEIC, CEDO, Champlain Housing Trust (CHT) and Green Mountain Habitat for Humanity to encourage Zero Energy Modular (ZEM) replacements for residents at the North Avenue Co-op Mobile Home Park. As of date, three ZEM's are now located in the park.

- *Impactful city policies to help renters with quality weatherization upgrades*– Due to BED's long-standing EEU experience with program design and implementation, ES staff was asked to work with the Department of Permitting & Inspections (DPI) Rental Housing Code Enforcement staff to design a mandatory weatherization requirement to be added to the "minimum rental housing code". Passed by the City Council in May of 2021, "high energy use" rental housing buildings need to comply with the new Weatherization Ordinance as of January 1, 2022.

- *Outreach and engagement to the business community including non-profit and low-income service organizations* - Prior to the pandemic, BED began to use customer and contractor-based videos to help with program outreach and energy education. BED's in-house communications staff produces, shoots, and edits these videos and distributes them via our website and social media platforms. The BED sponsored "Ventilation" webinar is an example. BED wanted to focus on the technical aspects of the building ventilation topic but do it while also featuring CVOEO and the

Children's Space as they both serve the low-income and BIPOC communities. Showing CVOEO and BED as community partners we hope sends an impactful message letting all customers know that BED is here to help.

- Champlain Housing Trust and Cathedral Square Corporation are now active members of the Burlington 2030 District. The steering committee has also invited Burlington Housing Authority to join. These three affordable housing organizations are key partners in providing energy efficiency services to our income-eligible customers.

The remaining pages on this report provide details on BED's delivery of the following EEU services in 2021:

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

2022 will also see the start of BED's approved Act 151 pilot programs that are listed below. BED will be reporting on these new activities in upcoming 2022 EEU quarterly reports and in the 2022 EEU Annual Report.

Act 151 activities in 2022 include the following:

- **Additive Incentives for all electric vehicles and plugin electric vehicles ("EVs")**
- **Preferred EV dealer network support**
- **Electric vehicle supply equipment ("EVSE") expansion into neighborhoods**
- **Additive incentives for advanced heat pump technologies with integrated controls**

- **Geothermal well testing**

- **Support of DeltaClime VT, a Vermont based business accelerator organization serving start-up ventures focused on climate economy innovation.**

Table 1: All Business & Residential DSM History*

		Costs						MWh		kW	
	Participants	Admin	Services	Incentive	Evaluation	Participant	Total	Annual	Lifetime	Winter	Summer
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
2014	988	$380,161	$577,196	$1,246,484	$63,671	$3,277,600	$5,545,111	5,399	64,811	959	785
2015	1,021	$329,612	$570,899	$1,291,414	$67,289	$2,025,393	$4,284,606	6,025	80,842	849	628
2016	1,427	$383,409	$511,696	$1,367,951	$69,644	$2,292,047	$4,624,747	6,102	72,043	745	529
2017	1,559	$529,382	$561,806	$1,307,062	$69,646	$2,477,247	$4,945,143	7,022	88,436	899	709
2018	1,555	$566,467	$562,927	$1,373,375	$42,397	$1,527,526	$4,072,691	4,896	63,890	886	607
2019	1,489	$545,939	$544,825	$797,194	$54,414	$684,504	$2,626,876	3,551	41,163	589	446
2020	1,228	$611,080	$464,690	$1,738,158	$106,259	$1,062,838	$3,983,025	3,792	57,343	613	492
2021	1,328	$506,856	$374,545	$1,329,429	$106,259	$279,992	$2,597,081	2,677	40,167	371	319
Total	**43,996**	**$10,835,656**	**$8,736,599**	**$20,412,503**	**$1,421,132**	**$38,264,700**	**$79,670,591**	**153,965**	**1,931,057**	**25,584**	**17,328**

**All history tables in this report reflect adjustments in MWh savings claims from the DPS savings verification process.*

Table 2: All Business DSM History

		Costs						MWh		kW	
	Participants	Admin	Services	Incentive	Evaluation	Participant	Total	Annual	Lifetime	Winter	Summer
1991	3	$130,784	$0	$1,849	$0	$2,157	$134,790	31	93	30	0
1992	16	$149,138	$0	$119,535	$4,063	$454,104	$726,840	246	24,388	227	0
1993	164	$162,366	$0	$305,473	$35,559	$1,308,524	$1,811,922	5,587	72,218	1,421	0
1994	104	$238,153	$0	$163,733	$21,690	$630,639	$1,054,215	2,242	14,970	626	0
1995	163	$199,835	$0	$142,342	$9,480	$1,368,954	$1,720,611	6,137	21,386	1,615	0
1996	151	$151,409	$0	$50,423	$28,498	$355,217	$585,547	1,233	16,150	0	334
1997	160	$78,321	$0	$96,959	$5,612	$757,774	$938,666	2,300	33,565	0	669
1998	164	$141,258	$0	$65,048	$50	$615,144	$821,500	2,767	37,930	0	734
1999	162	$150,772	$0	$71,501	$0	$270,056	$492,329	1,051	10,895	0	338
2000	145	$176,552	$56,070	$80,108	$0	$613,597	$926,327	2,438	28,712	309	334
2001	127	$255,082	$99,310	$84,729	$43,248	$384,763	$867,132	2,064	26,581	240	240
2002	113	$284,826	$112,447	$238,866	$252	$912,280	$1,548,671	2,888	43,183	224	392
2003	144	$154,937	$243,386	$148,306	$9,503	$254,905	$811,037	2,193	32,975	122	162
2004	142	$115,796	$192,327	$140,234	$3,928	$507,253	$959,538	2,505	35,419	335	394
2005	133	$133,542	$208,860	$202,143	$0	$814,001	$1,358,546	3,751	57,787	342	397
2006	150	$112,917	$240,425	$261,310	$24,533	$575,467	$1,214,652	5,094	73,084	503	652
2007	151	$125,761	$244,030	$280,213	$33,320	$977,132	$1,660,456	6,530	104,174	482	763
2008	115	$113,641	$250,666	$304,252	$43,576	$904,640	$1,616,775	3,264	48,407	386	386
2009	105	$173,789	$224,900	$305,352	$44,608	$1,743,182	$2,491,831	3,781	51,336	336	555
2010	228	$168,765	$249,094	$849,801	$35,630	$458,549	$1,761,839	3,489	52,358	511	673
2011	220	$162,357	$277,034	$972,032	$47,704	$335,095	$1,794,222	2,787	37,950	421	521
2012	323	$153,822	$307,898	$721,047	$49,516	$1,667,503	$2,899,786	4,215	54,786	494	680
2013	355	$166,097	$384,773	$952,314	$64,371	$1,320,521	$2,888,076	4,440	55,668	533	537
2014	365	$193,375	$434,315	$846,835	$47,753	$3,006,372	$4,528,650	3,559	43,676	526	524
2015	382	$159,179	$430,188	$746,424	$50,467	$1,709,721	$3,095,979	3,691	50,912	332	382
2016	512	$166,511	$406,350	$893,142	$51,990	$1,659,634	$3,177,627	4,074	39,361	361	397
2017	508	$232,740	$463,676	$907,098	$50,198	$2,183,380	$3,837,092	4,645	53,336	420	544
2018	436	$263,751	$478,835	$951,062	$31,671	$1,021,748	$2,747,066	2,716	30,459	433	464
2019	468	$292,555	$382,503	$575,846	$40,121	$445,251	$1,736,276	2,192	23,130	270	307
2020	448	$361,598	$317,005	$1,044,544	$74,576	$937,736	$2,735,459	2,642	39,210	383	411
2021	343	$282,828	$260,931	$872,954	$74,576	$86,597	$1,577,886	1,915	28,525	195	268
Total	**7,000**	**$5,652,457**	**$6,265,022**	**$13,395,474**	**$926,493**	**$28,281,896**	**$54,521,342**	**96,467**	**1,242,624**	**12,077**	**12,058**

Table 3: All Residential DSM History

		Costs						MWh		kW	
	Participants	Admin	Services	Incentive	Evaluation	Participant	Total	Annual	Lifetime	Winter	Summer
1991	388	$225,779	$0	$271,588	$6,015	$1,089,033	$1,592,415	3,672	52,010	1,194	0
1992	314	$184,928	$0	$145,080	$10,648	$649,946	$990,602	3,349	48,335	1,158	0
1993	1,179	$181,960	$0	$196,518	$72,087	$743,521	$1,194,086	3,611	60,861	1,213	0
1994	630	$129,447	$0	$33,321	$24,482	$297,163	$484,413	1,062	17,588	365	0
1995	664	$55,935	$0	$7,523	$7,186	$215,857	$286,501	627	10,016	35	0
1996	623	$63,920	$0	$67,583	$15,820	$145,146	$292,469	1,052	22,504	0	24
1997	575	$64,863	$0	$25,230	$399	$90,606	$181,098	365	5,526	0	45
1998	528	$63,330	$0	$42,092	$303	$116,563	$222,288	435	6,041	0	88
1999	513	$64,010	$0	$29,723	$1,529	$61,929	$157,191	249	3,279	0	20
2000	1,219	$158,210	$40,997	$68,054	$0	$148,076	$415,337	692	8,499	134	53
2001	1,283	$170,041	$30,645	$123,449	$16,389	$224,352	$564,876	1,030	14,677	158	101
2002	1,711	$184,437	$79,696	$168,191	$2,100	$266,415	$700,839	1,550	19,976	220	128
2003	1,753	$150,346	$122,305	$88,456	$9,503	$283,684	$654,294	1,153	23,357	224	199
2004	1,342	$137,241	$109,690	$131,622	$15,139	$131,566	$525,258	995	11,437	290	163
2005	1,844	$108,843	$142,149	$58,663	$5,904	$156,436	$471,995	1,197	11,783	288	233
2006	2,038	$108,945	$112,461	$120,396	$17,524	$127,108	$486,434	1,160	10,867	310	239
2007	1,894	$130,095	$131,450	$161,139	$18,705	$376,519	$817,908	3,149	23,848	724	395
2008	6,277	$334,226	$161,371	$273,993	$21,583	$283,031	$1,074,204	4,035	23,995	792	503
2009	1,076	$143,468	$146,333	$147,549	$23,059	$216,795	$677,204	1,898	13,080	429	256
2010	1,410	$209,388	$90,475	$252,796	$18,653	$322,979	$894,291	3,003	23,596	712	475
2011	807	$148,179	$104,009	$400,650	$22,038	$685,747	$1,360,623	4,404	30,203	912	479
2012	921	$142,282	$117,718	$314,004	$14,155	$300,610	$888,769	2,213	20,264	624	277
2013	874	$122,959	$87,496	$276,247	$13,191	$473,013	$972,906	2,567	26,605	734	373
2014	623	$186,786	$142,880	$399,649	$15,918	$271,228	$1,016,461	1,840	21,135	433	261
2015	639	$170,433	$140,711	$544,989	$16,822	$315,672	$1,188,627	2,334	29,930	517	246
2016	915	$216,898	$105,346	$474,809	$17,654	$632,413	$1,447,121	2,028	32,682	384	132
2017	1,051	$296,642	$98,130	$399,964	$19,448	$293,867	$1,108,051	2,377	35,100	479	165
2018	1,119	$302,715	$84,092	$422,314	$10,726	$505,778	$1,325,625	2,180	33,431	453	143
2019	1,021	$253,384	$162,322	$221,349	$14,293	$239,253	$890,601	1,359	18,033	319	139
2020	780	$249,481	$147,685	$693,614	$31,683	$125,102	$1,247,566	1,150	18,133	230	81
2021	985	$224,028	$113,614	$456,475	$31,683	$193,395	$1,019,195	762	11,642	176	51
Total	**36,996**	**$5,183,199**	**$2,471,576**	**$7,017,030**	**$494,639**	**$9,982,804**	**$25,149,249**	**57,498**	**688,433**	**13,507**	**5,270**

2 Overview of EEU Services Results

As described in more detail in each program below, 2021 proved to be a challenge for achieving savings goals in most programs. Overall, BED achieved 56% of the total annual MWh goal, 53% of the summer coincident–peak KW goal and 55% of the winter coincident–peak KW goal.

