BURLINGTON ELECTRIC DEPARTMENT

# 2023 Energy Efficiency Utility Annual Report

***(2021 DPS Measurement & Verification full results are applied in this Annual Report)***

***(2022 & 2023 DPS Measurement & Verification full results are not yet available)***

## May 1, 2024

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# 1 Introduction

The Burlington Electric Department (BED) is pleased to submit the following report to the Vermont Public Utility Commission (PUC), the Vermont Department of Public Service (DPS) and the Burlington Electric Commission (BEC) summarizing the implementation of energy efficiency programs in the City of Burlington for the year 2023, and the 2021-2023 three-year performance period. 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 supportive of BED's pursuit of additional cost-effective energy efficiency.

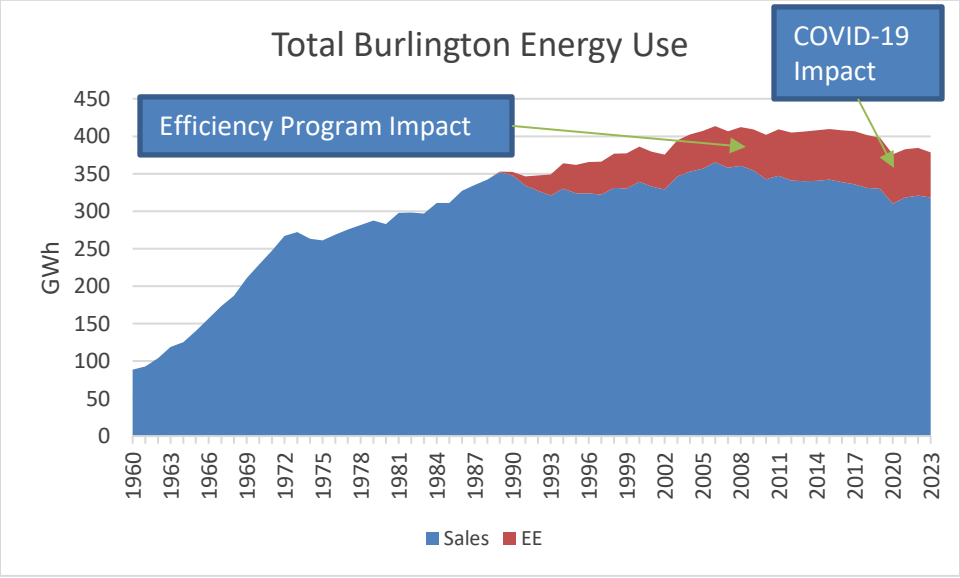
Burlington voters in 1990 approved an 11.3-million-dollar bond to fund energy efficiency programs that supported successful program activities through 2002. Since 2003, BED customers (like all other Vermont electric customers) pay a monthly charge that supports these "Energy Efficiency Utility" (EEU) programs. When these funding sources are considered along with customers' direct investment, approximately $87.5 million has been invested in energy efficiency efforts sponsored by BED over the last 34 years. This is comprised of approximately $45 million spent by BED on all of its energy efficiency efforts during that period, combined with another $42.5 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 2023,

electricity consumption in Burlington is approximately 9% lower today than in 1989. In other words, we are meeting the needs of a growing local economy with less electricity than the city 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 34 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**




***Program Annual Performance Trends***- 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 34 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, in concert with Vermont's broad climate action goals, 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.

***Partnerships***- This report includes coverage of BED's program activities related to the twenty-fourth 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 (appointed by the PUC as an EEU for

their customers), Champlain Valley Weatherization Service (CVWS) and the Burlington 2030 District. A cooperative relationship with VGS helps both organizations promote EEU services. Over 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 hybrid heaters i.e., 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 remains responsible for reacting with appropriate program design modifications to the changing market conditions that impact customers' decisions about undertaking energy efficiency upgrades.

**2024 Outlook -**

As BED has discussed with the DPS, BED continues to closely monitor existing commercial customer activity as the business community continues to face several challenges. The commercial sector represents about 75% of BED's savings goals with the Business Existing Facilities (BEF) program representing about 54% of the total three-year savings target and 45% of the total budget.

Over the past two years we have had multiple commercial customer engagements to help better understand the decrease in overall program participation during the 2021-2023 period, and to help us better forecast 2024-2026 potential participation. BED has learned that many businesses remain apprehensive about the lingering impacts of the pandemic, and other local economic disruptions. Some customers are still concerned about the future of their business' models. Business customers continue to report that

persistent staffing shortages, some lingering supply chain issues and inflation have not fully abated. Also, a high percentage of office-based employees are still working from home (partially or fully) so decreased sales from less customer traffic is a compounding issue. When talking with commercial Real Estate entities, they point out the high percentage of vacant floor space and the number of businesses asking to reduce the amount of square footage that they are currently leasing. About 70% of BED's commercial customers lease their building spaces.

Additionally, like other communities, Burlington has been facing opioid addiction and homelessness challenges that directly impact our downtown core businesses and have led to some business closings. Public safety issues, staff safety issues, increased retail theft and staffing shortages can, understandably, distract business owners from making energy efficiency improvements.

With the above said, we are slowly starting to see the positive impacts from local and state intervention strategies that we hope will lead to greater participation levels in the coming months. BED will continue to use our marketing and outreach services (described in more detail below) to inform customers and contractors that we are here to help with technical assistance, incentives, and on-bill financing services. We will also continue to leverage relationships with our colleagues at CEDO and Burlington's Department of Business and Workforce Development. BED will also continue to work 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 and often conduct joint energy audits for greater customer convenience.

BED will inform the PUC and DPS, as soon as possible, of any on-going concerns that may materially impact 2024-2026 savings goals.

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

BED will continue 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.

BED continues to recognize that these are both exciting and challenging 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. To reduce potential barriers to participation, BED is also committed to making sure that our utility billing and payment processes are clear, and easy to navigate for all customers, especially those struggling with household budgets.

As a city department and community member, BED acknowledges the hardships that many of our customers have still been experiencing due to on-going local and global economic impacts. Working toward our EEU, Tier 3 and Net Zero Energy City (NZE) goals, while also overcoming economic related challenges, continues to require support and engagement from the community over an extended period. BED also continues to recognize the 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 bullet point examples below indicate, BED has embarked on some of this important work to ensure that our programs are consistently

impactful. BED also recognizes that the efforts listed below (along with other efforts) will need to be regularly monitored and improved upon.

- BED-Trusted Community Voices (TCVs) Dialogue - Led by CEDO's Opportunity and Engagement Team, the TCV initiative seeks to enhance community engagement efforts and create open dialogue for Burlington residents, with a focus on immigrant and refugee communities. Known as TCV liaisons, trusted community members serve as a bridge between the City/CEDO and their communities to foster more effective, engaging, and supportive relationships. BED continues working with TCV on the following issues:
  - *How BED can do more to reach out to customers, with language translation or other services, so more of our customers can learn about and participate in our programs?*
  - *What are the most useful means for broader communications with our community – inserts in the monthly BED bill, emails, radio, Front Porch Forum, social media, other?*
  - *What types of energy rebate or assistance programs would be most helpful?*

- BED's Project & Equity Analyst position started in January 2023 and is now fully trained on all BED programs and services- This position focuses on many activities including: advising and coordinating with other BED departments on equitable and accessible processes, program design and implementation; identifying opportunities to help advance energy efficiency and fossil fuel reduction among BIPOC and other under-represented community members; works collaboratively to improve BED's customer care processes, energy efficiency and strategic electrification program design and delivery, and is designing and developing BED's community ambassador program and other community engagement efforts, including regular listening, communication, and outreach with key community stakeholders. This position works across all areas of BED.

- In 2023, Equity and Project Analyst participated in the Vermont Council of Rural Development's Leadership Summit and spoke on energy and equity panel with Green Mountain Power and Efficiency Vermont staff.

- In 2023, Equity and Project Analyst continued outreach to stakeholder groups and community members, including Family Room, BHA's Bobbin Mill, BHA's Hillside Apartments, Northgate Apartments, and continued Monday afternoon energy clinic program at the King Street Laundry whereby BED is available to answer questions and address customer bill concerns. The King Street Laundry is located in one of Burlington's most income challenged neighborhoods and the new owner has allowed it to become an "informal" community resource center.

- *BED staff learning & awareness city efforts*– As part of our city's commitment to racial equity, 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, our customers, and how we can best combat it. These training courses are a requisite part of every current and future employee's professional development.

- BED staff tabled at several regular community events in 2023 including: the downtown Farmers Market, the Old North End Farmers Market, Summervale at the Intervale Community Farm and Lake Monster's baseball games.

- 2nd Annual Net Zero Energy Festival – On Saturday, September 23, 2023, BED hosted our second annual NZE Fest. Approximately 200 people of all ages joined us for activities focused on reducing energy use and included food trucks; live

music; raffles; E-bike test rides; EV test-drives; bike parking; BED partners that provide heat pump, solar, and electric lawn care products; carshare and biking partners and a BED EEU energy experts information booth.

The remaining pages on this report provide details on BED's delivery of the following EEU services in 2023:

- **Development & Support Services (DSS)**
- **Business New Construction**
- **Business Existing Facilities**
- **Residential New Construction**
- **Existing Homes**
- **Efficient Retail Products**
- **Thermal Energy and Process Fuels (Residential and Commercial)**
- **Act 151 2021-2023 pilot programs**

**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 | 1,305 | $506,856 | $374,545 | $1,329,429 | $61,980 | $256,251 | $2,529,061 | 1,806 | 26,949 | 278 | 289 |
| 2022 | 1,659 | $619,995 | $352,278 | $1,220,793 | $42,611 | $2,088,944 | $4,324,621 | 4,111 | 64,817 | 759 | 609 |
| 2023 | 1,234 | $737,688 | $331,353 | $1,143,829 | $18,672 | $2,423,526 | $4,655,068 | 3,306 | 50,576 | 455 | 518 |
| **Total** | **46,866** | **$12,193,340** | **$9,420,230** | **$22,777,125** | **$1,438,136** | **$42,753,428** | **$88,582,260** | **160,511** | **2,033,232** | **26,705** | **18,425** |

**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 | 383 | $282,828 | $260,931 | $872,954 | $46,485 | $124,042 | $1,587,239 | 1,405 | 21,048 | 193 | 217 |
| 2022 | 438 | $358,306 | $240,626 | $967,844 | $31,958 | $1,526,647 | $3,125,381 | 3,334 | 53,675 | 597 | 479 |
| 2023 | 327 | $413,412 | $247,753 | $778,928 | $14,004 | $2,022,431 | $3,476,529 | 2,664 | 43,235 | 320 | 429 |
| **Total** | **7,805** | **$6,424,176** | **$6,753,402** | **$15,142,246** | **$944,364** | **$31,868,419** | **$61,132,607** | **101,955** | **1,332,057** | **12,992** | **12,915** |

**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 | 922 | $224,028 | $113,614 | $456,475 | $15,495 | $132,209 | $941,822 | 401 | 5,901 | 85 | 72 |
| 2022 | 1,221 | $261,689 | $111,652 | $252,949 | $10,653 | $562,296 | $1,199,240 | 777 | 11,142 | 162 | 130 |
| 2023 | 907 | $324,276 | $83,600 | $364,900 | $4,668 | $401,095 | $1,178,538 | 642 | 7,341 | 135 | 89 |
| **Total** | **39,061** | **$5,769,164** | **$2,666,828** | **$7,634,879** | **$493,772** | **$10,885,009** | **$27,449,653** | **58,556** | **701,175** | **13,713** | **5,510** |

# 2 Overview of EEU Services Results for 2023 & the 2021-2023 Performance Period

As described in more detail in each program below, 2023 proved to be a challenging year for achieving savings goals in most programs. Overall, BED achieved 71% of the total annual MWh goal, 94% of the summer coincident–peak KW goal and 76% of the winter coincident–peak KW goal.

As BED discussed with the DPS in November 2023, and also noted in its November 15, 2023, Q3 EEU Report, 2023 success was going to be highly dependent on several on-going commercial projects completing in time. Unfortunately, staffing shortages continued to plague the customers involved with these projects and they were unable to complete them in time for the 2023 savings claim.

BED projected 4,657 annualized MWh savings and achieved 3,306 annualized MWh which will result in 50,576 MWh of savings over the useful life of the installed measures (2023 measures have a weighted average lifetime of about 15 years). BED projected 551 coincident-peak summer KW savings and achieved 519 KW. BED projected 600 coincident-peak winter KW savings and achieved 455 KW.

BED's electric resource acquisition budget for 2023 was $2,227,283 and $2,133,886 was expended. BED's cost for, first year, saved energy was higher than projections. BED estimated it would spend about $478 per annualized MWh saved, and instead spent $645 per annualized MWh. As explained in the following section, the Department of Public Service's 2021 Measurement and Verification results for heat pumps was a contributing factor to this increase.

