



City of Burlington Electric Department
2021-2040
Energy Efficiency Utility Demand Resource Plan
Proposal for Electric and TEPF Resource Acquisition
and Development and Support Services

Case No. 19-3272-PET

Exhibit B (BED)

Submitted to the Vermont Public Utility Commission

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Introduction

Pursuant to its Energy Efficiency Utility (EEU) Order of Appointment, the City of Burlington Electric Department (“BED”) provides below a proposed 2021– 2040 Demand Resource Plan (DRP). This DRP includes funding to support complementary Tier III programs consistent with Act 151. BED’s plan consists of three main sections:

- Electric Resource Acquisition programs, including Act 151 initiatives;
- Development and Support Services; and,
- Thermal Energy & Process Fuels programs (TEPF)

This proposed plan describes energy efficiency (electric and TEPF) program budgets and savings targets over the 2021-2023 and 2024-2026 EEU performance periods and the Appendices provide sector budgets and savings projections over the 2021-2040 DRP study period. It also describes several activities that are additive to and complementary of our existing Tier III programs. These Act 151 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 may result in additional greenhouse gas (“GHG”) emissions reductions in a cost-effective manner.

BED worked collaboratively with the Vermont Department of Public Service (DPS), and its consultants GDS Associates and CADMUS, on the development of the 2021-2040 DRP. The DRP is based on an electric energy efficiency potential study of BED’s service territory conducted by the DPS with supporting data and customer information provided by BED to inform the final results. BED wishes to acknowledge the collaboration and assistance from the DPS on the potential study process. Conducting an energy efficiency potential study in Burlington, with its high percentage of renters and high saturation of natural gas users, can present challenges.

The potential study methodology, and the budget and savings scenario modeling process, used to inform BED’s DRP is described in detail in the GDS/Cadmus Final Report, “Vermont Energy Efficiency Market Potential Study” filed by the DPS on November 6, 2019 via ePUC in Case No. 19-3272-PET. The Report describes the analysis approach to develop the load forecast for the residential and commercial sectors along with an applicable list of energy efficiency measures, saturation rates and assumptions about emerging technologies over the twenty year period. Rate and bill impact analysis were also conducted on a number of budget and savings scenarios.

BED’s proposed DRP is based on the Program Achievable scenario described in the DPS report. With this plan, BED proposes to invest up to \$6.6 million in electric energy efficiency

through six core resource acquisition (RA) programs, \$0.514 million in DSS, \$0.705 million in Act 151 programs and, another \$1.034 million in TEPF programs over the 2021-2023 performance period. Evaluation, measurement and verification costs will amount to another \$0.150 million, inclusive of Act 151 program evaluation. BED anticipates that the 2021 – 2023 electric RA programs will achieve cumulative savings of 13,937 MWh by calendar year end 2023. Act 151 program activities will complement existing Tier III programs and therefore will help to further increase uptake of beneficial electrification measures and reduce GHG emissions. TEPF savings are expected to approximate 1,455 MMBTUs.

Proposed Electric Energy Efficiency Budget & Savings goals

The total 2021–2023 and 2024–2026 proposed electric efficiency resource acquisition budget and aggregate MWh savings goals by sector is as follows:¹