BED projected 4,747 annualized MWh savings and achieved 2,676 annualized MWh which will result in 40,167 MWh of savings over the useful life of the installed measures (2021 measures have a weighted average lifetime of about 15 years). BED projected 600 coincident-peak summer KW savings and achieved 320 KW. BED projected 680 coincident-peak winter KW savings and achieved 372 KW.

BED's electric resource acquisition budget for 2021 was $2,253893 and $2,197,498 was expended, about 3% less than budgeted. BED's cost for, first year, saved energy was higher than projections. BED estimated it would spend about $475 per annualized MWh saved, and instead spent $821 per annualized MWh. These higher costs can be directly attributed to BED Green Stimulus program activities which included significant increases to customer incentives. Absent the Green Stimulus effort, BED estimates that overall program savings and expenditures would have been significantly less.

BED's general administrative costs as a percentage of total BED program costs came in at 10.3%. Other non-program incentive costs were about 15.7% of the 20221 budget and 74% of the budget was spent on direct technical assistance (energy audits and engineering services) and cash incentives to customers.

Table 4: EEU Business & Residential - Total Resource Benefits

Avoided Costs of Electricity	$4,386,800
Fossil Fuel Savings	$416,270
Water Savings	$70,801
TRB Total	$4,548,233

	Annual	**Lifetime**
Meter MWh	2,580	38,636
Generation MWh	2,676	40,167
Meter Demand kW	1,209	17,611
Generation Peak Summer kW	320	4,529
Generation Peak Winter kW	372	5,684
Water Savings	$649	$9,086
Fuel Savings	$1,984	$37,790
O+M Savings	$12,059	$169,558

Table 5: EEU Business & Residential - Summary

	Prior Year 2020	Current 2021	Program to Date
Program Costs			
Incentive and Technical Assistance			
Incentive			
Incentives to Participants (RA)	$ 1,369,787	$ 1,328,339	$ 2,698,126
Incentives to Trade Allies (RA)	$ -	$ -	$ -
Technical Assistance			$ -
Services to Participants (RA)	$ 580,747	$ 464,323	$ 1,045,070
Services to Trade Allies (RA)	$ 6,144	$ 2,915	$ 9,059
Energy Code and Standards Support (DSS)	$ 29	$ 856	$ 884
Building Energy Labeling and Benchmarking (DSS)	$ -	$ -	$ -
Better Buildings by Design (DSS)	$ 2,877	$ 5,436	$ 8,313
***Incentive & Tech Asst Sub-Total* (1)**	$ 1,959,584	$ 1,801,869	$ 3,761,453
Non-Incentive Program Costs			
Programs and Implementation (RA)	$ 108,942	$ 179,050	$ 287,992
Strategy and Planning (RA)	$ 88,452	$ 73,208	$ 161,660
Marketing Program (RA)	$ -	$ 5,985	$ 5,985
Customer Support (DSS)	$ -	$ -	$ -
General Marketing & Public Education (DSS)	$ 15,745	$ 26,286	$ 42,031
Energy Literacy (DSS)	$ 7,944	$ 15,366	$ 23,310
Applied R&D (DSS)	$ 2,594	$ 951	$ 3,545
Support Services (RA)	$ 92,822	$ 55,251	$ 148,073
Quality Assurance	$ 53,690	$ 31,861	$ 85,551
***Non-Incentive Program Sub-Total* (2)**	$ 370,188	$ 387,958	$ 758,146
Total Program Costs	$ 2,329,772	$ 2,189,827	$ 4,519,599
Administrative			
Sr. Management, Budget, Financial Oversight (RA)	$ 95,594	$ 131,505	$ 227,100
Policy & Public Affairs (DSS	$ 10,304	$ 1,391	$ 11,695
Planning & Reporting (DSS)	$ 71,990	$ 31,813	$ 103,803
Administration & Regulatory (DSS)	$ -	$ -	$ -
IT (DSS)	$ 24,685	$ 25,582	$ 50,268
Evaluation (DSS)	$ 16,308	$ 19,733	$ 36,041
Direct and Indirect Overhead	$ 61,932	$ 40,441	$ 102,372
***Administrative Sub-Total* (3)**	$ 280,813	$ 250,465	$ 531,278
Earned Compensation			
Base Compensation			
Performance Compensation			
***Earned Compensation Sub-Total* (4)**			
Total Program and Administrative	$ 2,610,586	$ 2,440,291	$ 5,050,877
Overall Total	**$ 2,610,586**	**$ 2,440,291**	**$ 5,050,877**

--- Benefits ---			
Annual MWh	3,792	2,677	158,109
Lifetime MWh	57,343	40,167	2,000,265
Winter Peak kW	613	371	26,288
Summer Peak kW	492	319	18,521
MWh / Participant	3	2	4
Weighted Lifetime	15	15	13

Table 6: EEU Business & Residential - End Use Summary

		MWh			kW			
Description	**Participants**	**Gross**	**Net**	**Lifetime**	**Winter**	**Summer**	**MMBTU**	**CCF**
Air Conditioning Efficiency	124	235.18	246.98	3,495.16	1.32	29.12	0.00	0.00
Cooking and Laundry	35	59.03	46.12	589.58	6.25	4.67	0.67	649.00
Hot Water Efficiency	28	32.23	31.20	406.08	4.91	2.48	0.00	0.00
Light Bulb/Lamp	99	168.05	177.31	2,481.85	25.35	29.69	0.00	0.00
Lighting Hardwired Fixture	536	1,189.26	1,283.04	18,291.87	188.27	216.82	-222.79	0.00
Motors	55	12.87	13.40	247.71	2.14	1.29	0.00	0.00
Office	2	0.11	0.11	0.52	0.01	0.01	0.00	0.00
Other	5	146.43	155.40	3,107.91	29.17	2.30	1,547.20	0.00
Refrigeration	49	276.92	288.19	4,315.09	22.86	24.42	634.30	0.00
Space Heat Efficiency	261	54.42	55.75	1,066.99	1.70	0.16	-0.50	0.00
Space Heat Fuel Switch	4	-7.66	-8.17	-147.15	-1.20	0.00	0.00	0.00
Space Heat Replacement	304	384.50	368.11	5,848.83	88.57	8.90	0.00	0.00
Thermal Shell	10	27.32	17.44	435.92	2.32	0.19	25.40	0.00
Ventilation	24	1.45	1.39	26.44	0.17	0.17	0.00	0.00
Total		2,580.11	2,676.27	40,166.81	371.82	320.22	1,984.28	649.00

2.1 Development and Support Service

The following section highlights BED's Development and Support Services (DSS) activities for 2021 (renamed from Non-Resource Acquisition in 2017). DSS 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 DSS categories were developed collaboratively with the DPS as part of the EEU Demand Resource Plan Process and approved by the PUC.

BED's DSS activities include education, applied research, and development, planning and reporting, evaluation, policy and public affairs, information technology and general administration.

Education & Training- 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.

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.

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

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

Policy and Public Affairs- This DSS 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 consists of continuing the support of and improvement to the DSM EEU database system for the collection and processing of project data and program information critical to tracking, reporting, and planning functions. There is a fairly regular need to alter measure savings characterization, existing tools or add new tools and functionality to the system which helps us to better understand and respond to changes in the Burlington marketplace.

General Administration- This DSS 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: Electric Development and Support Services

Electric DSS Activity	2021 Budget	2021 Actual Spending	2021-2023 Budget	% 2021-2023 Budget
Education & Training	$ 32,640	$ 47,599	$ 99,840	48%
Applied R&D	$ 8,000	$ 951	$ 24,600	4%
Planning & Reporting	$ 46,733	$ 29,400	$ 142,933	21%
Evaluation	$ 17,000	$ 19,369	$ 52,000	37%
Policy & Public Affairs	$ 7,470	$ 1,053	$ 22,870	5%
Information Tech	$ 11,000	$ 25,400	$ 33,600	76%
General Administration	$ 45,000	$ 99,154	$ 137,700	72%
Total	**$ 167,843**	**$ 222,926**	**$ 513,543**	**43%**

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, 2021 results in business services fell short of the savings projections. BED projected 3,986 megawatt-hour (MWh) savings while achieving actual annual energy savings of 1,915 MWh, about 48% of the goal. BED's cost to deliver EEU business services in 2021 was $1,416,712 below the budgeted amount of $1,690,420 by 17%.

As mentioned in the Introduction, it is often difficult to forecast savings and expenses in the Business 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 explained in more detail in Business New Construction program below.

The impacts from the on-going pandemic also significantly affected program activities with a large number of employees still working from home along with reduced retail and restaurant activity.