BED's general administrative costs as a percentage of total BED program costs came in at 10.5%. Other non-program incentive costs were about 8.5% of the 2023 budget, and 81% of the budget was spent on direct technical assistance and cash incentives to customers.

**2021-2023 Three-year Performance Period Results and Informational Updates (Impacts from the DPS's 2021 M&V results and mid-stream program data errors by BED and EVT) –**

For the 2021-2023 EEU performance cycle, BED met 66% of MWh savings projections. BED projected 13,936 MWh savings and achieved 9,222 MWh. BED met 79% of the summer coincident-peak savings goal. 1,795 coincident-peak KW was projected, and BED achieved 1,418 KW. BED met 71% of the winter coincident-peak savings goal. 2,090 coincident-peak KW was projected, and BED achieved 1,494 KW. BED's budget for the 2021-2023 cycle was $6,646,605 (including carryover electric RA funds) and $6,499,219 was expended, about 98% of the budget. BED's cost for saved energy was higher than projections. BED estimated it would spend about $466 per annualized MWh saved, and instead spent $705 per annualized MWh. A very sluggish 2021 performance year combined with the impacts from the DPS's 2021 M&V heat pump results (as described below) are contributing factors to missing 2021-2023 savings targets.

As BED described in its 2021 EEU Annual Report, overall program activity was very sluggish, greatly influenced by the lingering impacts from the pandemic, in both new construction and commercial existing facilities, in particular, as was the case in 2020. Activity was 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 were bolstered by Tier 3, traditional EEU, EEU GS, and Act 151 pilot funds combined rebates. All of these products offer higher incentives for our low-income customers. While BED was pleased with the level of customer activity, the electric savings from these measures are relatively low so, alone, they do not contribute enough towards replacing lost commercial sector savings.

Table 30 (page 73) shows BED's overall results for the 2021-2023 "Minimum Performance Requirements" (MPR) and the "Quantifiable Performance Indicators" (QPI) as approved by the PUC. BED notes that it has met all of the electric MPR's but fell short on several of the QPI's.

**Impacts from DPS's 2021 M&V Heat Pump Results and Mid-stream Program Data and Invoicing Errors by BED and EVT -**

As BED discussed with the DPS in Quarter 3 2023, overall, 2021-2023 savings, and final program sector budgets, were impacted by a number of factors as described below that BED wishes to note.

***Impacts from DPS's 2021 M&V Results on Heat Pump Savings -***

As BED noted in its November 15, 2023, Quarter 3 Report, the final results of the DPS's 2021 M&V process (provided to BED in late May of 2023) found a significant variance with heat pump electric savings between the Electric Technical Reference Manual (TRM) and actual BED participating customer electric usage data. BED used the perspective heat pump savings values from the statewide TRM, but the M&V process utilized actual pre and post customer AMI data (weather normalized) that produced significantly reduced electric savings results, about a 60% reduction in annual electrical savings.

BED and the DPS believe that these results are driven by customer economics. The majority of the heat pumps were installed in Burlington homes that heat with natural gas where the energy cost savings are not as compelling as in oil or propane gas heated homes with their higher associated costs.

The DPS is currently conducting a statewide heat pump impact evaluation to explore all savings issues further, but it will not be completed in time to inform the current TRM prescriptive savings assumptions until later in 2024/2025. After discussions with the DPS, it was recommended that BED not only adjust its 2021 savings claim accordingly but also prospectively apply the 2021 M&V heat pump results to 2022 and 2023 heat pump measures to avoid a reoccurrence of this issue. This 2023 EEU Annual Report prospectively applies the 2021 M&V heat pump results to 2022 and 2023 heat pump measures.

*Mid-stream Program Data and Invoicing errors by BED and EVT –*

As BED discussed with the DPS, in Q4 2023 BED discovered BED staff data entry errors, and EVT data exchange and invoicing errors with the mid-stream HVAC and lighting programs.

First, due to BED staff errors a number of 2022 and 2023 HVAC and LED lighting measure were assigned to the wrong program accounts. Participating distributors send all Vermont sales data to EVT and then EVT sends all Burlington measures to BED for processing. The majority of the BED staff errors placed residential sector measures in the business sector. To be clear, there was no mistake regarding the total EEU dollars involved but we assigned the dollars to the wrong programs. BED has provided staff with additional training and support and has put improved internal system procedures in place to safeguard against future mistakes.

There were two additional issues from EVT's data processing. We found that EVT overbilled BED on a portion of monthly HVAC and LED lighting invoices from participating distributors. In addition, EVT did not send BED all the 2023 Burlington sales data from participating distributors. BED notes that EVT was very helpful in solving both issues and explained fully how they fixed the problems and improved their internal systems to prevent reoccurrences.

The EVT issues stemmed from changes to their sales data delivery system. EVT launched an improved version of their sales data delivery system for the Mid-stream HVAC & lighting distributor rebate programs. The new sales data system replaced the previous process of sending BED Excel spreadsheets of sales data for each product in the program. The new system expedited data directly from the EVT intake to the BED database. This automated improvement reduces the labor time needed to process data and send out vendor payments.

Unfortunately, in late 2023, BED was notified by one of the distributors that they were not getting all their payments from BED. BED searched internal files with no evidence of any lost sales. BED contacted EVT and asked them to query lost sales on their side.

The EVT query revealed that the data filter used to determine which sales should be forwarded to BED was defective- or had a 'gap.' This 'gap' left a substantial amount of residential midstream sales not being delivered to BED. Because some sales data was still coming through, BED did not quickly recognize that there was a problem.

The combined errors above did not cause BED to overspend the total 2021-2023 electric RA budget and had no impact on the low-income spending 2021-2023 MPR (which we have surpassed), but BED has overspent the 2021-2023 residential sector budget by 33%. Due to the late discovery of these issues in 2023 BED was unable to make any program changes.

**Table 4: EEU Business & Residential - Total Resource Benefits**

| | |
|---|---|
| **Avoided Costs of Electricity** | $3,919,248 |
| **Fossil Fuel Savings** | $1,986,790 |
| **Water Savings** | $101,907 |
| **TRB Total** | $6,007,945 |

| | **Annual** | **Lifetime** |
|---|---|---|
| **Meter MWh** | 3,427 | 52,669 |
| **Generation MWh** | 3,306 | 50,576 |
| **Meter Demand kW** | 1,377 | 19,961 |
| **Generation Peak Summer kW** | 518 | 7,246 |
| **Generation Peak Winter kW** | 454 | 6,698 |
| **Water Savings** | $739 | $10,375 |
| **Fuel Savings** | $9,006 | $180,349 |
| **O+M Savings** | $15,860 | $219,106 |

## Table 5: EEU Business & Residential - Summary

| | Prior Year 2022 | Current 2023 | Program to Date |
|---|---|---|---|
| **Program Costs** | | | |
| **Incentive and Technical Assistance** | | | |
| Incentive | | | |
| Incentives to Participants (RA) | $ 1,212,577 | $ 1,100,239 | $ 3,910,703 |
| Incentives to Trade Allies (RA) | $ - | $ - | $ - |
| Technical Assistance | $ - | $ - | $ - |
| Services to Participants (RA) | $ 419,765 | $ 434,676 | $ 1,464,835 |
| Services to Trade Allies (RA) | $ (24) | $ 1,493 | $ 9,035 |
| Energy Code and Standards Support (DSS) | $ 1,660 | $ 2,092 | $ 2,544 |
| Building Energy Labeling and Benchmarking (DSS) | $ - | $ - | $ - |
| Better Buildings by Design (DSS) | $ 2,850 | $ 3,304 | $ 11,162 |
| ***Incentive & Tech Asst Sub-Total* (1)** | $ 1,636,827 | $ 1,541,805 | $ 5,398,280 |
| **Non-Incentive Program Costs** | | | |
| Programs and Implementation (RA) | $ 285,441 | $ 270,138 | $ 573,433 |
| Strategy and Planning (RA) | $ 35,362 | $ 56,435 | $ 197,022 |
| Marketing Program (RA) | $ 4,183 | $ (5) | $ 10,168 |
| Customer Support (DSS) | $ - | $ - | $ - |
| General Marketing & Public Education (DSS) | $ 15,284 | $ 10,457 | $ 57,315 |
| Energy Literacy (DSS) | $ 10,258 | $ 9,148 | $ 33,568 |
| Applied R&D (DSS) | $ 1,481 | $ 3,065 | $ 5,026 |
| Support Services (RA) | $ 40,832 | $ 63,107 | $ 188,906 |
| Quality Assurance | $ 23,591 | $ 36,628 | $ 109,142 |
| ***Non-Incentive Program Sub-Total* (2)** | $ 416,434 | $ 448,972 | $ 1,174,580 |
| ***Total Program Costs*** | $ 2,053,261 | $ 1,990,777 | $ 6,572,860 |
| | $ - | | |
| **Administrative** | $ - | | |
| Sr. Management, Budget, Financial Oversight (RA) | $ 66,815 | $ 30,508 | $ 293,914 |
| Policy & Public Affairs (DSS | $ 5,761 | $ 14,690 | $ 17,455 |
| Planning & Reporting (DSS) | $ 129,187 | $ 157,827 | $ 232,990 |
| Administration & Regulatory (DSS) | $ - | $ - | $ - |
| IT (DSS) | $ 20,177 | $ 784 | $ 70,444 |
| Evaluation (DSS) | $ 18,475 | $ 10,989 | $ 54,517 |
| *Direct and Indirect Overhead* | $ 21,251 | $ 46,505 | $ 123,623 |
| ***Administrative Sub-Total* (3)** | $ 261,665 | $ 261,304 | $ 792,944 |
| | $ - | | |
| **Earned Compensation** | $ - | | |
| Base Compensation | $ - | $ - | |
| Performance Compensation | $ - | $ - | |
| ***Earned Compensation Sub-Total* (4)** | $ - | $ - | |
| **Total Program and Administrative** | $ 2,314,926 | $ 2,252,081 | $ 7,365,803 |
| **Overall Total** | $ 2,314,926 | $ 2,252,081 | **$ 7,365,803** |

| | | | |
|---|---|---|---|
| **--- Benefits ---** | | | |
| **Annual MWh** | 4,111 | 3,306 | 164,655 |
| **Lifetime MWh** | 64,817 | 50,576 | 2,102,440 |
| **Winter Peak kW** | 759 | 455 | 27,409 |
| **Summer Peak kW** | 609 | 518 | 19,618 |
| **MWh / Participant** | 2 | 3 | 4 |
| **Weighted Lifetime** | 16 | 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 | 73.82 | 74.67 | 1,019.83 | 0.49 | 13.90 | 0.00 | 0.00 |
| Cooking and Laundry | 50 | 78.87 | 70.17 | 948.03 | 8.96 | 7.90 | -0.46 | 723.00 |
| Hot Water Efficiency | 97 | 114.47 | 130.69 | 1,585.08 | 20.47 | 10.34 | 0.00 | 16.00 |
| Industrial Process Efficiency | 1 | 10.60 | 11.31 | 169.58 | 2.65 | 2.64 | 0.00 | 0.00 |
| Light Bulb/Lamp | 22 | 84.89 | 90.26 | 1,319.83 | 11.08 | 15.85 | 0.00 | 0.00 |
| Lighting | 403 | 991.64 | 1,065.60 | 13,914.12 | 125.99 | 200.22 | 0.00 | 0.00 |
| Lighting Hardwired Fixture | 117 | 195.58 | 210.36 | 2,989.04 | 26.39 | 32.95 | -44.40 | 0.00 |
| Motors | 67 | 11.46 | 11.94 | 238.80 | 2.25 | 0.00 | 0.00 | 0.00 |
| Other | 7 | 812.95 | 862.75 | 16,273.30 | 113.51 | 146.62 | 9,051.00 | 0.00 |
| Refrigeration | 85 | 91.48 | 92.84 | 1,326.08 | 12.89 | 9.58 | 0.00 | 0.00 |
| Space Heat Efficiency | 293 | 668.76 | 473.63 | 8,787.30 | 76.90 | 57.46 | 0.00 | 0.00 |
| Space Heat Fuel Switch | 1 | -7.44 | -7.86 | -141.50 | -1.32 | -0.05 | 0.00 | 0.00 |
| Space Heat Replacement | 110 | 173.26 | 85.65 | 1,343.43 | 21.04 | 16.45 | 0.00 | 0.00 |
| Thermal Shell | 12 | 125.43 | 132.18 | 777.82 | 33.89 | 5.04 | 0.00 | 0.00 |
| Ventilation | 18 | 1.35 | 1.33 | 25.29 | 0.16 | 0.16 | 0.00 | 0.00 |
| **Total** | | 3,427.14 | 3,305.51 | 50,576.04 | 455.35 | 519.07 | 9,006.14 | 739.00 |

## *2.1 Development and Support Services*

The following section highlights BED's Development and Support Services (DSS) activities for 2023. 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 stakeholders 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 quarterly and annual reports, and an annual plan to the PUC 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 IT initiative consists of continuing the support of and improvement to the 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 Activity**

| Electric DSS Activity | 2021 Spending | 2022 Spending | 2023 Spending | 2021-2023 Budget | % 2021-2023 Budget |
|---|---|---|---|---|---|
| Education & Training | $ 47,599 | $ 9,948 | $ 21,655 | **$ 99,840** | 79% |
| Applied R&D | $ 951 | $ 1,481 | $ 2,859 | **$ 24,600** | 22% |
| Planning & Reporting | $ 29,400 | $ 29,960 | $ 60,653 | **$ 142,933** | 84% |
| Evaluation | $ 19,369 | $ 18,192 | $ 10,611 | **$ 52,000** | 93% |
| Policy & Public Affairs | $ 1,053 | $ 5,761 | $ 14,040 | **$ 22,870** | 91% |
| Information Tech | $ 25,400 | $ 6,201 | $ 852 | **$ 33,600** | 97% |
| General Administration | $ 101,433 | $ 32,371 | $ 1,317 | **$ 137,700** | 98% |
| **Total** | **$ 225,205** | **$ 103,914** | **$ 111,987** | **$ 513,543** | 86% |

## *2.2 Business Services Overview*

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

Overall, 2023 savings results in business services were challenged as program activity in BNC was not as strong as projected. BEF did see relatively strong program activity with the mid-stream LED lighting rebate program but savings per LED fixture are relatively small which resulted in achieving only 71% of BEF's savings target.