Table 8: EEU Business - Total Resource Benefits

Avoided Costs of Electricity	$3,203,291
Fossil Fuel Savings	$337,951
Water Savings	$382
TRB Total	$3,336,789

	Annual	**Lifetime**
Meter MWh	1,815	26,975
Generation MWh	1,915	28,525
Meter Demand kW	480	7,025
Generation Peak Summer kW	268	3,821
Generation Peak Winter kW	195	2,964
Water Savings	$4	$49
Fuel Savings	$1,959	$37,154
O+M Savings	$10,804	$151,910

Table 9: EEU Business - Summary

	Prior Year 2020	Current 2021	Program to Date
Program Costs			
Incentive and Technical Assistance			
Incentive			
Incentives to Participants (RA)	$ 787,691	$ 871,864	$ 1,659,554
Incentives to Trade Allies (RA)		$ -	$ -
Technical Assistance			
Services to Participants (RA)	$ 374,852	$ 315,106	$ 689,958
Services to Trade Allies (RA)		$ -	$ -
Energy Code and Standards Support (DSS)		$ -	$ -
Building Energy Labeling and Benchmarking (DSS)		$ -	$ -
Better Buildings by Design (DSS)		$ -	$ -
***Incentive & Tech Asst Sub-Total* (1)**	$ 1,162,543	$ 1,186,970	$ 2,349,513
Non-Incentive Program Costs			
Programs and Implementation (RA)	$ 60,588	$ 90,392	$ 150,981
Strategy and Planning (RA)	$ 47,116	$ 29,110	$ 76,225
Marketing Program (RA)		$ 2,176	$ 2,176
Customer Support (DSS)		$ -	$ -
General Marketing & Public Education (DSS)		$ -	$ -
Energy Literacy (DSS)		$ -	$ -
Applied R&D (DSS)		$ -	$ -
Support Services (RA)	$ 57,629	$ 36,570	$ 94,199
Quality Assurance	$ 30,228	$ 19,407	$ 49,635
***Non-Incentive Program Sub-Total* (2)**	$ 195,562	$ 177,655	$ 373,216
Total Program Costs	$ 1,358,105	$ 1,364,625	$ 2,722,729
Administrative			
Sr. Management, Budget, Financial Oversight (RA)	$ 22,671	$ 14,555	$ 37,226
Policy & Public Affairs (DSS		$ -	$ -
Planning & Reporting (DSS)		$ -	$ -
Administration & Regulatory (DSS)		$ -	$ -
IT (DSS)		$ -	$ -
Evaluation (DSS)		$ -	$ -
Direct and Indirect Overhead	$ 35,997	$ 24,565	$ 60,562
***Administrative Sub-Total* (3)**	$ 58,668	$ 39,120	$ 97,788
Earned Compensation		$ -	
Base Compensation		$ -	
Performance Compensation		$ -	
***Earned Compensation Sub-Total* (4)**		$ -	
Total Program and Administrative	$ 1,416,773	$ 1,403,744	$ 2,820,517
Overall Total	**$ 1,416,773**	**$ 1,403,744**	**$ 2,820,517**

--- Benefits ---			
Annual MWh	2,642	1,915	100,474
Lifetime MWh	39,210	28,525	1,308,410
Winter Peak kW	383	195	12,772
Summer Peak kW	411	268	13,150
MWh / Participant	6	6	19
Weighted Lifetime	15	15	13

Table 10: EEU Business - End-Use Summary

		MWh			kW			
Description	**Participants**	**Gross**	**Net**	**Lifetime**	**Winter**	**Summer**	**MMBTU**	**CCF**
Air Conditioning Efficiency	4	195.11	207.78	3,115.78	0.00	18.41	0.00	0.00
Cooking and Laundry	2	0.16	0.16	2.21	0.02	0.02	0.00	3.50
Hot Water Efficiency	6	10.41	10.38	134.93	1.64	0.83	0.00	0.00
Light Bulb/Lamp	47	128.00	135.88	1,869.31	13.16	26.19	0.00	0.00
Lighting Hardwired Fixture	225	982.16	1,037.23	14,608.98	116.38	195.83	-222.79	0.00
Other	5	146.43	155.40	3,107.91	29.17	2.30	1,547.20	0.00
Refrigeration	16	266.19	280.69	4,192.41	22.15	23.54	634.30	0.00
Space Heat Efficiency	62	39.32	40.10	760.89	1.21	0.07	0.00	0.00
Space Heat Replacement	18	47.18	46.93	732.37	11.65	1.19	0.00	0.00
Total		1,814.96	1,914.53	28,524.79	195.38	268.37	1,958.71	3.50

2.2.1 Business New Construction

Program Description

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

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

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 Permitting & Inspections.

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

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

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

Project Highlights

The annualized megawatt-hour (MWh) savings for 2021 were 437, about 69% lower than the projection of 1,395 MWh. Total BED program costs were $513,167, about 13% lower than the budgeted amount of $591,647.

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. Also, timing plays a role in annual results as some projects do not complete precisely in the planned year. BED's tiered-incentive approach also impacts year-to year results as partial incentives can be paid in one year, but the savings are not claimed until the following year. Long-term average results are a better indicator of what can be expected on an annual basis than any given year's data. In addition, the Covid -19 pandemic added another layer of delays to several projects and has significantly dampened new projects applying for zoning permits.

Program Outlook

2022 will continue to see further coordination between BED's EEU and Tier 3 programs. Heat pump technology is continuing to emerge as an alternative for building space conditioning, even when natural gas service is available. Accordingly, BED will continue to evaluate the costs and benefits of various HVAC systems such as air source and ground source heat pumps. To further advance the adoption of these technologies, particularly ground source heat pumps, BED is using Tier 3 funding to help offset the initial cost of ground source or variable refrigerant flow (VRF) heat pump systems.

Combining Tier 3 and EEU funds together can help to further the City's transition away from fossil fuels to renewable electricity. Tier 3 funds can be used to influence heat pump adoption and EEU funds can be applied toward the highest efficiency water source heat pumps, thermal shell measures, building controls and lighting.

BED will also continue to offer financial assistance for commercial building envelope commissioning. With a growing number of heat pump heated and cooled buildings (ductless mini splits, variable refrigerant flow (VRF) and ground source heat pump systems) coming online, high performance building shells, and HVAC controls, are an increased focus. With the help of Vermont based thermal envelope specialists, BED continues working with Architects, owners, and contractors to encourage building envelops that are being designed and constructed utilizing higher performance thermal envelope techniques.

Understandably, building ventilation has been an important topic due to the pandemic and air leakage reduction may seem counterproductive to some from a health perspective. However, when looking at building energy models, air leakage reduction can have a significant impact on both building energy usage and can also make central ventilation systems more effective. "Build Tight-Ventilate Right" is a common high-performance building concept. Buildings that have both tight thermal envelopes, and efficient central energy recovery ventilation (ERV) systems, can provide healthy ventilation rates (consistently and comfortably) to occupants, throughout buildings, at a reduced cost. Leakier buildings can "short-circuit" air flow from central ventilation

systems leading to an imbalance of air distribution leading to under ventilation in parts of buildings. Leakier buildings, without good ventilation systems, also "leak" inconsistently as they are highly dependent of temperature differences and wind to move air in and out of buildings.

"Buildings as batteries" is another emerging concept that also supports high performance thermal shells. Tighter buildings are strong candidates for demand response (DR) programs, like BED's "Defeat the Peak" summertime DR effort based, mainly, on cooling load reductions. Temperature and relative humidity levels stay more consistent in tighter buildings. For HVAC based DR programs to be successful over time, avoiding occupant comfort related concerns is an important component.

Table 11: EEU Business New Construction - Total Resource Benefits

Avoided Costs of Electricity	$792,460
Fossil Fuel Savings	$313,076
Water Savings	$0
TRB Total	$1,105,551

	Annual	**Lifetime**
Meter MWh	416	6,922
Generation MWh	437	7,353
Meter Demand kW	101	1,632
Generation Peak Summer kW	55	839
Generation Peak Winter kW	61	1,063
Water Savings	$0	$0
Fuel Savings	$1,352	$28,018
O+M Savings	$0	$0

Table 12: EEU Business New Construction - Summary

	Prior Year 2020	Current 2021	Program to Date
Program Costs			
Incentive and Technical Assistance			
Incentive			
Incentives to Participants (RA)	$ 305,164	$ 361,520	$ 666,684
Incentives to Trade Allies (RA)		$ -	$ -
Technical Assistance			
Services to Participants (RA)	$ 120,732	$ 112,661	$ 233,393
Services to Trade Allies (RA)		$ -	$ -
Energy Code and Standards Support (DSS)		$ -	$ -
Building Energy Labeling and Benchmarking (DSS)		$ -	$ -
Better Buildings by Design (DSS)		$ -	$ -
***Incentive & Tech Asst Sub-Total* (1)**	$ 425,896	$ 474,181	$ 900,077
Non-Incentive Program Costs			
Programs and Implementation (RA)	$ 11,309	$ 11,297	$ 22,606
Strategy and Planning (RA)	$ 8,482	$ 6,731	$ 15,212
Marketing Program (RA)	$ -	$ 690	$ 690
Customer Support (DSS)			
General Marketing & Public Education (DSS)			
Energy Literacy (DSS)			
Applied R&D (DSS)			
Support Services (RA)	$ 8,482	$ 6,731	$ 15,212
Quality Assurance	$ 5,654	$ 4,487	$ 10,141
***Non-Incentive Program Sub-Total* (2)**	$ 33,926	$ 29,936	$ 63,862
Total Program Costs	$ 459,822	$ 504,117	$ 963,939
Administrative			
Sr. Management, Budget, Financial Oversight (RA)	$ 4,241	$ 3,365	$ 7,606
Policy & Public Affairs (DSS			$ -
Planning & Reporting (DSS)			$ -
Administration & Regulatory (DSS)			$ -
IT (DSS)			$ -
Evaluation (DSS)			$ -
Direct and Indirect Overhead	$ 3,891	$ 5,684	$ 9,576
***Administrative Sub-Total* (3)**	$ 8,132	$ 9,050	$ 17,182
Earned Compensation			
Base Compensation			
Performance Compensation			
***Earned Compensation Sub-Total* (4)**			
Total Program and Administrative	$ 467,954	$ 513,167	$ 981,121
Overall Total	**$ 467,954**	**$ 513,167**	**$ 981,121**
--- Benefits ---			
Annual MWh	1,007	437	24,622
Lifetime MWh	16,812	7,353	361,179
Winter Peak kW	238	61	2,734
Summer Peak kW	217	55	3,729
MWh / Participant	44	55	71
Weighted Lifetime	17	17	15

Table 13: EEU Business New Construction - End Use Summary

		MWh			kW			
Description	**Participants**	**Gross**	**Net**	**Lifetime**	**Winter**	**Summer**	**MMBTU**	**CCF**
Lighting Hardwired Fixture	2	264.69	276.21	4,143.15	31.79	52.86	-195.07	0.00
Other	5	146.43	155.40	3,107.91	29.17	2.30	1,547.20	0.00
Space Heat Efficiency	1	4.82	5.08	101.56	0.15	0.01	0.00	0.00
Total		415.93	436.68	7,352.63	61.11	55.16	1,352.13	0.00

2.2.2 Business Existing Facilities
(Market Opportunities & Retrofit Services)

Program Description

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

BED and EVT jointly offer statewide prescriptive incentives (fixed incentives for specific eligible measures) for building lighting, refrigeration, controls, motors, and unitary HVAC equipment.

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 VGS to encourage a comprehensive approach to energy savings. BED and VGS staff are committed to bringing appropriate projects to each other's attention.

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 facility.

Program Highlights

The annualized megawatt-hour (MWh) savings for 2021 were 1,478, about 43% lower than the projection of 2,591 MWh. Total BED program costs were $890,578, about 19% under the budgeted amount of $1,098,773.

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

Variance Discussion

As mentioned in other sections of this report, and in prior Annual Reports and Annual Plans, BED began to explore how to move beyond lighting as the dominant measure in this market starting about six years ago. HVAC, and other measures like refrigeration, need to play a more prominent role going forward but with about 70% of BED's commercial customer leasing their spaces, HVAC improvements present strong challenges. Also, HVAC and refrigeration equipment typically have longer lifetimes then lighting so there are less frequent replacement opportunities, and they are much more expensive measures relative to lighting upgrades.

Program Outlook

BED, in partnership with VGS, will continue to leverage participation in the Burlington 2030 District effort. 2030 Districts are unique private/public partnerships in designated urban areas across North America committed to reducing energy use, water, and transport emissions. Overseen by Architecture 2030, 2030 Districts are in the vanguard of grassroots collaborative efforts to renovate existing buildings and construct high-performance infill development and redevelopment. More information is available at: http://www.2030districts.org/burlington. Also, the video featuring two property members describes the customer experience further, https://www.youtube.com/watch?v=8MryRIwTBaw

As mentioned in the BNC section above, the pandemic has helped to educate many customers about ventilation systems. Unfortunately, many buildings have little or no mechanical ventilation systems, or some do have central ventilation systems, but they are ineffective and expensive to operate. As a reaction to customer concerns, BED staff encouraged Burlington's 2030 District steering committee (which includes Architects, Engineers, and HVAC specialists) to provide guidance on ASHRAE's COVID related building ventilation issues, and how to ventilate as efficiently as possible. The BED team also helped the city's CEDO staff secure a $90,000 State of Vermont grant focused on improving ventilation for small businesses and non-profits organizations that will continue into 2022. BED will continue to provide technical support to these projects including incentives and on-bill-financing when appropriate, especially for larger projects that the grant cannot fully support. Customer education will also continue in 2022 with a series of webinars and vides.

Table 14: EEU Business Existing Facilities - Total Resource Benefits

Avoided Costs of Electricity	$2,410,832
Fossil Fuel Savings	$24,875
Water Savings	$382
TRB Total	$2,231,237

	Annual	**Lifetime**
Meter MWh	1,399	20,053
Generation MWh	1,478	21,172
Meter Demand kW	379	5,393
Generation Peak Summer kW	213	2,982
Generation Peak Winter kW	134	1,901
Water Savings	$4	$49
Fuel Savings	$607	$9,136
O+M Savings	$10,804	$151,910

Table 15: EEU Business Existing Facilities - Summary

	Prior Year 2020	Current 2021	Program to Date
Program Costs			
Incentive and Technical Assistance			
Incentive			
Incentives to Participants (RA)	$ 482,526	$ 510,344	$ 992,870
Incentives to Trade Allies (RA)		$ -	$ -
Technical Assistance			
Services to Participants (RA)	$ 254,121	$ 202,445	$ 456,566
Services to Trade Allies (RA)		$ -	$ -
Energy Code and Standards Support (DSS)		$ -	$ -
Building Energy Labeling and Benchmarking (DSS)		$ -	$ -
Better Buildings by Design (DSS)		$ -	$ -
***Incentive & Tech Asst Sub-Total* (1)**	$ 736,647	$ 712,789	$ 1,449,436
Non-Incentive Program Costs			
Programs and Implementation (RA)	$ 49,280	$ 79,095	$ 128,375
Strategy and Planning (RA)	$ 38,634	$ 22,379	$ 61,013
Marketing Program (RA)		$ 1,486	$ 1,486
Customer Support (DSS)		$ -	$ -
General Marketing & Public Education (DSS)		$ -	$ -
Energy Literacy (DSS)		$ -	$ -
Applied R&D (DSS)		$ -	$ -
Support Services (RA)	$ 49,148	$ 29,839	$ 78,987
Quality Assurance	$ 24,574	$ 14,919	$ 39,493
***Non-Incentive Program Sub-Total* (2)**	$ 161,636	$ 147,719	$ 309,354
Total Program Costs	$ 898,283	$ 860,508	$ 1,758,791
Administrative			
Sr. Management, Budget, Financial Oversight (RA)	$ 18,430	$ 11,190	$ 29,620
Policy & Public Affairs (DSS			$ -
Planning & Reporting (DSS)			$ -
Administration & Regulatory (DSS)			$ -
IT (DSS)			$ -
Evaluation (DSS)			$ -
Direct and Indirect Overhead	$ 32,106	$ 18,881	$ 50,986
***Administrative Sub-Total* (3)**	$ 50,536	$ 30,070	$ 80,606
Earned Compensation			
Base Compensation			
Performance Compensation			
***Earned Compensation Sub-Total* (4)**			
Total Program and Administrative	$ 948,819	$ 890,578	$ 1,839,397
Overall Total	**$ 948,819**	**$ 890,578**	**$ 1,839,397**

--- Benefits ---			
Annual MWh	1,635	1,478	75,852
Lifetime MWh	22,398	21,172	947,231
Winter Peak kW	145	134	10,038
Summer Peak kW	194	213	9,421
MWh / Participant	4	4	15
Weighted Lifetime	14	14	12

Table 16: EEU Business Existing Facilities - End Use Summary

		MWh			kW			
Description	**Participants**	**Gross**	**Net**	**Lifetime**	**Winter**	**Summer**	**MMBTU**	**CCF**
Air Conditioning Efficiency	4	195.11	207.78	3,115.78	0.00	18.41	0.00	0.00
Cooking and Laundry	2	0.16	0.16	2.21	0.02	0.02	0.00	3.50
Hot Water Efficiency	6	10.41	10.38	134.93	1.64	0.83	0.00	0.00
Light Bulb/Lamp	47	128.00	135.88	1,869.31	13.16	26.19	0.00	0.00
Lighting Hardwired Fixture	223	717.47	761.02	10,465.82	84.59	142.98	-27.72	0.00
Refrigeration	16	266.19	280.69	4,192.41	22.15	23.54	634.30	0.00
Space Heat Efficiency	61	34.50	35.02	659.33	1.06	0.06	0.00	0.00
Space Heat Replacement	18	47.18	46.93	732.37	11.65	1.19	0.00	0.00
Total		1,399.04	1,477.85	21,172.16	134.27	213.21	606.58	3.50

2.3 Residential Service Overview

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

In 2021, BED projected 761 annualized MWh residential savings while achieving annual energy savings of 762 MWh; 100% of the projected goal. BED's cost to deliver residential services in 2021 was $791,118, about 41% more than the projected spending of $563,473. BED's on-going Green Stimulus program, as a reaction to the COVID-19 pandemic, was a major contributing factor to overall program activity in 2021.

As BED has described in previous Annual Reports, the residential class presents particular challenges as about 60% of BED's residential customers are renters and about 85% of these customers pay their electric and natural gas heating bills directly. Rental apartments are typically smaller with fewer appliances and lighting opportunities. BED's best information indicates that about 95% of residential buildings use natural gas for space heating and about 90% use natural gas for domestic hot water.

BED also turns over 30 to 35% of residential accounts each year due to the high percentage of students. Also, BED's (pre-pandemic) average annual usage per residential customer continues to remain flat with a monthly average of about 390 kWh. BED's (pre-pandemic) residential consumption is about **24**% less than the average Vermont residential customer, about **34**% less than the average New England residential customer and about **55**% less than the national average.

BED will continue to test all program design assumptions and pursue all strategies to make programs as cost-effective as possible. BED will also continue to focus on energy education efforts and to continue to strengthen our close collaboration with VGS as we jointly serve a majority of Burlington's residential customers.

As described in the Introduction section above, one of BED's key strategic objectives, outlined in BED's 2020-2021 Strategic Direction document, is to ensure all programs are equitable and accessible, with a priority given to low-to-moderate income, rental, black,

indigenous, and people of color (BIPOC), immigrant, and refugee populations. BED will continue to strive to proactively seek customer input, listen to, and hear their needs, and incorporate their input into program design.

Table 17: EEU Residential - Total Resource Benefits

Avoided Costs of Electricity	$1,183,509
Fossil Fuel Savings	$78,318
Water Savings	$70,419
TRB Total	$1,211,445

	Annual	**Lifetime**
Meter MWh	765	11,661
Generation MWh	762	11,642
Meter Demand kW	730	10,586
Generation Peak Summer kW	52	708
Generation Peak Winter kW	176	2,720
Water Savings	$646	$9,037
Fuel Savings	$26	$636
O+M Savings	$1,254	$17,649

Table 18: EEU Residential - Summary

	Prior Year 2020	Current 2021	Program to Date
Program Costs			
Incentive and Technical Assistance			
Incentive			
Incentives to Participants (RA)	$ 582,096	$ 456,475	$ 1,038,572
Incentives to Trade Allies (RA)	$ -	$ -	$ -
Technical Assistance			
Services to Participants (RA)	$ 205,894	$ 148,845	$ 354,740
Services to Trade Allies (RA)	$ 6,144	$ 2,171	$ 8,315
Energy Code and Standards Support (DSS)	$ -	$ -	$ -
Building Energy Labeling and Benchmarking (DSS)	$ -	$ -	$ -
Better Buildings by Design (DSS)	$ -	$ -	$ -
***Incentive & Tech Asst Sub-Total* (1)**	$ 794,135	$ 607,492	$ 1,401,627
Non-Incentive Program Costs			
Programs and Implementation (RA)	$ 48,353	$ 86,798	$ 135,152
Strategy and Planning (RA)	$ 41,337	$ 42,611	$ 83,947
Marketing Program (RA)	$ -	$ 3,808	$ 3,808
Customer Support (DSS)	$ -	$ -	$ -
General Marketing & Public Education (DSS)	$ -	$ -	$ -
Energy Literacy (DSS)	$ -	$ -	$ -
Applied R&D (DSS)	$ -	$ -	$ -
Support Services (RA)	$ 35,192	$ 17,566	$ 52,759
Quality Assurance	$ 23,462	$ 11,711	$ 35,172
***Non-Incentive Program Sub-Total* (2)**	$ 148,344	$ 162,495	$ 310,839
Total Program Costs	$ 942,479	$ 769,987	$ 1,712,465
Administrative			
Sr. Management, Budget, Financial Oversight (RA)	$ 17,596	$ 8,783	$ 26,379
Policy & Public Affairs (DSS	$ -	$ -	$ -
Planning & Reporting (DSS)	$ -	$ -	$ -
Administration & Regulatory (DSS)	$ -	$ -	$ -
IT (DSS)	$ -	$ -	$ -
Evaluation (DSS)	$ -	$ -	$ -
Direct and Indirect Overhead	$ 25,934	$ 14,983	$ 40,918
***Administrative Sub-Total* (3)**	$ 43,531	$ 23,767	$ 67,297
Earned Compensation			
Base Compensation			
Performance Compensation			
***Earned Compensation Sub-Total* (4)**			
Total Program and Administrative	$ 986,009	$ 793,753	$ 1,779,763
Overall Total	**$ 986,009**	**$ 793,753**	**$ 1,779,763**