BED projected 3,909 megawatt-hour (MWh) overall savings while achieving actual annual energy savings of 2,664 MWh, about 68% of the goal. BED's cost to deliver EEU business services in 2023 was $1,358,590 below the budgeted amount of $1,670,462 by 20%.

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.

BED notes that over the past two years we have had multiple commercial customer engagements to help better understand the decrease in overall program participation during 2021-2023, and to help us better forecast 2024-2026 participation. BED has learned that many businesses remain apprehensive about the lingering impacts of the pandemic, and other global, and local, economic disruptions. Some customers are still concerned about the future of their business' models. Business customers continue to report that persistent staffing shortages, some lingering supply chain issues and inflation have not fully abated. Also, a high percentage of office-based employees are still working from home (partially or fully) so decreased sales from less customer traffic is a compounding issue. When talking with commercial Real Estate entities, they point out the high percentage of vacant floor space and the number of businesses asking to

reduce the amount of square footage that they are currently leasing. About 70% of BED's commercial customers lease their building spaces.

Additionally, like many other communities, Burlington has been facing opioid addiction and homelessness challenges that directly impact our downtown core businesses and have led to some business closings. Public safety issues, staff safety issues, increased retail theft and staffing shortages can, understandably, distract business owners from making energy efficiency improvements.

With the above said, we are slowly starting to see the positive impacts from some local and state intervention strategies that we hope will lead to greater participation levels in the coming months. BED will continue to use our marketing and outreach services to inform customers and contractors that we are here to help with technical assistance, incentives, and on-bill financing services. We will also continue to leverage relationships with our colleagues at CEDO and Burlington's Department of Business and Workforce Development. BED will also continue to work closely with VGS (the natural gas utility serving about 98% of Burlington's commercial customers) to encourage a comprehensive approach to energy savings. BED and VGS staff are committed to bringing appropriate projects to each other's attention and often conduct joint energy audits for greater customer convenience.

**Table 8: EEU Business - Total Resource Benefits**

| | |
|---|---|
| **Avoided Costs of Electricity** | $3,293,663 |
| **Fossil Fuel Savings** | $1,987,252 |
| **Water Savings** | $13,641 |
| **TRB Total** | $5,294,556 |

| | **Annual** | **Lifetime** |
|---|---|---|
| **Meter MWh** | 2,510 | 40,788 |
| **Generation MWh** | 2,664 | 43,236 |
| **Meter Demand kW** | 681 | 10,813 |
| **Generation Peak Summer kW** | 428 | 6,779 |
| **Generation Peak Winter kW** | 320 | 5,255 |
| **Water Savings** | $93 | $1,401 |
| **Fuel Savings** | $9,007 | $180,354 |
| **O+M Savings** | $15,467 | $221,362 |

## Table 9: EEU Business - Summary

| | Prior Year 2022 | Current 2023 | Program to Date |
|---|---|---|---|
| **Program Costs** | | | |
| **Incentive and Technical Assistance** | | | |
| Incentive | | | |
| Incentives to Participants (RA) | $ 959,627 | $ 729,889 | $ 2,619,182 |
| Incentives to Trade Allies (RA) | $ - | $ - | $ - |
| Technical Assistance | $ - | $ - | $ - |
| Services to Participants (RA) | $ 275,987 | $ 298,934 | $ 965,945 |
| 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)** | $ 1,235,614 | $ 1,028,823 | $ 3,585,127 |
| | $ - | $ - | $ - |
| **Non-Incentive Program Costs** | $ - | $ - | $ - |
| Programs and Implementation (RA) | $ 173,104 | $ 151,496 | $ 324,085 |
| Strategy and Planning (RA) | $ 22,574 | $ 31,464 | $ 98,799 |
| Marketing Program (RA) | $ 2,799 | $ (5) | $ 4,975 |
| Customer Support (DSS) | $ - | $ - | $ - |
| General Marketing & Public Education (DSS) | $ - | $ - | $ - |
| Energy Literacy (DSS) | $ - | $ - | $ - |
| Applied R&D (DSS) | $ - | $ - | $ - |
| Support Services (RA) | $ 28,020 | $ 39,629 | $ 122,219 |
| Quality Assurance | $ 15,049 | $ 20,976 | $ 64,684 |
| ***Non-Incentive Program Sub-Total* (2)** | $ 241,547 | $ 243,560 | $ 614,763 |
| ***Total Program Costs*** | $ 1,477,161 | $ 1,272,384 | $ 4,199,890 |
| | $ - | | |
| **Administrative** | $ - | | |
| Sr. Management, Budget, Financial Oversight (RA) | $ 11,287 | $ 16,201 | $ 48,513 |
| Policy & Public Affairs (DSS | $ - | $ - | $ - |
| Planning & Reporting (DSS) | $ 25,802 | $ 43,526 | $ 25,802 |
| Administration & Regulatory (DSS) | $ - | $ - | $ - |
| IT (DSS) | $ - | $ - | $ - |
| Evaluation (DSS) | $ - | $ - | $ - |
| *Direct and Indirect Overhead* | $ 17,866 | $ 26,479 | $ 78,428 |
| ***Administrative Sub-Total* (3)** | $ 54,955 | $ 86,206 | $ 152,743 |
| | $ - | | |
| **Earned Compensation** | $ - | | |
| Base Compensation | $ - | $ - | |
| Performance Compensation | $ - | $ - | |
| ***Earned Compensation Sub-Total* (4)** | $ - | $ - | |
| **Total Program and Administrative** | $ 1,532,116 | $ 1,358,589 | $ 4,352,634 |
| **Overall Total** | **$ 1,532,116** | **$ 1,358,589** | **$ 4,352,634** |

| | | | |
|---|---|---|---|
| **--- Benefits ---** | | | |
| **Annual MWh** | 3,334 | 2,664 | 105,962 |
| **Lifetime MWh** | 53,675 | 43,235 | 1,397,843 |
| **Winter Peak kW** | 597 | 320 | 13,687 |
| **Summer Peak kW** | 479 | 429 | 14,007 |
| **MWh / Participant** | 8 | 8 | 17 |
| **Weighted Lifetime** | 16 | 16 | 13 |

## Table 10: EEU Business - End-Use Summary

| | | MWh | | | kW | | | |
|---|---|---|---|---|---|---|---|---|
| **Description** | **Participants** | **Gross** | **Net** | **Lifetime** | **Winter** | **Summer** | **MMBTU** | **CCF** |
| Air Conditioning Efficiency | 1 | 44.52 | 47.42 | 711.27 | 0.00 | 6.18 | 0.00 | 0.00 |
| Cooking and Laundry | 3 | 21.73 | 23.05 | 345.16 | 2.57 | 3.12 | 0.00 | 93.40 |
| Hot Water Efficiency | 8 | 2.31 | 2.66 | 35.85 | 0.41 | 0.21 | 0.00 | 0.00 |
| Industrial Process Efficiency | 1 | 10.60 | 11.31 | 169.58 | 2.65 | 2.64 | 0.00 | 0.00 |
| Light Bulb/Lamp | 11 | 78.71 | 83.60 | 1,225.23 | 10.28 | 14.63 | 0.00 | 0.00 |
| Lighting | 210 | 939.53 | 1,004.30 | 13,730.85 | 108.66 | 194.71 | 0.00 | 0.00 |
| Lighting Hardwired Fixture | 54 | 171.21 | 181.78 | 2,564.16 | 18.30 | 30.47 | -44.40 | 0.00 |
| Motors | 18 | 4.03 | 4.08 | 81.63 | 0.77 | 0.00 | 0.00 | 0.00 |
| Other | 7 | 812.95 | 862.75 | 16,273.30 | 113.51 | 146.62 | 9,051.00 | 0.00 |
| Refrigeration | 29 | 77.37 | 81.59 | 1,134.77 | 11.84 | 8.27 | 0.00 | 0.00 |
| Space Heat Efficiency | 39 | 326.34 | 342.72 | 6,705.68 | 45.34 | 20.90 | 0.00 | 0.00 |
| Space Heat Fuel Switch | 1 | -7.44 | -7.86 | -141.50 | -1.32 | -0.05 | 0.00 | 0.00 |
| Space Heat Replacement | 15 | 28.61 | 26.64 | 399.62 | 6.52 | 1.21 | 0.00 | 0.00 |
| **Total** | | 2,510.48 | 2,664.02 | 43,235.60 | 319.54 | 428.91 | 9,006.60 | 93.40 |

## 2.2.1 Business New Construction

### Program Description

This service helps commercial 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 and 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 CBES 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 2023 were 863, about 37% lower than the 1,368 MWh goal. Total BED program costs were $185,514, about 68% lower than the budgeted amount of $584,662.

### Variance Discussion

Customers make business decisions independent of BED's program budgeting efforts, and we fully anticipate that year to year results will be "lumpy" and show dramatic swings in performance. Also, timing plays a role in annual results as some projects are not completed 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.

As part of the 2024-2026 DRP, BED has identified large BNC projects that are likely to be completed within the three-year performance period as the delay or postponement of

these projects can have dramatic budget and savings impacts. If any of these projects are delayed or postponed, then BED will consult with the DPS on the appropriateness of a QPI goal and budget adjustment request.

**Program Outlook**

2024 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.

Combining BED's 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, energy recovery ventilation systems, 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 envelopes that are being designed and constructed utilizing higher performance thermal envelope techniques.