Annual MWh	1,150	762	57,635
Lifetime MWh	18,133	11,642	691,855
Winter Peak kW	230	176	13,516
Summer Peak kW	81	51	5,371
MWh / Participant	1	1	2
Weighted Lifetime	16	15	12

Table 19: EEU Residential - End Use Summary

		MWh			kW			
Description	**Participants**	**Gross**	**Net**	**Lifetime**	**Winter**	**Summer**	**MMBTU**	**CCF**
Air Conditioning Efficiency	120	40.07	39.20	379.38	1.32	10.71	0.00	0.00
Cooking and Laundry	33	58.87	45.96	587.37	6.23	4.66	0.67	645.50
Hot Water Efficiency	22	21.82	20.82	271.15	3.28	1.66	0.00	0.00
Light Bulb/Lamp	52	40.05	41.43	612.54	12.18	3.50	0.00	0.00
Lighting Hardwired Fixture	311	207.10	245.81	3,682.90	71.88	20.99	0.00	0.00
Motors	55	12.87	13.40	247.71	2.14	1.29	0.00	0.00
Office	2	0.11	0.11	0.52	0.01	0.01	0.00	0.00
Refrigeration	33	10.73	7.50	122.68	0.70	0.88	0.00	0.00
Space Heat Efficiency	199	15.10	15.66	306.10	0.49	0.10	-0.50	0.00
Space Heat Fuel Switch	4	-7.66	-8.17	-147.15	-1.20	0.00	0.00	0.00
Space Heat Replacement	286	337.31	321.18	5,116.47	76.93	7.71	0.00	0.00
Thermal Shell	10	27.32	17.44	435.92	2.32	0.19	25.40	0.00
Ventilation	24	1.45	1.39	26.44	0.17	0.17	0.00	0.00
Total		765.15	761.73	11,642.02	176.44	51.85	25.57	645.50

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 (VESH) standard.

The 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 a better performing thermal shells, HVAC equipment, efficient lighting fixtures, major appliances, and ventilation equipment.

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

- BED staff attends monthly Technical Review Committee meetings where all major new construction projects are introduced to the Burlington Planning and Zoning Department staff as part of the City's local project approval process.
- 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.
- The Burlington Department of Permitting & Inspections (DPI) refers projects to BED.

Program Highlights

In 2021, the RNC service achieved 16 MWh in annualized electricity savings for the year which was about 89% of the projected 144 MWh goal. At $71,584 spending was 29% lower than the projected spending of $101,425.

Variance Discussion

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 impact savings projections and budgets dramatically. In recent program year history, RNC has worked successfully with a number of multi-family buildings that utilize cold climate heat pumps as the primary heating and cooling source. These "electrically" heated buildings provided strong thermal shell savings to the RNC programs, however, the on-going pandemic brought most new construction activity to a standstill.

Program Outlook

In 2022, the RNC program will continue to assist the residential market with exceeding RBES/CBES and will also promote low-load and net-zero building practices. To help promote program objectives, BED will actively participate in regional events such as the Better Building by Design conference and work with relevant associations such as the Vermont Green Building Network, and the Vermont Passive House Association. Over the past several years, BED has already co-sponsored several design build seminars ow for local designers and builders.

BED's RNC program is projected to be dominated by multi-family structures and that cold climate heat pumps (CCHP's) (aka ductless mini splits) will continue to be the most popular HVAC solution for market-rate multi-family new construction projects due to the low first installation cost. As part of BED's on-going beneficial electrification efforts, BED will continue to focus on high performance thermal envelopes, and controls, to help mitigate potential future regrets from strategic thermal electrification.
As we have discussed in previous Annual Plans, from a thermal decarbonization, and net zero energy city perspective, the use of CCHP's can be a positive solution. However,

most heat pump buildings to date use electric resistance heat to back-up the CCHP's so potential winter peak and customer high bill issues need to be carefully considered if both operate frequently. Fortunately, each of the CCHP buildings built to date have worked with BED to design and construct high performance thermal envelopes which has mitigated peaking, high bill, and comfort issues. Also, for most of the buildings, the electric baseboard heat is on a master control so that it cannot come on until outside temperature is lower than 5 degrees F.

BED has reviewed the 15-minute electric usage data for the CCHP buildings, and they are performing well from both a kWh and CP-kW perspective. Again, BED credits the strong attention to detail on the thermal envelopes with a particular focus on air leakage reduction work and blower door testing. If thermal envelopes are done poorly, then unwanted peak issues may arise. Also, tenant comfort complaints could lead to the installation of additional electric resistance heat as it is typically the least cost solution for the building owner.

Table 20: EEU Residential New Construction - Total Resource Benefits

Avoided Costs of Electricity	$29,538
Fossil Fuel Savings	$6,708
Water Savings	$0
TRB Total	$33,578

	Annual	**Lifetime**
Meter MWh	17	412
Generation MWh	16	396
Meter Demand kW	11	279
Generation Peak Summer kW	0	5
Generation Peak Winter kW	2	59
Water Savings	$0	$0
Fuel Savings	$25	$635
O+M Savings	$0	$0

Table 21: EEU Residential New Construction - Summary

	Prior Year 2020	Current 2021	Program to Date
Program Costs			
Incentive and Technical Assistance			
Incentive			
Incentives to Participants (RA)	$ 108,883	$ 10,172	$ 119,054
Incentives to Trade Allies (RA)		$ -	$ -
Technical Assistance			
Services to Participants (RA)	$ 14,692	$ 31,296	$ 45,988
Services to Trade Allies (RA)		$ -	$ -
Energy Code and Standards Support (DSS)		$ -	$ -
Building Energy Labeling and Benchmarking (DSS)		$ -	$ -
Better Buildings by Design (DSS)		$ -	$ -
***Incentive & Tech Asst Sub-Total* (1)**	$ 123,575	$ 41,468	$ 165,042
Non-Incentive Program Costs			
Programs and Implementation (RA)	$ 3,934	$ 17,787	$ 21,721
Strategy and Planning (RA)	$ 3,934	$ 2,819	$ 6,753
Marketing Program (RA)		$ 997	$ 997
Customer Support (DSS)		$ -	$ -
General Marketing & Public Education (DSS)		$ -	$ -
Energy Literacy (DSS)		$ -	$ -
Applied R&D (DSS)		$ -	$ -
Support Services (RA)	$ 3,934	$ 2,819	$ 6,753
Quality Assurance	$ 2,623	$ 1,879	$ 4,502
***Non-Incentive Program Sub-Total* (2)**	$ 14,425	$ 26,302	$ 40,727
Total Program Costs	$ 138,000	$ 67,769	$ 205,769
Administrative			
Sr. Management, Budget, Financial Oversight (RA)	$ 1,967	$ 1,410	$ 3,377
Policy & Public Affairs (DSS			$ -
Planning & Reporting (DSS)			$ -
Administration & Regulatory (DSS)			$ -
IT (DSS)			$ -
Evaluation (DSS)			$ -
Direct and Indirect Overhead	$ 2,947	$ 2,405	$ 5,352
***Administrative Sub-Total* (3)**	$ 4,914	$ 3,815	$ 8,729
Earned Compensation			
Base Compensation			
Performance Compensation			
***Earned Compensation Sub-Total* (4)**			
Total Program and Administrative	$ 142,914	$ 71,584	$ 214,498
Overall Total	**$ 142,914**	**$ 71,584**	**$ 214,498**
--- Benefits ---			
Annual MWh	268	16	2,082
Lifetime MWh	5,456	396	37,569
Winter Peak kW	38	2	412
Summer Peak kW	4	0	314
MWh / Participant	27	3	4
Weighted Lifetime	20	25	18

Table 22: EEU Residential New Construction - End Use Summary

		MWh			kW			
Description	**Participants**	**Gross**	**Net**	**Lifetime**	**Winter**	**Summer**	**MMBTU**	**CCF**
Hot Water Efficiency	1	0.04	0.04	0.97	0.01	0.01	0.00	0.00
Space Heat Efficiency	1	1.92	2.03	40.68	0.02	0.00	0.00	0.00
Thermal Shell	4	14.88	14.16	354.02	2.32	0.19	25.40	0.00
Total		16.85	16.23	395.68	2.35	0.20	25.40	0.00

2.3.2 Residential Existing Buildings

Program Description

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

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

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

BED's best information is that a majority of WAP eligible customers live in multi-family rental buildings where over 95% use natural gas for space heating and domestic hot water. The average annual electric usage for WAP eligible customers is on par with average BED multi-family residential, historic, consumption patterns of about 320 kWh per month. When combining the high saturation of natural gas usage, with low electric usage, electric energy savings opportunities are limited and challenging.

REB works closely with high usage households for energy efficiency improvements that can reduce energy bills and solve comfort and moisture related issue. Virtual and on-site energy audits, customer energy education, appliance meter loans, technical assistance, project management and cash incentives are all part of this service.

BED and VGS work 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 BED's residential customers) 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; creating the "split-incentive" paradigm.

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

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

Program Highlights

In 2021, REB achieved 424 MWh in annualized electricity savings for the year, only about 21% less than the projected goal of 545 MWh. At $531,719 spending was 29% higher than BED's projected spending of $411,335.

Variance Discussion

As BED stated in the Introduction, year to year program savings can be lumpy based on a number of factors. BED's Green Stimulus program, as a reaction to the COVID-19 pandemic, was a major contributing factor to overall program activity again in 2021. BED continued to see strong participation with residential cold climate heat pumps and some modest activity with energy efficient home appliances. The strong residential activity was critical again in 2021 as the commercial sector remained noticeably quiet considering the substantial number of employees working from home and the greatly reduced retail and restaurant activity.

Program Outlook

BED and VGS will continue program coordination and collaboration designed to encourage more residential customers to participate in available efficiency programs. This collaboration helps customers to take a more complete look at their total energy picture including the thermal shell, HVAC, thermostat controls, lighting, appliances, along with solutions for comfort or moisture related issues.

About 95% of BED's residential customers use natural gas as their primary space heating source. However, there are a number of dwellings that are mostly natural gas heated but electric usage data also reveals high electric heat usage and/or air conditioning usage. Customers scheduling energy audits are asked their permission for the two EEU's to share usage data for analysis purpose. BED and VGS have established a methodology so that BED now offers an additional customer incentive to complete the recommended weatherization work. VGS now includes this information in the customers' report with the goal of increasing the "energy audit" to "actual project" completion rate. Anecdotally, customers are pleased with the VGS and BED joint effort.

BED and VGS have also developed a similar weatherization cost sharing process where cold climate heat pumps are installed but they can only provide a portion of the space heating load. Customers and contractors are made aware that the full weatherization rebate amounts are available to "hybrid" heated buildings, and they will get a proportional rebate check from both EEU's.

BED will also continue to cultivate partnerships and pursue initiatives that allow for additional opportunities to engage with the ***low-and moderate-income*** customers and also those organizations that serve these customers. BED is engaged in a number of initiatives on this front, but we know that more creative work is needed.

Burlington's new Weatherization Ordinance (for high-energy using rental housing buildings) will directly benefit LMI customers in the coming months and years. The Ordinance is based on space heating loads, but BED will do everything possible to leverage and encourage the comprehensive energy treatment of these buildings.

BED's securing of an APPA DEED grant to help Burlington's 2030 District offer free "Property Energy Plans" (PEPs)to affordable housing organizations should also result in direct energy saving benefits to our LMI customers as the PEPs are structured to encourage participation in BED's and VGS's EEU programs.

BED was invited to work closely with VHFA, VGS and EVT on the early design and development of the "Tariff On-Bill" loan program pilot schedule to begin in mid-2022. This effort should also result in real benefits to LMI customers who can benefit from weatherization upgrades with no up-front cost to get the work completed.

Table 23: EEU Residential Existing Homes - Total Resource Benefits

Avoided Costs of Electricity	$653,583
Fossil Fuel Savings	$56,954
Water Savings	$6,338
TRB Total	$728,190

	Annual	**Lifetime**
Meter MWh	449	7,028
Generation MWh	424	6,690
Meter Demand kW	321	4,856
Generation Peak Summer kW	19	274
Generation Peak Winter kW	94	1,480
Water Savings	$58	$813
Fuel Savings	$0	$2
O+M Savings	$31	($388)

Table 24: EEU Residential Existing Homes - Summary

	Prior Year 2020	Current 2021	Program to Date
Program Costs			
Incentive and Technical Assistance			
Incentive			
Incentives to Participants (RA)	$ 278,076	$ 349,911	$ 627,987
Incentives to Trade Allies (RA)		$ -	$ -
Technical Assistance			
Services to Participants (RA)	$ 169,194	$ 109,950	$ 279,144
Services to Trade Allies (RA)			$ -
Energy Code and Standards Support (DSS)			$ -
Building Energy Labeling and Benchmarking (DSS)			$ -
Better Buildings by Design (DSS)			$ -
***Incentive & Tech Asst Sub-Total* (1)**	$ 447,270	$ 459,861	$ 907,131
Non-Incentive Program Costs			
Programs and Implementation (RA)	$ 13,618	$ 13,767	$ 27,384
Strategy and Planning (RA)	$ 12,826	$ 31,107	$ 43,932
Marketing Program (RA)	$ -	$ 2,189	$ 2,189
Customer Support (DSS)			$ -
General Marketing & Public Education (DSS)			$ -
Energy Literacy (DSS)			$ -
Applied R&D (DSS)			$ -
Support Services (RA)	$ 12,826	$ 8,234	$ 21,059
Quality Assurance	$ 8,550	$ 5,489	$ 14,039
***Non-Incentive Program Sub-Total* (2)**	$ 47,819	$ 60,786	$ 108,605
Total Program Costs	$ 495,090	$ 520,647	$ 1,015,736
Administrative			
Sr. Management, Budget, Financial Oversight (RA)	$ 6,413	$ 4,117	$ 10,530
Policy & Public Affairs (DSS			$ -
Planning & Reporting (DSS)			$ -
Administration & Regulatory (DSS)			$ -
IT (DSS)			$ -
Evaluation (DSS)			$ -
Direct and Indirect Overhead	$ 8,682	$ 6,955	$ 15,637
***Administrative Sub-Total* (3)**	$ 15,095	$ 11,072	$ 26,167
Earned Compensation			
Base Compensation			
Performance Compensation			
***Earned Compensation Sub-Total* (4)**			
Total Program and Administrative	$ 510,184	$ 531,719	$ 1,041,903
Overall Total	**$ 510,184**	**$ 531,719**	**$ 1,041,903**
--- Benefits ---			
Annual MWh	333	424	22,623
Lifetime MWh	5,090	6,690	349,942
Winter Peak kW	55	94	6,133
Summer Peak kW	22	19	1,053
MWh / Participant	1	1	2
Weighted Lifetime	15	16	15

Table 25: EEU Residential Existing Homes - End Use Summary

		MWh			kW			
Description	**Participants**	**Gross**	**Net**	**Lifetime**	**Winter**	**Summer**	**MMBTU**	**CCF**
Air Conditioning Efficiency	93	8.05	7.71	87.96	0.02	3.28	0.00	0.00
Cooking and Laundry	31	9.48	9.07	113.88	1.23	0.92	0.73	58.10
Hot Water Efficiency	21	21.78	20.78	270.18	3.27	1.65	0.00	0.00
Light Bulb/Lamp	10	26.98	28.42	426.28	8.54	2.34	0.00	0.00
Lighting Hardwired Fixture	7	11.09	11.36	170.37	2.35	1.76	0.00	0.00
Motors	55	12.87	13.40	247.71	2.14	1.29	0.00	0.00
Office	1	0.04	0.04	0.19	0.00	0.00	0.00	0.00
Refrigeration	31	1.81	1.82	30.84	0.17	0.21	0.00	0.00
Space Heat Efficiency	198	13.18	13.62	265.42	0.47	0.09	-0.50	0.00
Space Heat Fuel Switch	4	-7.66	-8.17	-147.15	-1.20	0.00	0.00	0.00
Space Heat Replacement	286	337.31	321.18	5,116.47	76.93	7.71	0.00	0.00
Thermal Shell	6	12.44	3.28	81.90	0.00	0.00	0.00	0.00
Ventilation	24	1.45	1.39	26.44	0.17	0.17	0.00	0.00
Total		448.83	423.89	6,690.49	94.08	19.44	0.23	58.10

2.3.3 Retail Efficient Products

Program Description

The Retail Efficient Products Program (EPP) service aims to increase sales of ENERGY STAR® qualified lighting products, and appliances such as clothes washers, refrigerators, freezers, 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.

EPP 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. EPP 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

Savings of 322 annualized MWh significantly surpassed projection of 72 annualized MWh in 2021. Annual expenditures of $190,451 also significantly exceeded he projected budget of $50,713.

Variance Discussion

With the on-going pandemic impacting commercial activity (including all new construction activity), a greater focus was placed on EPP. LED lighting products accounted for about 77% of total program savings with air conditioners and other appliances making up the balance.

Program Outlook

BED will continue to augment EVTs outreach with its own public education and product awareness campaigns using social media channels, website, customer newsletters ads and articles in the North Avenue News monthly publication.

This period will also focus on promoting specialty LED bulbs, LED fixtures and other appliances that are the most efficient within Energy Star. Historically, A-lamps (screw-in general duty LED's) have made up a majority of program savings so a new focus on other LED lighting products (and other appliances) is required to meet budgets and savings targets. Products like refrigerators, clothes washers, a variety of heat pump products and consumer electronics will continue to play a more prominent role.

Table 26: EEU Efficient Products - Total Resource Benefits

Avoided Costs of Electricity	$500,388
Fossil Fuel Savings	$14,657
Water Savings	$64,080
TRB Total	$449,677

	Annual	**Lifetime**
Meter MWh	299	4,222
Generation MWh	322	4,556
Meter Demand kW	397	5,452
Generation Peak Summer kW	32	428
Generation Peak Winter kW	80	1,181
Water Savings	$587	$8,224
Fuel Savings	$0	($1)
O+M Savings	$1,223	$18,036

Table 27: EEU Efficient Products - Summary

	Prior Year 2020	Current 2021	Program to Date
Program Costs			
Incentive and Technical Assistance			
Incentive			
Incentives to Participants (RA)	$ 195,137	$ 96,393	$ 291,531
Incentives to Trade Allies (RA)			
Technical Assistance			
Services to Participants (RA)	$ 22,008	$ 7,599	$ 29,607
Services to Trade Allies (RA)	$ 6,144	$ 2,171	$ 8,315
Energy Code and Standards Support (DSS)			$ -
Building Energy Labeling and Benchmarking (DSS)			$ -
Better Buildings by Design (DSS)			$ -
***Incentive & Tech Asst Sub-Total* (1)**	$ 223,290	$ 106,163	$ 329,453
Non-Incentive Program Costs			
Programs and Implementation (RA)	$ 30,802	$ 55,245	$ 86,046
Strategy and Planning (RA)	$ 24,577	$ 8,685	$ 33,262
Marketing Program (RA)		$ 622	$ 622
Customer Support (DSS)			$ -
General Marketing & Public Education (DSS)			$ -
Energy Literacy (DSS)			$ -
Applied R&D (DSS)			$ -
Support Services (RA)	$ 18,433	$ 6,513	$ 24,946
Quality Assurance	$ 12,288	$ 4,342	$ 16,631
***Non-Incentive Program Sub-Total* (2)**	$ 86,100	$ 75,407	$ 161,507
Total Program Costs	$ 309,390	$ 181,571	$ 490,960
Administrative			
Sr. Management, Budget, Financial Oversight (RA)	$ 9,216	$ 3,257	$ 12,473
Policy & Public Affairs (DSS			$ -
Planning & Reporting (DSS)			$ -
Administration & Regulatory (DSS)			$ -
IT (DSS)			$ -
Evaluation (DSS)			$ -
Direct and Indirect Overhead	$ 14,306	$ 5,623	$ 19,929
***Administrative Sub-Total* (3)**	$ 23,522	$ 8,880	$ 32,402
Earned Compensation			
Base Compensation			
Performance Compensation			
***Earned Compensation Sub-Total* (4)**			
Total Program and Administrative	$ 332,912	$ 190,451	$ 523,362
Overall Total	**$ 332,912**	**$ 190,451**	**$ 523,362**
--- Benefits ---			
Annual MWh	549	322	32,930
Lifetime MWh	7,587	4,556	304,344
Winter Peak kW	137	80	6,971
Summer Peak kW	55	32	4,004
MWh / Participant	1	1	2
Weighted Lifetime	14	14	9

Table 28: EEU Efficient Products - End Use Summary

		MWh			kW			
Description	**Participants**	**Gross**	**Net**	**Lifetime**	**Winter**	**Summer**	**MMBTU**	**CCF**
Air Conditioning Efficiency	27	32.02	31.49	291.42	1.29	7.43	0.00	0.00
Cooking and Laundry	2	49.39	36.89	473.49	5.00	3.74	-0.06	587.40
Light Bulb/Lamp	42	13.07	13.01	186.26	3.64	1.16	0.00	0.00
Lighting Hardwired Fixture	304	196.01	234.46	3,512.52	69.54	19.23	0.00	0.00
Office	1	0.07	0.08	0.33	0.00	0.00	0.00	0.00
Refrigeration	2	8.92	5.69	91.84	0.53	0.67	0.00	0.00
Total		299.47	321.61	4,555.85	80.00	32.22	-0.06	587.40

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

Program Description

TEPF services are designed to increase the thermal energy and process fuel efficiency of homes and businesses heating with unregulated fuels, i.e.; oil, LP-gas, kerosene, and wood. The scope of these services is limited in Burlington as over 95% of customers are served by VGS who also implements thermal EEU programs with both comprehensive weatherization and equipment replacement services.