**Table 11: EEU Business New Construction - Total Resource Benefits**

| | |
|---|---|
| **Avoided Costs of Electricity** | $1,287,650 |
| **Fossil Fuel Savings** | $1,994,812 |
| **Water Savings** | $0 |
| **TRB Total** | $3,282,462 |

| | **Annual** | **Lifetime** |
|---|---|---|
| **Meter MWh** | 813 | 15,334 |
| **Generation MWh** | 863 | 16,273 |
| **Meter Demand kW** | 203 | 3,881 |
| **Generation Peak Summer kW** | 147 | 2,738 |
| **Generation Peak Winter kW** | 114 | 2,151 |
| **Water Savings** | $0 | $0 |
| **Fuel Savings** | $9,051 | $181,020 |
| **O+M Savings** | $0 | $0 |

## Table 12: EEU Business New Construction – Summary

| | Prior Year 2022 | Current 2023 | Program to Date |
|---|---|---|---|
| **Program Costs** | | | |
| **Incentive and Technical Assistance** | | | |
| Incentive | | | |
| Incentives to Participants (RA) | $ 232,227 | $ 41,185 | $ 898,911 |
| Incentives to Trade Allies (RA) | $ - | | $ - |
| Technical Assistance | | | $ - |
| Services to Participants (RA) | $ 94,569 | $ 76,896 | $ 327,961 |
| 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)** | $ 326,796 | $ 118,081 | $ 1,226,872 |
| | | | $ - |
| **Non-Incentive Program Costs** | | | $ - |
| Programs and Implementation (RA) | $ 11,180 | $ 15,824 | $ 33,786 |
| Strategy and Planning (RA) | $ 6,235 | $ 6,968 | $ 21,447 |
| Marketing Program (RA) | $ 750 | $ - | $ 1,440 |
| Customer Support (DSS) | | | $ - |
| General Marketing & Public Education (DSS) | | | $ - |
| Energy Literacy (DSS) | | | $ - |
| Applied R&D (DSS) | | | $ - |
| Support Services (RA) | $ 6,235 | $ 6,968 | $ 21,447 |
| Quality Assurance | $ 4,156 | $ 4,645 | $ 14,298 |
| ***Non-Incentive Program Sub-Total* (2)** | $ 28,556 | $ 34,406 | $ 92,418 |
| ***Total Program Costs*** | $ 355,352 | $ 152,487 | $ 1,319,290 |
| **Administrative** | | | |
| Sr. Management, Budget, Financial Oversight (RA) | $ 3,117 | $ 3,484 | $ 10,723 |
| Policy & Public Affairs (DSS | | | $ - |
| Planning & Reporting (DSS) | $ 11,147 | $ 24,348 | $ 11,147 |
| Administration & Regulatory (DSS) | | | $ - |
| IT (DSS) | | | $ - |
| Evaluation (DSS) | | | $ - |
| *Direct and Indirect Overhead* | $ 4,966 | $ 5,196 | $ 14,542 |
| ***Administrative Sub-Total* (3)** | $ 19,230 | $ 33,027 | $ 36,412 |
| **Earned Compensation** | | | |
| Base Compensation | | | |
| Performance Compensation | | | |
| ***Earned Compensation Sub-Total* (4)** | | | |
| **Total Program and Administrative** | $ 374,582 | $ 185,514 | $ 1,355,702 |
| **Overall Total** | **$ 374,582** | **$ 185,514** | **$ 1,355,702** |

| | | | |
|---|---|---|---|
| **--- Benefits ---** | | | |
| **Annual MWh** | 1,339 | 863 | 26,707 |
| **Lifetime MWh** | 26,698 | 16,273 | 402,192 |
| **Winter Peak kW** | 357 | 114 | 3,205 |
| **Summer Peak kW** | 188 | 147 | 4,053 |
| **MWh / Participant** | 223 | 123 | 74 |
| **Weighted Lifetime** | 20 | 19 | 15 |

**Table 13: EEU Business New Construction - End Use Summary**

| | | MWh | | | kW | | | |
|---|---|---|---|---|---|---|---|---|
| **Description** | **Participants** | **Gross** | **Net** | **Lifetime** | **Winter** | **Summer** | **MMBTU** | **CCF** |
| Other | 7 | 812.95 | 862.75 | 16,273.30 | 113.51 | 146.62 | 9,051.00 | 0.00 |
| **Total** | | 812.95 | 862.75 | 16,273.30 | 113.51 | 146.62 | 9,051.00 | 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 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 2023 were 1,801, about 29% lower than the goal of 2,541 MWh. Total BED program costs were $1,173,075, about 8% higher than the budgeted amount of $1,085,800.

As BED's largest program in most years (the commercial customer sector 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 a large hospital and colleges to office buildings, retail stores and restaurants. 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 several 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 customers leasing their spaces, HVAC improvements present strong challenges. Also, HVAC and refrigeration equipment typically have longer lifetimes than lighting measures so there are less frequent replacement opportunities, and they can be much more expensive measures to install relative to lighting upgrades.

**Program Outlook**

For 2024-2026, BEF represents 45% of the total 3-year budget and 53% of the total savings goal so strong customer participation is critical to achieving performance goals. There are no new planned initiatives to the program structure as described in BED's DRP, however, BED continues to monitor existing commercial customer activity closely, and the challenges that they are facing, as described in the Business Sector Overview section above.

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

**Table 14: EEU Business Existing Facilities - Total Resource Benefits**

| | |
|---|---|
| **Avoided Costs of Electricity** | $2,006,013 |
| **Fossil Fuel Savings** | ($7,559) |
| **Water Savings** | $13,641 |
| **TRB Total** | $2,012,094 |

| | **Annual** | **Lifetime** |
|---|---|---|
| **Meter MWh** | 1,698 | 25,454 |
| **Generation MWh** | 1,801 | 26,962 |
| **Meter Demand kW** | 477 | 6,932 |
| **Generation Peak Summer kW** | 282 | 4,040 |
| **Generation Peak Winter kW** | 206 | 3,103 |
| **Water Savings** | $93 | $1,401 |
| **Fuel Savings** | ($44) | ($666) |
| **O+M Savings** | $15,467 | $221,362 |

## Table 15: EEU Business Existing Facilities - Summary

| | Prior Year 2022 | Current 2023 | Program to Date |
|---|---|---|---|
| **Program Costs** | | | |
| **Incentive and Technical Assistance** | | | |
| Incentive | | | |
| Incentives to Participants (RA) | $ 727,400 | $ 688,704 | $ 2,408,975 |
| Incentives to Trade Allies (RA) | $ - | | $ - |
| Technical Assistance | | | $ - |
| Services to Participants (RA) | $ 181,418 | $ 222,038 | $ 860,022 |
| 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)** | $ 908,819 | $ 910,742 | $ 3,268,997 |
| | | | $ - |
| **Non-Incentive Program Costs** | | | $ - |
| Programs and Implementation (RA) | $ 161,924 | $ 135,673 | $ 425,971 |
| Strategy and Planning (RA) | $ 16,339 | $ 24,496 | $ 101,848 |
| Marketing Program (RA) | $ 2,049 | $ (5) | $ 3,531 |
| Customer Support (DSS) | | | $ - |
| General Marketing & Public Education (DSS) | | | $ - |
| Energy Literacy (DSS) | | | $ - |
| Applied R&D (DSS) | | | $ - |
| Support Services (RA) | $ 21,786 | $ 32,661 | $ 133,433 |
| Quality Assurance | $ 10,893 | $ 16,330 | $ 66,717 |
| ***Non-Incentive Program Sub-Total* (2)** | $ 212,991 | $ 209,155 | $ 731,500 |
| ***Total Program Costs*** | $ 1,121,809 | $ 1,119,897 | $ 4,000,497 |
| **Administrative** | | | |
| Sr. Management, Budget, Financial Oversight (RA) | $ 8,170 | $ 12,717 | $ 50,506 |
| Policy & Public Affairs (DSS | | | $ - |
| Planning & Reporting (DSS) | $ 14,656 | $ 19,178 | $ 33,834 |
| Administration & Regulatory (DSS) | | | $ - |
| IT (DSS) | | | $ - |
| Evaluation (DSS) | | | $ - |
| *Direct and Indirect Overhead* | $ 12,900 | $ 21,283 | $ 85,169 |
| ***Administrative Sub-Total* (3)** | $ 35,725 | $ 53,178 | $ 169,510 |
| **Earned Compensation** | | | |
| Base Compensation | | | |
| Performance Compensation | | | |
| ***Earned Compensation Sub-Total* (4)** | | | |
| **Total Program and Administrative** | $ 1,157,534 | $ 1,173,075 | $ 4,170,007 |
| **Overall Total** | **$ 1,157,534** | **$ 1,173,075** | **$ 4,170,007** |
| **--- Benefits ---** | | | |
| **Annual MWh** | 1,995 | 1,801 | 79,255 |
| **Lifetime MWh** | 26,977 | 26,962 | 995,651 |
| **Winter Peak kW** | 240 | 206 | 10,482 |
| **Summer Peak kW** | 291 | 282 | 9,954 |
| **MWh / Participant** | 5 | 6 | 14 |
| **Weighted Lifetime** | 14 | 15 | 13 |

## Table 16: EEU Business Existing Facilities - End Use Summary

| | | MWh | | | kW | | | |
|---|---|---|---|---|---|---|---|---|
| **Description** | **Participants** | **Gross** | **Net** | **Lifetime** | **Winter** | **Summer** | **MMBTU** | **CCF** |
| Air Conditioning Efficiency | 1 | 44.52 | 47.42 | 711.27 | 0.00 | 6.18 | 0.00 | 0.00 |
| Cooking and Laundry | 3 | 21.73 | 23.05 | 345.16 | 2.57 | 3.12 | 0.00 | 93.40 |
| Hot Water Efficiency | 8 | 2.31 | 2.66 | 35.85 | 0.41 | 0.21 | 0.00 | 0.00 |
| Industrial Process Efficiency | 1 | 10.60 | 11.31 | 169.58 | 2.65 | 2.64 | 0.00 | 0.00 |
| Light Bulb/Lamp | 11 | 78.71 | 83.60 | 1,225.23 | 10.28 | 14.63 | 0.00 | 0.00 |
| Lighting | 210 | 939.53 | 1,004.30 | 13,730.85 | 108.66 | 194.71 | 0.00 | 0.00 |
| Lighting Hardwired Fixture | 54 | 171.21 | 181.78 | 2,564.16 | 18.30 | 30.47 | -44.40 | 0.00 |
| Motors | 18 | 4.03 | 4.08 | 81.63 | 0.77 | 0.00 | 0.00 | 0.00 |
| Refrigeration | 29 | 77.37 | 81.59 | 1,134.77 | 11.84 | 8.27 | 0.00 | 0.00 |
| Space Heat Efficiency | 39 | 326.34 | 342.72 | 6,705.68 | 45.34 | 20.90 | 0.00 | 0.00 |
| Space Heat Fuel Switch | 1 | -7.44 | -7.86 | -141.50 | -1.32 | -0.05 | 0.00 | 0.00 |
| Space Heat Replacement | 15 | 28.61 | 26.64 | 399.62 | 6.52 | 1.21 | 0.00 | 0.00 |
| **Total** | | 1,697.53 | 1,801.28 | 26,962.30 | 206.03 | 282.29 | -44.40 | 93.40 |

## *2.3 Residential Services 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 (TEPF) services for customers heating with oil, propane, or wood.

In 2023, BED projected 748 annualized MWh residential savings while achieving annual energy savings of 642 MWh; about 86% of the projected goal. BED's cost to deliver residential services in 2023 was $775,296, about 39% more than the projected spending of $556,821. Combining Tier 3, EEU and Act 151funds was a major contributing factor to overall program activity in 2023 with strong heat pump program participation. 2023 also saw strong customer participation in the LED rebate program especially after BED and EVT announced the ending to most LED rebates at the end of 2023.

As BED has described in past EEU Annual Reports and Annual Plans, 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 over 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 average annual usage per residential customer continues to remain flat with a monthly average of about 390 kWh. BED's residential consumption is about **24**% less than the average Vermont residential customer and about **34**% less than the average New England residential customer.

As residential sector savings transitions away from LED lighting measures, starting in the 2024-2026 performance period, BED notes the increasing importance of our marketing and outreach efforts to inform customers of other energy savings products and services to meet savings goals. LED lighting products have been a relatively accessible and inexpensive energy efficiency improvement for many customers where

larger appliances, heat pump technologies and weatherization improvements can be more challenging and expensive to obtain, especially for renters.

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.

BED does note a new partner in the low-income, larger multi-family, rental housing space. 3E Thermal will now be working directly with BED and VGS on weatherization and energy efficiency upgrades on rental buildings five-units and larger. 3E thermal is a statewide program of Capstone Community Action and focuses on improving the energy performance, health, and durability of apartment buildings. In January 2024, 3E, BED and VGS started a first project on a 60-unit apartment building. CVWS will continue to partner on single-family homes and smaller rental buildings.

As described in the Introduction section above, one of BED's key strategic objectives, outlined in BED's 2023-2024 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 proactively seek customer input and incorporate this input into program designs.