As BED describe in detail in its 2021-2023 EEU Demand Resource Plan, BED's 2021-2023 TEPF program is comprised of two resource acquisition components and one emerging research and development component. The components include:

1. Traditional Weatherization Services (a/k/a Home Performance with Energy Star or HPwES);
2. Advanced Manufactured Homes (a/k/a Zero Energy Modular or ZEM);
3. McNeil Biomass Generation Station District Energy System Development (DES)

Traditional Weatherization-

This resource acquisition service focuses on providing non-VGS residential homeowners and businesses with energy audits to identify cost-effective weatherization opportunities and to provide incentives to help pay for eligible work. BED's customers can access a number of statewide services and incentives though the following programs:

Home Performance with ENERGY STAR

BED, EVT and VGS collaborate to deliver TEPF savings to residential customers through a network of Building Performance Institute (BPI) certified contractors installing comprehensive home energy thermal improvements.

Commercial Building Performance

Technical assistance and incentives are provided to TEPF customer as a means to assist business property owners with improving the insulation and comfort of their buildings. Energy audits and improvements are performed by a participating Building Performance Institute (BPI) certified contractor.

BED projects that there are about 400 homes in the TEPF market. The single-family market is made up of homes that are located in the more affluent Burlington neighborhoods where the properties have been relatively well maintained and updated over the years. The potential for energy efficiency savings in the condominium market is also limited (about 200 units heated mostly by LP-gas) but it too presents challenges as about 35% of the units are rentals. The rental property owner, who does not typically pay the energy bill, and will not benefit from the energy savings, is typically unmotivated to participate. For rental buildings, BED now offers a 75% inventive for eligible weatherization improvements up to a $10,000 maximum. BED's TEPF weatherization program now mimics VGS's incentive levels to help avoid confusion among weatherization contractors and customers.

Zero Energy Modular Homes (ZEM)-

This resource acquisition service is founded on a partnership with Green Mountain Habitat for Humanity, the North Avenue Cooperative ("NAC"), Burlington's Community Economic Development Office (CEDO), Champlain Housing Trust ("CHT"), and VEIC. Since 2017, BED has been actively promoting ultra-efficient ZEM homes. EVT has been doing the same in other parts of Vermont. Thus far, three ZEM's (all net zero energy homes) have been installed in the NAC providing home ownership to three low-income households.

NAC is Burlington's only mobile home park and consists of about 110 homes heated by LP gas or kerosene. Dozens of these homes have been served but CVWS WAP over the years but many of the homes are old and ready to be replaced. There are also about five empty lots in the park. Starting in 2016, BED, and partners begun to explore the financial viability of introducing high performance modular homes to the residents. These are homes that can be net-zero energy, which eliminates fossil fuel usage, and can have a significant financial impact for customers when compared to existing high space heating costs.

The program objective is to provide financial and technical assistance to income qualifying customers seeking to purchase an affordable home for their families, increase housing options and address fuel poverty. The program focuses primarily on the residents of the NAC, but we may also assist other residents living outside of this neighborhood.

BED continues to work with the NAC Board to encourage more ZEM homes in the park and will continuing working with CHT's Homeownership Program and Green Mountain Habitat for Humanity to find income eligible buyers.

Program Highlights

BED's TEPF 2021 savings goals are based on "traditional weatherization services" and "ZEM services". BED achieved 4% of the 2021 annual savings goal with only two traditional weatherization project completions. BED spent $13,332 in 2021, 6% of the $206,00 annual resource acquisition budget.

Variance Discussion

The pandemic brought weatherization project activity to a stop for most of the year. In addition, the limited unregulated fossil fuel market, as well as the housing characteristics (as described above) of the potential unregulated fuels market, has presented challenges in attracting participants. There was also little ZEM activity in 2021 and we suspect that customers were proceeding cautiously in the on-going pandemic.

Program Outlook

For traditional weatherization services, we hope that activity will increase as the pandemic wanes. Burlington's new rental housing weatherization ordinance will apply to some of BED's TEFP market, and we stand ready to sever these property-owners. BED's Tier 3 Cold Climate Heat Pump program (CCHP) may also present us with opportunities to weatherize homes that are partial heat pump and partial unregulated fuel.

Regarding ZEM services, BED is hopeful that 2022 and 2023 will see increased activity as the impacts from the on-going pandemic lessen. Affordable housing options continues to be a

major problem in the greater Burlington area so ZEM's at the NAC could be an attractive option for some customers.

Regarding DES development, as described in detail in BED's 2022 EEU Annual Plan, BED has been actively working with community leaders, businesses, residents, and internationally recognized district energy engineering firms to develop a DES in the city using the McNeil bio-mass plant.

BED is remains engaged with VGS and Evergreen Energy to evaluate the merits, viability, and cost-effectiveness of a streamlined and modified DES. The new proposed DES would be based on steam rather than hot water, and serve – at least, initially – a smaller subset of customers located closer to the McNeil plant than the original design had envisioned. Senior management at the UVM Medical Center and UVM remain actively engaged in these discussions. Although BED is presently unsure whether the newly revised DES design will be able to compete with natural gas prices, we remain hopeful that climate conscious customers will determine that our proposed DES will still be an economic means to decarbonize a significant portion of their heating loads. Also, the current proposed system would reduce some of the risk associated with the customer's conversion costs relative to the original DES design, since UVMMC and UVM would not need to retrofit their existing heating plant to accept hot water. Moreover, the smaller footprint of the new DES – which would serve the UVMMC and potentially select nearby UVM buildings – reduces the capital cost for building the DES relative to the potential thermal sales we expect the new DES to serve.

A potential DES remains one of the most significant measures we can support in furtherance of BED's efforts to achieve the City's Net Zero Energy goals. Likewise, a successfully implemented DES would achieve progress toward the State of Vermont's climate and energy goals.

For the 2021-2023 period, BED's DES development PUC approved budget is $413,714. 2021 spending was $153,750, which is about 37% of the approved three-year budget.

Table 29: Thermal Energy and Process Fuels Activity

Period Costs for TEPF Savings	**Residential**	**Commercial**	**Total**
Year to Date Costs	$12,968	$364	$13,332
Annual Budget*	$200,300	$5,700	$206,000
% Of Annual Budget	6%	6%	6%
Energy Savings Results			
MMBTU Year to Date	18	0	18
MMBTU Annual Goal*	485	30	515
% Of MMBTU Annual Goal	4%	0%	3%
Progress Towards MMBTU 3-Year Goals			
MMBTU Cumulative to Date	18	0	18
3-Year MMBTU Goal	1,455	90	1,545
% Of 3-Year MMBTU Goal	1%	0%	1%

*Budgets and savings figures include Traditional and Zero Energy Modular program activities.

3.1 TEPF Development & Support Services (DSS)

Development & Support Service (DSS) activities are essential support services that are not directly related to the acquisition of energy savings but are necessary to ensure that the RA program portfolio is well managed and forward thinking. DSS activities in research, education, and training, for example, focus on new and emerging best practices to reduce barriers to efficiency, address potential lost opportunities and transform markets. In total, the DSS budget encompasses the following work areas: education & training, applied research, planning and reporting, evaluation, policy and public affairs, information technology and general administration. Within each of these general activity areas are several sub-activities which are explained in further detail below.

Education and Training
This work includes BED's efforts to build overall awareness of energy efficiency, weatherization, building performance issues and availability of efficiency services from BED, VGS and the low-income weatherization program administrators. These activities are not tied to specific program goals. It includes presentations at public forums and workshops, and activities with Burlington's numerous educational institutions. Media responses and the development of monthly energy tips that submitted to various publications and blogs are also included. BED also shares program costs with EVT for the Home Performance with Energy Star Program.

Applied Research and Development
This activity supports research on "smart" thermostatic controls installed in buildings where there are multiple heating systems present. For example, a heat pump and some type of secondary fossil-based heating system.

Planning and Reporting
This work includes BED's responsibility to provide the PUC and DPS with detailed EEU Annual Plans as described in the "Process and Administration of an Order of an Appointment" document. This work covers all required regulatory reports associated with BED's EEU activities. These reporting activities also help to keep the PUC, DPS, Burlington Electric Commission and customers informed about how BED is meeting its established budgets and savings targets. Such reports include:

- EEU Annual Report- submitted May 1 each year

- BED Monthly and Quarterly Reports
- Periodic Ad hoc reporting requests

Evaluation
This activity supports BED's TAG and TRM participation along with other general program evaluation activities such as conducting periodic savings verification studies.

Policy and Public Affairs
This activity supports BED's participation in broad energy efficiency public discussions and EEU related regulatory proceedings. The Thermal Energy Task Force and Building Energy Labeling working group are two examples of this type of work.

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

General Administration
This category covers BED's costs for the overall management of TEPF programs including general staff meetings, coordination of program implementation across all program functions, coordination with other EEU's and managing and monitoring of overall performance and spending.

Table 30: Thermal Energy and Process Fuels DSS Activity

TEPF DSS Activity	2021 Budget	2021 Actual Spending	2021-2023 Budget	% 2021-2023 Budget
Education & Training	$ 2,275	$ 344	$ 6,875	5%
Applied R&D	$ 250	$ -	$ 850	0%
Planning & Reporting	$ 1,650	$ 2,413	$ 5,050	48%
Evaluation	$ 400	$ 364	$ 1,200	30%
Policy & Public Affairs	$ 350	$ 338	$ 1,150	29%
Information Tech	$ 375	$ 182	$ 1,175	15%
General Administration	$ 2,350	$ 7,898	$ 7,150	110%
Total	**$ 7,650**	**$ 11,539**	**$ 23,450**	**49%**

4 Appendix

4.1 2021-2023 Quantifiable Performance Indicators (QPI) / Minimum Performance Requirements (MPR) Progress

Table 30: BED's 2021-2023 Electric & TEPF QPI and MPR Results Thru Q4 2021

QPI#	Title	Performance Indicator	2021-2023 Target	Policy Goal Advanced	Progress towards 3 yr Goal (thru Q4 2021)
1	Total Resource Benefits	Present worth of lifetime electric, fossil, and water benefits	$14,354,750	Encourage BED to design and implement efficiency initiatives that will maximize the lifetime electric, fossil fuel, and water benefits	32%
2	Electricity Savings	Annual incremental net MWh expected savings	13,937	Annual incremental MWh savings indicator intended to encourage BED to design and implement efficiency initiatives that will maximize annual incremental electrical energy savings	19%
3	Summer Peak Demand Savings (MW)	Cumulative net summer peak demand expected savings	1.8	Cumulative summer peak demand savings indicator intended to encourage BED to design and implement efficiency initiatives that will maximize the capacity reduction coincident with peak summer demand	19%
4	Winter Peak Demand Savings (MW)	Cumulative net winter peak demand expected savings	2.1	Cumulative winter peak demand savings indicator intended to encourage BED to design and implement efficiency initiatives that will maximize the capacity reduction coincident with peak winter demand	19%
5	Weighted Lifetime MWh Savings	Cumulative Lifetime MWh Savings	160,272	Encourage BED to design and implement efficiency initiatives that will maximize the lifetime electric benefits	25%
6	Administrative Effciency	Total Administrative cost as a % of total budget	$42,627	5% savings based on total Admin costs in next DRP - TBD	TBD

TEPF QPI/MPR	Title	Performance Indicator	2021-2023 Target	Policy Goal Advanced	Progress towards 3 yr Goal (thru Q4 2021)
1	Thermal & Mechanical Energy Efficiency Savings (Residential and Commercial)	Incremental net MMBTU savings (3Yr total)	1,455	Intended to encourage BED to design and implement efficiency initiatives that will maximize unregulated thermal energy savings	1.0%
2	Residential single family comprehensiveness	1) Average air leakage reduction per project 2) Percent of projects with both shell and heating systems measures installed.	1) 30% reduction per project 2.) 16% of premises	Intended to ensure that energy efficiency initiatives are designed and implemented to acquire comprehensive savings	Currently meeting the air leakage reduction target but not the comprehensiveness target.
3	Equity for residential customers	A minimum level of overall efficiency efforts, as reflected in "traditional" TEPF program spending, will be dedicated to residential customers or 95% of total budget	$ 327,750.00	Intended to encourage BED to design and implement efficiency initiatives that will maximize unregulated thermal energy savings	6%

MPR #	Title	Performance Indicator	2021-2023 Target	Policy Goal Advanced	Progress towards 3 Year Goal (thru Q4 2021)
1	Minimum Electric Benefits (Equity for all Electric Ratepayers)	Total electric benefits divided by total costs	Equal or greater than 1.2 benefit/cost ratio	Equity for all Vermont electric customers as a group by assuring that the overall electric benefits are greater than the costs incurred to implement and evaluate the *EEU* and the *EEC*	1.5 (with BED program and evaluation costs of $2,272,810 and ACE of $4,386,800
2	Equity for Residential Ratepayers	A minimum level of overall efficiency efforts, as reflected in spending, will be dedicated to residential customers	A minimum of 85% of residential-sector share of total RA spending be in the residential sector ($1,412,404 over the 3 year period).	Equity for residential customers by assuring that a minimum level of overall efficiency efforts, as reflected in spending, will be dedicated to residential customers	56% (with spending thru Q4 2021 of $794,118)

3	Equity for Low-income Customers	A minimum level of overall efficiency efforts, as reflected in spending, will be dedicated to Low-income customers	A minimum of 85% of the low-income sector share of total RA spending be on low-income services (adjusted up to $180,240 from $141,240 over the 3 year period)	Equity for low-income customers by assuring that a minimum level of overall efficiency efforts, as reflected in spending, will be dedicated to low-income households	144% (with spending thru Q4 2021 of $259,930)
4	Equity for Small Business Customers	Number of total non-residential premises with annual electric use 40,000 kWh/yr. or less participating in energy efficiency programs.	180	Equity for small business customers by assuring that a minimum level of overall efficiency efforts, as reflected in participation, will be dedicated to small business accounts	27% of goal (thru Q4 2021)

4.2 *MPR #11 Electric Administrative Efficiency Results for CY2021*

Incentive, Non-Incentive, and Administrative Cost Report

	Electric Efficiency	Business Energy Services		Residential Energy Services				Development & Support Services	Total
		Business New Construction	Business Existing Facilities	Residential New Construction	Efficient Products	Existing Homes	Act 151		
Direct Costs	**Program Costs**								
	Incentive and Technical Assistance								
	Incentive								
	Incentives to Participants (RA)	$361,520	$510,344	$10,172	$96,393	$349,911	$0	$0	$1,328,339
	Incentives to Trade Allies (RA)	$0	$0	$0	$0	$0	$0	$0	$0
	Technical Assistance								
	Services to Participants (RA)	$112,661	$202,445	$31,296	$7,599	$109,950	$372	$0	$464,323
	Services to Trade Allies (RA)	$0	$0	$0	$2,171	$0	$744	$0	$2,915
	Energy Code and Standards Support (DSS)	$0	$0	$0	$0	$0	$0	$856	$856
	Building Energy Labeling and Benchmarking (DSS)	$0	$0	$0	$0	$0	$0	$0	$0
	Better Buildings by Design (DSS)	$0	$0	$0	$0	$0	$0	$5,436	$5,436
	Incentive & Tech Asst Sub-Total (1)	***$474,181***	***$712,789***	***$41,468***	***$106,163***	***$459,861***	***$1,115***	***$6,291***	$1,801,869
	Non-Incentive Program Costs								
	Programs and Implementation (RA)	$11,297	$79,095.27	$17,787.06	$55,244.65	$13,766.77	$1,859	$0	$179,050
	Strategy and Planning (RA)	$6,731	$22,379	$2,819	$8,685	$31,106.82	$1,487	$0	$73,208
	Marketing Program (RA)	$690	$1,486	$997	$622	$2,189	$0	$0	$5,985
	Customer Support (DSS)	$0	$0	$0	$0	$0	$0	$0	$0
	General Marketing & Public Education (DSS)	$0	$0	$0	$0	$0	$0	$26,286	$26,286
	Energy Literacy (DSS)	$0	$0	$0	$0	$0	$0	$15,366	$15,366
	Applied R&D (DSS)	$0	$0	$0	$0	$0	$0	$951	$951
	Support Services (RA)	$6,731	$29,839	$2,819	$6,513	$8,234	$1,115	$0	$55,251
	Quality Assurance	$4,487	$14,919	$1,879	$4,342	$5,489	$744	$0	$31,861
	Non-Incentive Program Sub-Total (2)	***$29,936***	***$147,719***	***$26,302***	***$75,407***	***$60,786***	***$5,206***	***$42,603***	***$387,958***
	Total Program Costs	*$504,117*	*$860,508*	*$67,769*	*$181,571*	*$520,647*	*$6,321*	*$48,894*	*$2,189,827*

Indirect Costs	**Administrative**								
	Sr. Management, Budget, Financial Oversight (RA)	$3,365	$11,190	$1,410	$3,257	$4,117	$1,115	$107,052	$131,505
	Policy & Public Affairs (DSS							$1,391	$1,391
	Planning & Reporting (DSS)							$31,813	$31,813
	Administration & Regulatory (DSS)								$0
	IT (DSS)							$25,582	$25,582
	Evaluation (DSS)							$19,733	$19,733
	Direct and Indirect Overhead	**$5,684**	**$18,881**	**$2,405**	**$5,623**	**$6,955**	**$892**		$40,441
	***Administrative Sub-Total* (3)**	**$9,050**	**$30,070**	**$3,815**	**$8,880**	**$11,072**	**$2,008**	**$185,571**	**$250,465**
	Earned Compensation								
	Base Compensation								
	Performance Compensation								
	***Earned Compensation Sub-Total* (4)**								
	Total Program and Administrative	$513,167	$890,578	$71,584	$190,451	$531,719	$8,329	$234,465	$2,440,291
	Overall Total	**$513,167**	**$890,578**	**$71,584**	**$190,451**	**$531,719**	**$8,329**	**$234,465**	**$2,440,291**

Summary Report	Totals	% of total
Incentive & Technical Assist Costs		
Incentive	$1,328,339	
Technical Assistance	$473,530	
Total Incentive & Tech Assistance Costs	**$1,801,869**	**74%**
Non-Incentive Costs		
Non-incentive program costs	$387,958	16%
Admin	$250,465	10%
Earned Compensation	$0	
Total Non-Incentive Costs	**$638,422**	**26%**
Overall Total	$2,440,291	
Incentive-to-nonincentive program cost ratio		2.82
Summary		
Program	$2,189,827	89.7%
Administrative Costs	$250,465	10.3%
Overall Total	$2,440,291	

4.3 *TEPF Administrative Efficiency Results for CY2021*

Incentive, Non-Incentive, and Administrative Cost Report

	TEPF Programs	Business Energy Services		Residential Energy Services	Development & Support Services	Total
		Business Initiatives	Unregulated Fuels Commercial	Unregulated Fuels Resedential		
Direct Costs	**Program Costs**					
	Incentive and Technical Assistance					
	Incentive					
	Incentives to Participants (RA)			$1,090		$1,090
	Incentives to Trade Allies (RA)					$0
	Technical Assistance					
	Services to Participants (RA)	$119,660	$146	$4,311		$124,117
	Services to Trade Allies (RA)					$0
	Energy Code and Standards Support (DSS)					$0
	Building Energy Labeling and Benchmarking (DSS)					$0
	Better Buildings by Design (DSS)					$0
	***Incentive & Tech Asst Sub-Total* (1)**	***$119,660***	***$146***	***$5,401***	***$0***	$125,207
	Non-Incentive Program Costs					
	Programs and Implementation (RA)	$16,703	$55	$4,333		$21,090
	Strategy and Planning (RA)	$12,420	$55	$1,078		$13,553
	Marketing Program (RA)					$0
	Customer Support (DSS)					$0
	General Marketing & Public Education (DSS)					$0
	Energy Literacy (DSS)					$0
	Applied R&D (DSS)					$0
	Support Services (RA)		$36	$719		$755
	Quality Assurance		$36	$719		$755
	***Non-Incentive Program Sub-Total* (2)**	***$29,123***	***$182***	***$6,848***	***$0***	***$36,153***
	Total Program Costs	*$148,783*	*$328*	*$12,249*	*$0*	*$161,360*

Indirect Costs	**Administrative**					
	Sr. Management, Budget, Financial Oversight (RA)	$2,192	$36	$719		$2,947
	Policy & Public Affairs (DSS					$0
	Planning & Reporting (DSS)					$0
	Administration & Regulatory (DSS)					$0
	IT (DSS)					$0
	Evaluation (DSS)					$0
	Direct and Indirect Overhead	**$1,842**				$1,842
	***Administrative Sub-Total* (3)**	**$4,034**	**$36**	**$719**	**$0**	**$4,789**
	Earned Compensation					
	Base Compensation					
	Performance Compensation					
	***Earned Compensation Sub-Total* (4)**					
	Total Program and Administrative	$152,817	$364	$12,968	$0	$166,149
	Overall Total	**$152,817**	**$364**	**$12,968**	**$0**	**$166,149**

Summary Report	Total	% of total
Incentive & Technical Assist Costs		
Incentive	$1,090	
Technical Assistance	$124,117	
Total Incentive & Tech Assistance Costs	$125,207	75%
Non-Incentive Costs		
Non-incentive program costs	$36,153	22%
Admin	$4,789	3%
Earned Compensation	0	
Total Non-Incentive Costs	$40,942	
Overall Total	$166,149	
Incentive-to-nonincentive program cost ratio	3.06	
Summary		
Program	$161,360	97%
Administrative Costs	$4,789	3%
Overall Total	$166,149	