**Table 17: EEU Residential - Total Resource Benefits**

| | |
|---|---|
| **Avoided Costs of Electricity** | $625,584 |
| **Fossil Fuel Savings** | ($462) |
| **Water Savings** | $88,266 |
| **TRB Total** | $713,389 |

| | **Annual** | **Lifetime** |
|---|---|---|
| **Meter MWh** | 917 | 11,881 |
| **Generation MWh** | 641 | 7,340 |
| **Meter Demand kW** | 696 | 9,148 |
| **Generation Peak Summer kW** | 89 | 967 |
| **Generation Peak Winter kW** | 135 | 1,443 |
| **Water Savings** | $646 | $8,974 |
| **Fuel Savings** | $0 | ($5) |
| **O+M Savings** | $393 | ($2,256) |

## Table 18: EEU Residential - Summary

| | Prior Year 2022 | Current 2023 | Program to Date |
|---|---|---|---|
| **Program Costs** | | | |
| **Incentive and Technical Assistance** | | | |
| Incentive | | | |
| Incentives to Participants (RA) | $ 252,949 | $ 370,350 | $ 1,291,521 |
| Incentives to Trade Allies (RA) | $ - | $ - | $ - |
| Technical Assistance | $ - | $ - | $ - |
| Services to Participants (RA) | $ 143,778 | $ 135,742 | $ 498,518 |
| Services to Trade Allies (RA) | $ (24) | $ 1,493 | $ 8,291 |
| Energy Code and Standards Support (DSS) | $ - | $ - | $ - |
| Building Energy Labeling and Benchmarking (DSS) | $ - | $ - | $ - |
| Better Buildings by Design (DSS) | $ - | $ - | $ - |
| ***Incentive & Tech Asst Sub-Total* (1)** | $ 396,704 | $ 507,586 | $ 1,798,330 |
| | $ - | $ - | $ - |
| **Non-Incentive Program Costs** | $ - | $ - | $ - |
| Programs and Implementation (RA) | $ 112,337 | $ 118,642 | $ 247,489 |
| Strategy and Planning (RA) | $ 12,788 | $ 24,971 | $ 96,735 |
| Marketing Program (RA) | $ 1,384 | $ - | $ 5,193 |
| Customer Support (DSS) | $ - | $ - | $ - |
| General Marketing & Public Education (DSS) | $ - | $ - | $ - |
| Energy Literacy (DSS) | $ - | $ - | $ - |
| Applied R&D (DSS) | $ - | $ - | $ - |
| Support Services (RA) | $ 12,812 | $ 23,478 | $ 65,571 |
| Quality Assurance | $ 8,541 | $ 15,652 | $ 43,714 |
| ***Non-Incentive Program Sub-Total* (2)** | $ 147,863 | $ 182,743 | $ 458,702 |
| ***Total Program Costs*** | $ 544,567 | $ 690,328 | $ 2,257,032 |
| | $ - | | |
| **Administrative** | $ - | | |
| Sr. Management, Budget, Financial Oversight (RA) | $ 6,406 | $ 11,739 | $ 32,785 |
| Policy & Public Affairs (DSS | $ - | $ - | $ - |
| Planning & Reporting (DSS) | $ 71,933 | $ 53,203 | $ 71,933 |
| Administration & Regulatory (DSS) | $ - | $ - | $ - |
| IT (DSS) | $ - | $ - | $ - |
| Evaluation (DSS) | $ - | $ - | $ - |
| *Direct and Indirect Overhead* | $ 3,385 | $ 20,026 | $ 44,303 |
| ***Administrative Sub-Total* (3)** | $ 81,724 | $ 84,968 | $ 149,021 |
| | $ - | | |
| **Earned Compensation** | $ - | $ - | |
| Base Compensation | $ - | $ - | |
| Performance Compensation | $ - | $ - | |
| ***Earned Compensation Sub-Total* (4)** | $ - | $ - | |
| **Total Program and Administrative** | $ 626,291 | $ 775,297 | $ 2,406,053 |
| **Overall Total** | **$ 626,291** | **$ 775,297** | **$ 2,406,053** |

| | | | |
|---|---|---|---|
| **--- Benefits ---** | | | |
| **Annual MWh** | 777 | 642 | 58,693 |
| **Lifetime MWh** | 11,142 | 7,341 | 704,597 |
| **Winter Peak kW** | 162 | 135 | 13,722 |
| **Summer Peak kW** | 130 | 89 | 5,611 |
| **MWh / Participant** | 1 | 1 | 2 |
| **Weighted Lifetime** | 14 | 11 | 12 |

## Table 19: EEU Residential - End Use Summary

| | | MWh | | | kW | | | |
|---|---|---|---|---|---|---|---|---|
| **Description** | **Participants** | **Gross** | **Net** | **Lifetime** | **Winter** | **Summer** | **MMBTU** | **CCF** |
| Air Conditioning Efficiency | 123 | 29.30 | 27.25 | 308.57 | 0.49 | 7.72 | 0.00 | 0.00 |
| Cooking and Laundry | 47 | 57.15 | 47.12 | 602.87 | 6.39 | 4.78 | -0.46 | 629.60 |
| Hot Water Efficiency | 89 | 112.15 | 128.03 | 1,549.23 | 20.06 | 10.13 | 0.00 | 16.00 |
| Light Bulb/Lamp | 11 | 6.18 | 6.66 | 94.60 | 0.80 | 1.22 | 0.00 | 0.00 |
| Lighting | 193 | 52.11 | 61.30 | 183.27 | 17.33 | 5.51 | 0.00 | 0.00 |
| Lighting Hardwired Fixture | 63 | 24.36 | 28.58 | 424.88 | 8.09 | 2.48 | 0.00 | 0.00 |
| Motors | 49 | 7.44 | 7.86 | 157.17 | 1.48 | 0.00 | 0.00 | 0.00 |
| Refrigeration | 56 | 14.11 | 11.25 | 191.30 | 1.05 | 1.32 | 0.00 | 0.00 |
| Space Heat Efficiency | 254 | 342.42 | 130.92 | 2,081.63 | 31.56 | 36.56 | 0.00 | 0.00 |
| Space Heat Replacement | 95 | 144.65 | 59.01 | 943.81 | 14.52 | 15.24 | 0.00 | 0.00 |
| Thermal Shell | 12 | 125.43 | 132.18 | 777.82 | 33.89 | 5.04 | 0.00 | 0.00 |
| Ventilation | 18 | 1.35 | 1.33 | 25.29 | 0.16 | 0.16 | 0.00 | 0.00 |
| **Total** | | 916.66 | 641.49 | 7,340.44 | 135.81 | 90.16 | -0.46 | 645.60 |

## 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 such as thermal envelope, space heating, water heating, central cooling, ventilation, major appliances, and lighting. Residential New Construction (RNC) encourages builders and consumers to build to the Vermont Certified Homes standard (VCH), or High-Performance Track Multi-family standard, which is offered statewide from Efficiency Vermont, VGS and BED.

The standards are promoted to developers, architects, builders, building supply centers, equipment suppliers and consumers through a combination of marketing, technical assistance to builders 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 attend monthly Technical Review Committee (TRC) meetings where all major new construction projects are introduced to City departments as part of the City's local zoning and permitting approval process.
- New and revised electric service and line extension applications help staff 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 2023, the RNC service achieved 126 MWh in annualized electricity savings for the year which was 90% of the projected 142 MWh goal. At $119,815 spending was 20% higher than the projected spending of $100,228.

## Variance Discussion

As BED has reported in previous EEU Annual Reports and Annual Plans, 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 (pre-pandemic) 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 program, however, the pandemic, coupled with poor economic conditions, limited new construction starts in 2020, 2021 and most of 2022. Fortunately, three of four identified projects were completed in 2023 providing a relatively stronger program year than in 2022.

## Program Outlook

In 2024, the RNC program will continue to assist the residential market with exceeding RBES 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.

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, especially when air conditioning is desired. 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 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 the outside temperature is lower than 5 degrees F.

BED continues to review the 15-minute electric usage data for the CCHP buildings constructed over the past several years, 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.

**Table 20: EEU Residential New Construction - Total Resource Benefits**

| | |
|---|---|
| **Avoided Costs of Electricity** | $2,684 |
| **Fossil Fuel Savings** | $0 |
| **Water Savings** | $0 |
| **TRB Total** | $2,684 |

| | **Annual** | **Lifetime** |
|---|---|---|
| **Meter MWh** | 121 | 646 |
| **Generation MWh** | 126 | 645 |
| **Meter Demand kW** | 34 | 197 |
| **Generation Peak Summer kW** | 5 | 26 |
| **Generation Peak Winter kW** | 34 | 173 |
| **Water Savings** | $0 | $0 |
| **Fuel Savings** | $0 | $0 |
| **O+M Savings** | $0 | $0 |

## Table 21: EEU Residential New Construction - Summary

| | Prior Year 2022 | Current 2023 | Program to Date |
|---|---|---|---|
| **Program Costs** | | | |
| **Incentive and Technical Assistance** | | | |
| Incentive | | | |
| Incentives to Participants (RA) | $ 17,500 | $ 75,000 | $ 136,554 |
| Incentives to Trade Allies (RA) | $ - | | $ - |
| Technical Assistance | | | $ - |
| Services to Participants (RA) | $ 6,007 | $ 21,999 | $ 51,995 |
| 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)** | $ 23,507 | $ 96,999 | $ 188,549 |
| | | | $ - |
| **Non-Incentive Program Costs** | | | $ - |
| Programs and Implementation (RA) | $ 13,120 | $ 13,898 | $ 34,841 |
| Strategy and Planning (RA) | $ 115 | $ 1,829 | $ 6,868 |
| Marketing Program (RA) | $ (77) | $ - | $ 920 |
| Customer Support (DSS) | | | $ - |
| General Marketing & Public Education (DSS) | | | $ - |
| Energy Literacy (DSS) | | | $ - |
| Applied R&D (DSS) | | | $ - |
| Support Services (RA) | $ 115 | $ 1,829 | $ 6,868 |
| Quality Assurance | $ 77 | $ 1,219 | $ 4,579 |
| ***Non-Incentive Program Sub-Total* (2)** | $ 13,350 | $ 18,775 | $ 54,077 |
| ***Total Program Costs*** | $ 36,857 | $ 115,774 | $ 242,626 |
| **Administrative** | | | |
| Sr. Management, Budget, Financial Oversight (RA) | $ 57 | $ 914 | $ 3,434 |
| Policy & Public Affairs (DSS | | | $ - |
| Planning & Reporting (DSS) | $ 3,471 | $ 1,576 | $ 3,471 |
| Administration & Regulatory (DSS) | | | $ - |
| IT (DSS) | | | $ - |
| Evaluation (DSS) | | | $ - |
| *Direct and Indirect Overhead* | $ 40 | $ 1,551 | $ 5,392 |
| ***Administrative Sub-Total* (3)** | $ 3,568 | $ 4,041 | $ 12,296 |
| **Earned Compensation** | | | |
| Base Compensation | | | |
| Performance Compensation | | | |
| ***Earned Compensation Sub-Total* (4)** | | | |
| **Total Program and Administrative** | $ 40,425 | $ 119,815 | $ 254,923 |
| **Overall Total** | **$ 40,425** | **$ 119,815** | **$ 254,923** |
| **--- Benefits ---** | | | |
| **Annual MWh** | 2 | 126 | 2,206 |
| **Lifetime MWh** | 43 | 645 | 38,152 |
| **Winter Peak kW** | 0 | 34 | 446 |
| **Summer Peak kW** | 0 | 5 | 319 |
| **MWh / Participant** | 0 | 42 | 4 |
| **Weighted Lifetime** | 22 | 5 | 17 |

## Table 22: EEU Residential New Construction - End Use Summary

| | | MWh | | | kW | | | |
|---|---|---|---|---|---|---|---|---|
| **Description** | **Participants** | **Gross** | **Net** | **Lifetime** | **Winter** | **Summer** | **MMBTU** | **CCF** |
| Space Heat Efficiency | 1 | 0.59 | 0.22 | 4.04 | 0.05 | 0.07 | 0.00 | 0.00 |
| Space Heat Replacement | 2 | 3.06 | 1.17 | 17.49 | 0.29 | 0.40 | 0.00 | 0.00 |
| Thermal Shell | 1 | 117.82 | 124.70 | 623.50 | 33.59 | 5.02 | 0.00 | 0.00 |
| **Total** | | 121.47 | 126.09 | 645.03 | 33.94 | 5.49 | 0.00 | 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 heat pump technology and electric vehicles; electric vehicle charging equipment and other transportation related measures.

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 (and 3E Thermal starting in 2024).

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 but BED is committed to working with our CVWS, 3E Thermal and VGS partners to provided efficiency services to our income eligible customers.

REB also works closely with high usage households for energy efficiency improvements that can reduce energy bills and solve comfort and moisture related issues. 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 2023, REB achieved 114 MWh in annualized electricity savings for the year, about 21% of the projected goal of 535 MWh. At $533,438 spending was 31% higher than BED's projected spending of $406,479.

### Variance Discussion

As BED stated in the Introduction section, year to year program savings, and spending, can fluctuate based on a number of factors. The Act 151 pilot program was a major contributing factor to overall program activity 2023. BED continued to see strong participation with residential cold climate heat pumps. The combination of BED's Tier 3, EEU and Act 151 incentives funds strongly impacted residential heat pump program participation, however, the electric savings for heat pumps was significantly reduced due to findings from the DPS's 2021 Measurement and Verification (M&V) of BED's savings claim.

As BED noted in the May 1, 2023 submittal of its 2022 EEU Annual Report, the DPS's 2021 M&V results were not yet available but, ultimately, the final results of the 2021 M&V process (provided to BED in late May of 2023) found a significant variance with heat pump savings between the Electric Technical Reference Manual (TRM) and actual BED participating customer electric usage data. BED used the perspective heat pump savings values from the statewide TRM, but the M&V process utilized actual pre and post customer AMI data (weather normalized) that produced significantly reduced electric savings results, about a 60% reduction in annual electrical savings.

BED and the DPS believe that these results are driven by customer economics. The majority of the heat pumps were installed in Burlington homes that heat with natural gas where the energy cost savings are not as compelling as in oil or propane gas heated homes with their higher associated costs.

The DPS is currently conducting a statewide heat pump impact evaluation to explore this issue further, but it will not be completed in time to inform the current TRM prescriptive savings assumptions until later in 2024/2025. After discussions with the DPS, it was recommended that BED not only adjust its 2021 savings claim accordingly but also prospectively apply the 2021 M&V heat pump results to 2022 and 2023 heat pump measures to avoid a reoccurrence of this issue.

This 2023 EEU Annual Report prospectively applies the 2021 M&V heat pump results to 2022 and 2023 heat pump measures.

**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.

Over 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 some electric heat usage and/or air conditioning usage. Customers scheduling energy audits are asked for their permission for the two EEU's to share usage data for analysis purposes. 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.

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.

To effectively address the needs of the community, BED will continue to partner with the Champlain Valley Weatherization Service (CVWS), who combine their services with our incentives to deliver a comprehensive suite of energy services to lower income households. Other partners include the Burlington Housing Authority, Champlain Housing Trust, Cathedral Square Corporation and 3E Thermal. BED will strive to substantially increase cumulative spending in this area by nearly 2.5 times relative to prior performance periods. The spending increase of approximately $178,000 is a result of additional analyses of the proportion of Burlington's households earning 80% or less than average median income in Chittenden County.

**Table 23: EEU Residential Existing Homes - Total Resource Benefits**

| | |
|---|---|
| **Avoided Costs of Electricity** | $180,463 |
| **Fossil Fuel Savings** | ($92) |
| **Water Savings** | $13,068 |
| **TRB Total** | $193,439 |

| | **Annual** | **Lifetime** |
|---|---|---|
| **Meter MWh** | 232 | 3,600 |
| **Generation MWh** | 114 | 1,731 |
| **Meter Demand kW** | 156 | 2,387 |
| **Generation Peak Summer kW** | 24 | 346 |
| **Generation Peak Winter kW** | 22 | 334 |
| **Water Savings** | $99 | $1,323 |
| **Fuel Savings** | $0 | ($1) |
| **O+M Savings** | $10 | $51 |

## Table 24: EEU Residential Existing Homes - Summary

| | Prior Year 2022 | Current 2023 | Program to Date |
|---|---|---|---|
| **Program Costs** | | | |
| **Incentive and Technical Assistance** | | | |
| Incentive | | | |
| Incentives to Participants (RA) | $ 15,961 | $ 271,925 | $ 915,873 |
| Incentives to Trade Allies (RA) | $ - | | $ - |
| Technical Assistance | | | |
| Services to Participants (RA) | $ 137,274 | $ 108,517 | $ 524,935 |
| 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)** | $ 153,235 | $ 380,442 | $ 1,440,808 |
| **Non-Incentive Program Costs** | | | |
| Programs and Implementation (RA) | $ 32,766 | $ 34,897 | $ 95,048 |
| Strategy and Planning (RA) | $ 12,769 | $ 17,169 | $ 73,871 |
| Marketing Program (RA) | $ 2,087 | $ - | $ 4,276 |
| Customer Support (DSS) | | | $ - |
| General Marketing & Public Education (DSS) | | | $ - |
| Energy Literacy (DSS) | | | $ - |
| Applied R&D (DSS) | | | $ - |
| Support Services (RA) | $ 12,769 | $ 17,169 | $ 50,998 |
| Quality Assurance | $ 8,513 | $ 11,446 | $ 33,998 |
| ***Non-Incentive Program Sub-Total* (2)** | $ 68,904 | $ 80,682 | $ 258,191 |
| ***Total Program Costs*** | $ 222,139 | $ 461,123 | $ 1,698,999 |
| **Administrative** | | | |
| Sr. Management, Budget, Financial Oversight (RA) | $ 6,385 | $ 8,585 | $ 25,499 |
| Policy & Public Affairs (DSS | | | $ - |
| Planning & Reporting (DSS) | $ 68,462 | $ 48,839 | $ 117,302 |
| Administration & Regulatory (DSS) | | | $ - |
| IT (DSS) | | | $ - |
| Evaluation (DSS) | | | $ - |
| *Direct and Indirect Overhead* | $ 3,421 | $ 14,891 | $ 33,949 |
| ***Administrative Sub-Total* (3)** | $ 78,268 | $ 72,315 | $ 176,749 |
| **Earned Compensation** | | | |
| Base Compensation | | | |
| Performance Compensation | | | |
| ***Earned Compensation Sub-Total* (4)** | | | |
| **Total Program and Administrative** | $ 300,407 | $ 533,439 | $ 1,342,310 |
| **Overall Total** | **$ 300,407** | **$ 533,439** | **$ 1,342,310** |
| **--- Benefits ---** | | | |
| **Annual MWh** | 224 | 114 | 22,688 |
| **Lifetime MWh** | 3,498 | 1,731 | 350,844 |
| **Winter Peak kW** | 50 | 22 | 6,146 |
| **Summer Peak kW** | 59 | 24 | 1,159 |
| **MWh / Participant** | 0 | 0 | 2 |
| **Weighted Lifetime** | 16 | 15 | 15 |

## Table 25: EEU Residential Existing Homes - End Use Summary

| | | MWh | | | kW | | | |
|---|---|---|---|---|---|---|---|---|
| **Description** | **Participants** | **Gross** | **Net** | **Lifetime** | **Winter** | **Summer** | **MMBTU** | **CCF** |
| Air Conditioning Efficiency | 25 | 1.90 | 1.84 | 21.29 | 0.00 | 0.69 | 0.00 | 0.00 |
| Cooking and Laundry | 27 | 5.03 | 5.07 | 68.30 | 0.69 | 0.51 | -0.08 | 83.10 |
| Hot Water Efficiency | 41 | 27.49 | 26.94 | 336.11 | 4.17 | 2.11 | 0.00 | 16.00 |
| Light Bulb/Lamp | 1 | 0.22 | 0.23 | 3.42 | 0.07 | 0.02 | 0.00 | 0.00 |
| Lighting | 7 | 2.00 | 2.10 | 4.20 | 0.59 | 0.15 | 0.00 | 0.00 |
| Motors | 24 | 4.11 | 4.35 | 86.90 | 0.82 | 0.00 | 0.00 | 0.00 |
| Refrigeration | 53 | 2.18 | 2.09 | 35.45 | 0.19 | 0.24 | 0.00 | 0.00 |
| Space Heat Efficiency | 45 | 53.24 | 18.99 | 309.31 | 4.65 | 5.95 | 0.00 | 0.00 |
| Space Heat Replacement | 92 | 127.03 | 43.54 | 690.61 | 10.81 | 14.50 | 0.00 | 0.00 |
| Thermal Shell | 11 | 7.61 | 7.48 | 154.32 | 0.30 | 0.02 | 0.00 | 0.00 |
| Ventilation | 14 | 1.10 | 1.09 | 20.70 | 0.13 | 0.13 | 0.00 | 0.00 |
| **Total** | | 231.89 | 113.69 | 1,730.60 | 22.41 | 24.32 | -0.08 | 99.10 |

## 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.

The incentives are intended to entice consumers by lowering the cost of efficient products. EPP uses a variety of marketing and promotion efforts 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 402 annualized MWh significantly surpassed projection of 71 annualized MWh in 2023. Annual expenditures of $122,043 also exceeded the projected budget of $51,115.

### Variance Discussion

EEU messaging regarding the end of most lighting rebates, in 2023, increased participation.

As residential sector savings transitions away from LED lighting measures, starting in the 2024-2026 performance period, BED notes the increasing importance of our marketing and outreach efforts to inform customers of other energy savings products and services to meet savings goals. LED lighting products have been a relatively accessible and inexpensive energy efficiency improvement for many customers where larger appliances, heat pump technologies and weatherization improvements can be more challenging and expensive to obtain.

## Program Outlook

BED will continue to augment EVTs outreach with its own public education and product awareness campaigns using social media channels, websites, customer newsletters ads and articles in the North Avenue News monthly publication. As most lighting rebates end, EPP will continue to focus on a variety of appliances such as refrigerators, freezers, clothes washers & dryers, window air conditioners, dehumidifiers, and room air cleaners. Energy Savings kits and appliance recycling will also be featured in 2024.

**Table 26: EEU Efficient Products - Total Resource Benefits**

| | |
|---|---|
| **Avoided Costs of Electricity** | $442,438 |
| **Fossil Fuel Savings** | ($370) |
| **Water Savings** | $75,198 |
| **TRB Total** | $517,266 |

| | **Annual** | **Lifetime** |
|---|---|---|
| **Meter MWh** | 563 | 7,635 |
| **Generation MWh** | 402 | 4,965 |
| **Meter Demand kW** | 506 | 6,564 |
| **Generation Peak Summer kW** | 60 | 692 |
| **Generation Peak Winter kW** | 79 | 936 |
| **Water Savings** | $547 | $7,651 |
| **Fuel Savings** | $0 | ($4) |
| **O+M Savings** | $383 | ($2,307) |

## Table 27: EEU Efficient Products - Summary

| | Prior Year 2022 | Current 2023 | Program to Date |
|---|---|---|---|
| **Program Costs** | | | |
| **Incentive and Technical Assistance** | | | |
| Incentive | | | |
| Incentives to Participants (RA) | $ 219,488 | $ 23,426 | $ 534,445 |
| Incentives to Trade Allies (RA) | $ - | | |
| Technical Assistance | | | |
| Services to Participants (RA) | $ 497 | $ 5,227 | $ 35,331 |
| Services to Trade Allies (RA) | $ (24) | $ 1,493 | $ 9,785 |
| Energy Code and Standards Support (DSS) | $ - | | $ - |
| Building Energy Labeling and Benchmarking (DSS) | $ - | | $ - |
| Better Buildings by Design (DSS) | $ - | | $ - |
| ***Incentive & Tech Asst Sub-Total* (1)** | $ 219,962 | $ 30,145 | $ 579,560 |
| **Non-Incentive Program Costs** | | | |
| Programs and Implementation (RA) | $ 66,450 | $ 69,846 | $ 222,343 |
| Strategy and Planning (RA) | $ (96) | $ 5,973 | $ 39,139 |
| Marketing Program (RA) | $ (626) | $ - | $ (4) |
| Customer Support (DSS) | | | $ - |
| General Marketing & Public Education (DSS) | | | $ - |
| Energy Literacy (DSS) | | | $ - |
| Applied R&D (DSS) | | | $ - |
| Support Services (RA) | $ (72) | $ 4,480 | $ 29,354 |
| Quality Assurance | $ (48) | $ 2,987 | $ 19,570 |
| ***Non-Incentive Program Sub-Total* (2)** | $ 65,609 | $ 83,286 | $ 310,402 |
| ***Total Program Costs*** | $ 285,571 | $ 113,431 | $ 889,962 |
| **Administrative** | | | |
| Sr. Management, Budget, Financial Oversight (RA) | $ (36) | $ 2,240 | $ 14,677 |
| Policy & Public Affairs (DSS | | | $ - |
| Planning & Reporting (DSS) | | $ 2,788 | $ 2,788 |
| Administration & Regulatory (DSS) | | | $ - |
| IT (DSS) | | | $ - |
| Evaluation (DSS) | | | $ - |
| *Direct and Indirect Overhead* | $ (76) | $ 3,584 | $ 23,437 |
| ***Administrative Sub-Total* (3)** | $ (112) | $ 8,612 | $ 32,290 |
| **Earned Compensation** | | | |
| Base Compensation | | | |
| Performance Compensation | | | |
| ***Earned Compensation Sub-Total* (4)** | | | |
| **Total Program and Administrative** | $ 285,459 | $ 122,044 | $ 930,865 |
| **Overall Total** | **$ 285,459** | **$ 122,044** | **$ 930,865** |
| **--- Benefits ---** | | | |
| **Annual MWh** | 551 | 402 | 33,799 |
| **Lifetime MWh** | 7,601 | 4,965 | 315,601 |
| **Winter Peak kW** | 112 | 79 | 7,130 |
| **Summer Peak kW** | 71 | 60 | 4,133 |
| **MWh / Participant** | 1 | 1 | 2 |
| **Weighted Lifetime** | 14 | 12 | 9 |

## Table 28: EEU Efficient Products - End Use Summary

| | | MWh | | | kW | | | |
|---|---|---|---|---|---|---|---|---|
| **Description** | **Participants** | **Gross** | **Net** | **Lifetime** | **Winter** | **Summer** | **MMBTU** | **CCF** |
| Air Conditioning Efficiency | 98 | 27.40 | 25.42 | 287.27 | 0.49 | 7.03 | 0.00 | 0.00 |
| Cooking and Laundry | 20 | 52.12 | 42.05 | 534.58 | 5.70 | 4.26 | -0.38 | 546.50 |
| Hot Water Efficiency | 48 | 84.67 | 101.09 | 1,213.12 | 15.89 | 8.02 | 0.00 | 0.00 |
| Light Bulb/Lamp | 10 | 5.96 | 6.44 | 91.18 | 0.73 | 1.20 | 0.00 | 0.00 |
| Lighting | 186 | 50.12 | 59.20 | 179.08 | 16.74 | 5.36 | 0.00 | 0.00 |
| Lighting Hardwired Fixture | 63 | 24.36 | 28.58 | 424.88 | 8.09 | 2.48 | 0.00 | 0.00 |
| Motors | 25 | 3.33 | 3.51 | 70.26 | 0.66 | 0.00 | 0.00 | 0.00 |
| Refrigeration | 3 | 11.93 | 9.17 | 155.86 | 0.86 | 1.07 | 0.00 | 0.00 |
| Space Heat Efficiency | 208 | 288.60 | 111.70 | 1,768.28 | 26.86 | 30.54 | 0.00 | 0.00 |
| Space Heat Replacement | 1 | 14.56 | 14.30 | 235.71 | 3.42 | 0.35 | 0.00 | 0.00 |
| Ventilation | 4 | 0.25 | 0.24 | 4.59 | 0.04 | 0.04 | 0.00 | 0.00 |
| **Total** | | 563.30 | 401.70 | 4,964.81 | 79.46 | 60.34 | -0.38 | 546.50 |

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

## Program Description

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

As BED describes in detail in its 2021-2023 EEU Demand Resource Plan, BED's TEPF program is comprised of two resource acquisition components and one 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 several 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 customers to assist business property owners with improving the insulation, air tightness and comfort of their buildings. Energy audits and improvements are performed by a participating Building Performance Institute (BPI) certified contractor.

**Zero Energy Modular Homes (ZEM)-**

In partnership with Green Mountain Habitat for Humanity, North Avenue Cooperative ("NAC"), Burlington's Community Economic Development Office (CEDO). Champlain Housing Trust ("CHT"), and VEIC, BED has been actively promoting ultra-efficient ZEM homes since 2017. Thus far, three ZEMs have been installed in the NAC providing home ownership to three low-income households.

The NAC is Burlington's only mobile home park and consists of about 110 homes that are heated by LP gas or kerosene. Over the years, many of these homes have been served by the low-income Weatherization Assistance Program (WAP), in collaboration with BED, but many of the homes are old and are ready to be replaced.

Starting in 2016, BED, and partners, begun to explore the financial viability of introducing high performance modular homes to the residents as an option over new or pre-owned homes. ZEM homes can be net-zero energy, which eliminates fossil fuel usage, and has a significant financial impact for customers when compared to existing high energy costs.

ZEM's objective is to provide financial and technical assistance to income qualified 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 residents living outside of this neighborhood can also apply so long as the eligible home complies with the city's zoning ordinances and the household meets the income eligibility criteria.

## Program Highlights

BED's TEPF 2023 savings goals are based on "traditional weatherization services" and "ZEM services". BED achieved 11% of the 2023 annual savings goal with only four traditional

weatherization project completions. BED spent $26,796 in 2023, 13% of the $208,000 annual resource acquisition budget.

### Variance Discussion

The pandemic brought weatherization project activity to a stop for most of 2021 and 2022, and activity remained slow in 2023. In addition, the limited unregulated fossil fuel market, as well as the housing characteristics (as described below) of the potential unregulated fuels market, has presented challenges in attracting participants. There was also little ZEM activity in 2023 as customers faced both rising construction costs and rising mortgage interest rates. CHT reported few ZEM mortgage applicants.

### Program Outlook

As part of the 2024-2026 Demand Resource Plan (DRP) process, in consultation with the DPS, BED has reduced traditional TEPF budgets and savings targets to better align with our understanding of the limited potential market in Burlington.

For traditional weatherization services, we hope that activity will increase with economic improvement. Also, Burlington's new rental housing weatherization ordinance will apply to a small number of BED's TEFP rental housing 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. The new Weatherization Repayment Assistance Program (WRAP) (on bill repayment) will also be available to customers not served by VGS.

Overall, BED estimates that there are about 350 homes in the TEPF potential 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. As previously reported, it is unusual for BED to find very poorly weatherized owner-occupied homes. For example, four projects were completed in 2023 but all with modest savings as the homes were in "reasonable" weatherization condition to start with. Each home was professionally served, including pre and post blower door air leakage tests, but the average air leakage reduction figure was only 12%.

The potential for energy efficiency savings in the condominium market is also limited (about 150 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 offers a 50% incentive for eligible weatherization improvements up to a $7,500 maximum. BED's TEPF weatherization program now follows VGS's incentive levels to help avoid confusion among weatherization contractors and customers.

BED will continue promoting our TEPF service through a variety of channels including through Vermont's contractor networks. BED will also continue to serve on the Weatherization at Scale committee hosted by the Energy Action Network (EAN). BED will continue to serve on the Tenant Weatherization Protection committee also hosted by EAN. BED will continue to serve on the WRAP working group with VHFA, VGS and EVT. These activities also help to promote BED's TEPF services.

Regarding ZEM services, BED is hopeful that the 2024 to 2026 period will see increased activity should mortgage interest rates improve and high construction costs level-off. Affordable housing options continue to be a major problem in the greater Burlington area so ZEM's could be an attractive option for some customers.

**McNeil Biomass Generation Station District Energy System Development (DES) -**

Regarding DES development, as described in BED's 2023 EEU Annual Plan, BED has been actively working with community leaders, businesses, residents, VGS and internationally recognized district energy engineering firms to develop a District Energy System (DES) in the city using waste heat from the McNeil bio-mass generation facility. 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 also achieve progress toward the State of Vermont's climate and energy goals.

In 2023, BED and other stakeholders continued to work on several fronts to advance the DES project. Activities in 2023 included:

- Continuing to finalize construction design in conjunction with the Department of Public Works team.
- Work to get updates to pricing.
- Work to finalize thermal energy and electric boiler contracts.
- Work to finalize debt financing structure and rates.
- Prepare for initial selection of construction bids.
- Determination of potential construction start date.

**Table 29: Thermal Energy and Process Fuels Activity**

| Period Costs for TEPF Savings | Residential (2023) | Commercial (2023) | Total |
|---|---|---|---|
| Year to Date Costs | $25,829 | $967 | $26,796 |
| Annual Budget* | $202,200 | $5,800 | $208,000 |
| % Of Annual Budget | 13% | 17% | 13% |
| **Energy Savings Results** | | | |
| MMBTU Year to Date | 11 | 0 | 11 |
| MMBTU Annual Goal* | 455 | 30 | 485 |
| % Of MMBTU Annual Goal | 2% | 0% | 2% |
| **Progress Towards MMBTU 3-Year Goals** | | | |
| MMBTU Cumulative to Date | 315 | 0 | 315 |
| 3-Year MMBTU Goal | 1,365 | 90 | 1,455 |
| % Of 3-Year MMBTU Goal | 23% | 0% | 22% |

*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. 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 educational institutions. Media responses and the development of 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 may support 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, in hybrid heated buildings.

**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.
- EEU Quarterly Reports
- EEU Annual Plans
- 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.

**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 Actual Spending | 2022 Actual Spending | 2023 Actual Spending | 2021-2023 Budget | % 2021-2023 Budget |
|---|---|---|---|---|---|
| Education & Training | $ 344 | $ 2,334 | $ 3,345 | $ 6,875 | 88% |
| Applied R&D | $ - | $ - | $ 206 | $ 850 | 24% |
| Planning & Reporting | $ 2,413 | $ 842 | $ 1,063 | $ 5,050 | 85% |
| Evaluation | $ 364 | $ 284 | $ 378 | $ 1,200 | 85% |
| Policy & Public Affairs | $ 338 | $ - | $ 650 | $ 1,150 | 86% |
| Information Tech | $ 182 | $ 573 | $ 288 | $ 1,175 | 89% |
| General Administration | $ 5,618 | $ (653) | $ 1,251 | $ 7,150 | 87% |
| **Total** | **$ 9,259** | **$ 3,380** | **$ 7,181** | **$ 23,450** | 85% |

# 4 Act 151 Pilot Programs

With Act 151 pilot program funds, BED has been pursuing several activities that are additive to and complementary of our existing Tier III programs. These activities are directed at programs that are intended to reduce greenhouse gas emissions in the thermal energy and transportation sectors, have a nexus with electricity usage, do not compete with BED's (or any other DU's) Tier III programs, and result in additional greenhouse gas ("GHG") emissions reductions in a cost-effective manner.

The Act 151 activities are designed to support existing Tier III programs by addressing known market gaps and customer barriers to adopting beneficial electrification technologies. In some cases, the activities seek to accelerate measure adoption and emission reductions by further reducing customers' upfront capital costs beyond existing Tier III incentives, which are limited by the alternative compliance payment ("ACP") cap per megawatt-hour-equivalent ("MWH e").

In other cases, the Act 151 activities are intended to further develop upstream market channels and increase the inventory of beneficial electrification technologies from which customers can choose. Other activities are designed to increase customer awareness about the benefits of electrification, as well as boost market actor education and training. Our overall objective for these programs is to further the State's and City's efforts to transform the building thermal and transportation markets. The primary benefit of these activities is expected to be increased uptake in the number of electrification measures included in our Tier III programs.

In 2023, BED continued providing enhanced incentives for several Tier III measures funded through our Energy Efficiency Utility's ("EEU") Act 151 funds.

Act 151 activities 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; and,
- Support of DeltaClime VT, a Vermont based business accelerator organization serving start-up ventures focused on climate economy innovation.

As the table below indicates, electric vehicles and heat pumps were the most active measures over the 2021-2023 period.

**2021-2023 Act 151 Activity (thru Q4 2023)**

| | Advanced Heat Pumps | Ground Source Heat Pump Test Wells | Electric Vehicles (EV & PHEV) | Multi-Family EV Charging Station Support | Preferred Dealer Network Support | Delta Clime VT (energy related business accelerator) | Total Act 151 Programs |
|---|---|---|---|---|---|---|---|
| 2021-2023 Spending (thru ( | $ 482,401 | $ 4,602 | $ 101,620 | $ 58,815 | $ 350 | $ 54,365 | $ 702,153 |
| 2021-2023 Budget | $ 240,000 | $ 120,000 | $ 90,000 | $ 120,000 | $ 45,000 | $ 90,000 | $ 705,000 |
| % of Budget | 201% | 4% | 113% | 49% | 1% | 60% | 99.60% |

***2024 Outlook with Act 44 Programs-***

Consistent with legislation, BED's Act 44 programs are designed to further reduce greenhouse gas emissions ("GHG") in the thermal energy and transportation sectors; be additive and complementary to our Tier III programs; and, have a nexus with electricity usage. These programs will not compete with BED's (or any other DU's) Tier III programs. The programs were approved in BED's previous DRP proceeding – Case 19-3272. (Order of 8/26/2021). The main objective for implementing the approved enhanced incentive programs is to accelerate Tier III measure adoption by providing customers with additional incentives; thus, reducing their upfront capital costs even further and increasing the cost competitiveness of beneficial electrification technologies. Act 44 programs include:

- Enhanced incentives for new and pre-owned all-electric vehicles and more efficient plug-in electric vehicles,

- Enhanced incentives for workplace/retail electric vehicle supply equipment ("EVSE) located in neighborhoods designated as disadvantaged communities,

- Enhanced incentives for EVSEs located at residential multifamily apartment buildings (market rate & low income), provided the units are available to the public,

- Enhanced incentives for EVSE's located at single family/home residences,

- Advanced heat pumps – ductless only,

- DeltaClime,

- Geo-thermal well testing; and,

- Preferred EV dealer network support.

# 5 Appendix

## *5.1 2021-2023 Quantifiable Performance Indicators (QPI) / Minimum Performance Requirements (MPR)*

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

| QPI# | Title | Performance Indicator | 2021-2023 Target | Policy Goal Advanced | Progress towards 3 yr. Goal (thru Q4 2023) |
|---|---|---|---|---|---|
| 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 | 109% |
| 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 | 66% |
| 3 | Summer Peak Demand Savings (MW) | Cumulative net summer peak demand expected savings | 1.80 | 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 | 79% |
| 4 | Winter Peak Demand Savings (MW) | Cumulative net winter peak demand expected savings | 2.10 | 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 | 71% |
| 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 | 89% |
| 6 | Administrative Efficiency | Total Administrative cost as a % of total budget | $42,627 | 5% savings based on total Admin costs in next DRP - TBD | BED achieved $56,590 in savings with costs at 10.4% (versus 10.8%)of total budget over the 2021-2023 period. |

| TEPF QPI/ MPR | Title | Performance Indicator | 2021-2023 Target | Policy Goal Advanced | Progress towards 3 yr. Goal (thru Q4 2023) |
|---|---|---|---|---|---|
| 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 | 23% |
| 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 | 23% average air leakage reduction over the 2021-2023 period. Did not meet the 16% heating system target. Please see the TEPF section pn P.62 for more information. |
| 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 | 19% |

| MPR # | Title | Performance Indicator | 2021-2023 Target | Policy Goal Advanced | Progress towards 3 Year Goal |
|---|---|---|---|---|---|
| 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* | 1.7 (with BED program and evaluation costs of $7,838,372 and ACE of $13,109,913) |
| 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 | 155% (with spending thru Q4 2023 of $2,192,706) |
| 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 to make up for 2018-2020 shortfall) | 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 | 295% (with spending thru Q4 2023 of $536,335) |
| 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 | 165% (478 business customers) |

# 5.2 MPR #11 Electric Administrative Efficiency Results for CY2023

**BED 2023**

**Incentive, Non-Incentive, and Administrative Cost Report**

| | | 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) | $41,185 | $688,704 | $75,000 | $23,426 | $271,925 | $308,222 | $0 | $1,408,462 |
| | Incentives to Trade Allies (RA) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| | Technical Assistance | | | | | | | | |
| | Services to Participants (RA) | $76,896 | $222,038 | $21,999 | $5,227 | $108,517 | $2,051 | $0 | $436,727 |
| | Services to Trade Allies (RA) | $0 | $0 | $0 | $1,493 | | $2,550 | $0 | $4,043 |
| | Energy Code and Standards Support (DSS) | $0 | $0 | $0 | $0 | $0 | $0 | $2,092 | $2,092 |
| | 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 | $3,304 | $3,304 |
| | ***Incentive & Tech Asst Sub-Total* (1)** | ***$118,081*** | ***$910,742*** | ***$96,999*** | ***$30,145*** | ***$380,442*** | ***$312,823*** | ***$5,396*** | $1,854,628 |
| | **Non-Incentive Program Costs** | | | | | | | | |
| | Programs and Implementation (RA) | $15,824 | $135,673 | $13,898 | $69,846 | $34,897 | $6,374 | | $276,512 |
| | Strategy and Planning (RA) | $6,968 | $24,496 | $1,829 | $5,973 | $17,169 | $5,099 | | $61,534 |
| | Marketing Program (RA) | $0 | -$5 | $0 | $0 | $0 | $0 | | -$5 |
| | Customer Support (DSS) | | | | | | | | $0 |
| | General Marketing & Public Education (DSS) | | | | | | | $10,457 | $10,457 |
| | Energy Literacy (DSS) | | | | | | | $9,148 | $9,148 |
| | Applied R&D (DSS) | | | | | | | $3,065 | $3,065 |
| | Support Services (RA) | $6,968 | $32,661 | $1,829 | $4,480 | $17,169 | $3,824 | | $66,931 |
| | Quality Assurance | $4,645 | $16,330 | $1,219 | $2,987 | $11,446 | $2,550 | | $39,177 |
| | ***Non-Incentive Program Sub-Total* (2)** | ***$34,406*** | ***$209,155*** | ***$18,775*** | ***$83,286*** | ***$80,682*** | ***$17,847*** | ***$22,669*** | ***$466,819*** |
| | ***Total Program Costs*** | *$152,487* | *$1,119,897* | *$115,774* | *$113,431* | *$461,123* | *$330,670* | *$28,065* | *$2,321,447* |
| Indirect Costs | **Administrative** | | | | | | | | |
| | Sr. Management, Budget, Financial Oversight (RA) | $3,484 | $12,717 | $914 | $2,240 | $8,585 | $3,824 | $2,569 | $34,333 |
| | Policy & Public Affairs (DSS | | | | | | | $14,690 | $14,690 |
| | Planning & Reporting (DSS) | $24,348 | $19,178 | $1,576 | $2,788 | $48,839 | $0 | $61,098 | $157,827 |
| | Administration & Regulatory (DSS) | | | | | | | | $0 |
| | IT (DSS) | | | | | | | $784 | $784 |
| | Evaluation (DSS) | | | | | | | $10,989 | $10,989 |
| | *Direct and Indirect Overhead* | **$5,196** | **$21,283** | **$1,551** | **$3,584** | **$14,891** | **$7,647** | | $54,152 |
| | ***Administrative Sub-Total* (3)** | **$33,027** | **$53,178** | **$4,041** | **$8,612** | **$72,315** | **$11,471** | **$90,130** | **$272,774** |
| | **Earned Compensation** | | | | | | | | |
| | Base Compensation | | | | | | | | |
| | Performance Compensation | | | | | | | | |
| | ***Earned Compensation Sub-Total* (4)** | | | | | | | | |
| | **Total Program and Administrative** | $185,514 | $1,173,075 | $119,815 | $122,044 | $533,439 | $342,140 | $118,195 | $2,594,221 |
| | **Overall Total** | **$185,514** | **$1,173,075** | **$119,815** | **$122,044** | **$533,439** | **$342,140** | **$118,195** | **$2,594,221** |

| Summary Metrics | Without Admin Metric | | | With proposed Admin Metric | |
|---|---|---|---|---|---|
| **Incentive Costs** | | | | | |
| Incentive & Technical Assistance | $1,854,628 | | | $1,854,628 | |
| Non-Incentive Costs | $466,819 | | | $466,819 | |
| Admin | $272,774 | | | $272,774 | |
| Earned Compensation | $0 | | | $0 | |
| **Overall Total** | $2,594,221 | | | $2,594,221 | |
| **Incentive & Technical Assistance % of Total** | 71% | | | 71% | |
| **Incentive to Non-incentive Cost Ratio** | 3.97 | | | 3.97 | |
| | Cost | % of Total | | Cost | % of Total |
| **Program** | $2,321,447 | 89.5% | | $2,321,447 | 90.3% |
| **Administration** | $272,774 | 10.5% | | $248,238 | 9.7% |
| **Admin Savings ($)** | | | | $24,536 | |
| **Overall Total** | $2,594,221 | 100.0% | | $2,569,685 | 100.0% |

## *5.3 TEPF Administrative Efficiency Results for CY2023*

**BED 2023 TEPF**

**Incentive, Non-Incentive, and Administrative Cost Report**

| | | Business Energy Services | | Residential Energy Services | Total |
|---|---|---|---|---|---|
| | | Business Initiatives | Unregulated Fuels Commercial | Unregulated Fuels Resedential | |
| **Direct Costs** | **Program Costs** | | | | |
| | **Incentive and Technical Assistance** | | | | |
| | Incentive | | | | |
| | Incentives to Participants (RA) | | | $9,577 | $9,577 |
| | Incentives to Trade Allies (RA) | | | | $0 |
| | Technical Assistance | | | | |
| | Services to Participants (RA) | $592,477 | $580 | $8,062 | $601,119 |
| | 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)** | ***$592,477*** | ***$580*** | ***$17,639*** | $610,696 |
| | **Non-Incentive Program Costs** | | | | |
| | Programs and Implementation (RA) | $7,638 | | $4,340 | $11,978 |
| | Strategy and Planning (RA) | $2,336 | | $122 | $2,458 |
| | 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) | | | $81 | $81 |
| | Quality Assurance | | | $81 | $81 |
| | ***Non-Incentive Program Sub-Total* (2)** | ***$9,974*** | ***$0*** | ***$4,624*** | ***$14,598*** |
| | ***Total Program Costs*** | *$602,451* | *$580* | *$22,263* | *$625,294* |

| | | | | | |
|---|---|---|---|---|---|
| Indirect Costs | **Administrative** | | | | |
| | Sr. Management, Budget, Financial Oversight (RA) | $412 | | $81 | $493 |
| | Policy & Public Affairs (DSS | | | | $0 |
| | Planning & Reporting (DSS) | | $387 | $3,485 | $3,872 |
| | Administration & Regulatory (DSS) | | | | $0 |
| | IT (DSS) | | | | $0 |
| | Evaluation (DSS) | | | | $0 |
| | *Direct and Indirect Overhead* | **$535** | | | $535 |
| | ***Administrative Sub-Total* (3)** | **$948** | **$387** | **$3,566** | **$4,901** |
| | **Earned Compensation** | | | | |
| | Base Compensation | | | | |
| | Performance Compensation | | | | |
| | ***Earned Compensation Sub-Total* (4)** | | | | |
| | **Total Program and Administrative** | $603,399 | $967 | $25,829 | $630,195 |
| | **Overall Total** | **$603,399** | **$967** | **$25,829** | **$630,195** |

| **Summary Metrics** | Without Admin Metric | | With proposed Admin Metric | |
|---|---|---|---|---|
| **Incentive Costs** | | | | |
| Incentive & Technical Assistance | $610,696 | | $610,696 | |
| Non-Incentive Costs | $14,598 | | $14,598 | |
| Admin | $4,901 | | $4,901 | |
| Earned Compensation | $0 | | $0 | |
| **Overall Total** | $630,195 | | $630,195 | |
| **Incentive & Technical Assistance % of Total** | 97% | | 97% | |
| **Incentive to Non-incentive Cost Ratio** | 41.83 | | 41.83 | |
| | Cost | % of Total | Cost | % of Total |
| **Program** | $625,294 | 99.2% | $625,294 | 99.3% |
| **Administration** | $4,901 | 0.8% | $4,656 | 0.7% |
| **Admin Savings ($)** | | | $245 | |
| **Overall Total** | $630,195 | 100.0% | $629,950 | 100.0% |

## 5.4 Further Process Improvement Updates from the Overall Performance Assessment (Case No. 21-1500-PET) thru Q4 2023

| # | Process Improvement | Update | Status |
|---|---|---|---|
| 1 | BED should consider separating the savings and budgets for large projects in its next demand resources plan (DRP) | BED will be able to track large new construction projects and separate savings & budgets in the next DRP | Completed. Filed via e-PUC on 3/09/23 in Case No. 22-2954-PET |
| 2 | BED should consider rationalizing its TEPF budget to the available market potential in its service territory in its next DRP | As part of the potential study process, BED will continue to analyze the potential TEPF market and rationalize budgets and savings goals in the next DRP | Completed. Filed via e-PUC on 3/09/23 in Case No. 22-2954-PET |
| 3 | BED should review its low-income programs, identify ways to maximize low-income customer participation, and reflect its determinations in its next DRP | As BED reported in the 2022 Annual Plan, 2021 EEU Annual Report and 2022 EEU quarterly reports, outreach efforts are producing positive results and BED will continue to focus on our LI customers. | As shown in the QPI/MPR progress table above, BED is pleased to report that we have surpassed the 2021-2023 low-income spending goal and continue to work on additional income-eligible projects that will further enhance activity in the next performance period. |
| 4 | Before the start of the next DRP proceeding, BED should develop robust internal review processes for documents to be filed with the Commission, compliance checks to ensure timely response to Commission orders, and quality controls to verify that filings are made in the appropriate case(s) with all required materials | BED continues to review its regulatory compliance process and quality control procedures to ensure that EEU filings are timely, accurate, and complete. | In progress. This continues to be an on-going process improvement effort that staff is keenly focused on. |
| 5 | BED should consider changes to its annual report and savings claims processes, report its determinations, and propose any necessary changes to its order of appointment (OOA)or to the Process and Administration (P&A) Document; | BED will consult with the DPS on changes to the annual report and savings claim process to make the results more transparent to the PUC and other stakeholders. | In progress. To be included in the next updates to the OOA or P&A documents. The timing of the DPS's annual M&V process will be an important factor in any changes to BED's annual report and savings claim process. |
| 6 | BED should begin using the ACR that was approved for use by the EEUs in Case No. EEU-2016-03, should separate electric efficiency from TEPF program costs in the ACR, and should incorporate these changes into its reporting, beginning with BED's 2021 Annual Report | BED has incorporated the ACR in its reporting structure and it was included in the 2021 EEU Annual Report | Completed. Filed via e-PUC on 4/28/22 in Case No. 19-3271-PET |
| 7 | BED should document its efforts to increase customer awareness of EEU programs in its triennial plans, annual updates, and quarterly reports | Please see the "Outreach & Engagement with a Focus on BIPOC and Low- and Moderate-Income Customers (LMI)" section (Page 11)above for more information on these continuing efforts. | In progress. This is a continuous process improvement effort and BED will continue to update progress in all EEU reporting. With the end of most LED lighting programs, the high percentage of renters, the high saturation of natural gas users and the post-pandemic changes to commercial building use , BED will need to find creative solutions going |
| 8 | BED should file a revised SQRP that incorporates performance standards, monitoring, and reporting specific to its EEU services by March 31, 2022. | BED has revised the SQRP as directed and wishes to thank the DPS for their assistance. | Completed. Filed via e-PUC on 3/31/22 in Case No. 22-1063-PET |