Total Program Budget								
<i>Resource Acquisition</i>	2021	2020	2023	3 yr Cum.	2024	2025	2026	3 yr Cum.
Commercial	\$ 1,690,420	\$ 1,624,073	\$ 1,670,462	\$ 4,984,955	\$ 1,514,232	\$ 1,494,082	\$ 1,371,239	\$ 4,379,553
Residential	\$ 563,473	\$ 541,358	\$ 556,821	\$ 1,661,652	\$ 504,744	\$ 498,027	\$ 457,080	\$ 1,459,851
Act 151 programs	\$ 240,000	\$ 235,000	\$ 230,000	\$ 705,000	\$ -	\$ -	\$ -	
RA Program Budgets	\$ 2,493,894	\$ 2,400,430	\$ 2,457,282	\$ 7,351,606	\$ 2,018,976	\$ 1,992,109	\$ 1,828,319	\$ 5,839,404
Development & Support Services	\$ 167,843	\$ 171,100	\$ 174,600	\$ 513,543	\$ 178,200	\$ 181,900	\$ 185,700	\$ 545,800
Total RA and DSS Budget	\$ 2,661,737	\$ 2,571,530	\$ 2,631,882	\$ 7,865,149	\$ 2,197,176	\$ 2,174,009	\$ 2,014,019	\$ 6,385,204
Department Evaluation & Other EEU				3 yr Cum.				3 yr Cum.
Costs	2021	2020	2023	Total	2024	2025	2026	Total
Fiscal Agent (inc: court reporter share)	\$ 2,850	\$ 2,907	\$ 2,965	\$ 8,722	\$ 3,024	\$ 3,085	\$ 3,147	\$ 9,256
Annual EEU Fund Audit	\$ 1,300	\$ 1,326	\$ 1,353	\$ 3,979	\$ 1,380	\$ 1,407	\$ 1,435	\$ 4,222
Triennial Independent Audit	\$ 1,425	\$ 1,454	\$ 1,483	\$ 4,361	\$ 1,512	\$ 1,542	\$ 1,573	\$ 4,628
DPS Evaluation (Traditional EEU)	\$ 61,979	\$ 41,975	\$ 20,194	\$ 124,148	\$ 21,010	\$ 86,981	\$ 62,807	\$ 170,798
DPS Evaluation (Act 151)	\$ -	\$ -	\$ 15,000	\$ 15,000	\$ -	\$ -	\$ -	\$ -
Total Proposed Budget	\$ 67,554	\$ 47,662	\$ 40,994	\$ 156,210	\$ 26,926	\$ 93,016	\$ 68,962	\$ 188,904
TOTAL DRP BUDGET	\$ 2,729,291	\$ 2,619,192	\$ 2,672,877	\$ 8,021,359	\$ 2,224,103	\$ 2,267,024	\$ 2,082,981	\$ 6,574,109

¹ For information related to 20 yr forecasts of DSS, DPS evaluation and “other” costs, please refer to appendices.

Resource Acquisition only				3 yr. Cum.				3 yr. Cum.
MWh Savings	2021	2022	2023	Total	2024	2025	2026	Total
Efficient Products	72	71	71	214	65	64	60	189
Residential New Construction	144	142	142	428	130	129	120	379
Residential Existing Homes	505	496	496	1,497	454	451	420	1,325
Income Qualified	40	39	39	117	36	35	33	104
Total Residential	761	748	748	2,256	684	680	633	1,997
Business New Construction	1,395	1,325	1,368	4,088	1,229	1,254	1,165	3,648
Business Existing Facilities	2,591	2,460	2,541	7,592	2,283	2,329	2,163	6,775
Total Commercial	3,986	3,784	3,910	11,680	3,512	3,584	3,327	10,423
Total RA Savings	4,748	4,532	4,657	13,937	4,196	4,264	3,960	12,420

Summer - Ann. Incremental Peak Demand Savings (MWs)				3 yr Cum.				3 yr Cum.
	2021	2022	2023	Total	2024	2025	2026	Total
Residential	0.09	0.08	0.08	0.25	0.07	0.07	0.06	0.19
Commercial	0.51	0.47	0.47	1.46	0.42	0.43	0.40	1.24
Total	0.60	0.56	0.55	1.71	0.49	0.49	0.46	1.44

Winter - Ann. Incremental Peak Demand Savings (MWs)				3 yr Cum.				3 yr Cum.
	2021	2022	2023	Total	2024	2025	2026	Total
Residential	0.12	0.12	0.11	0.35	0.11	0.11	0.10	0.31
Commercial	0.56	0.53	0.55	1.64	0.50	0.50	0.46	1.46
Total	0.68	0.65	0.66	1.99	0.60	0.61	0.56	1.77

Proposed TEPF Budget & MMBTU goals

The total 2021–2023 and 2024-2026 proposed resource acquisition budget and aggregate MMBTU savings goals by sector is as follows:²

Net Revenue Projections from BED's Participation in FCM & RGGI				3 yr Cum.			
	2021	2020	2023	Total	2024	2025	2026
Total Net Revenues	\$ 385,287	\$ 383,997	\$ 265,430	\$ 1,034,714	\$ 180,742	\$ 223,615	\$ 243,670
TEPF (proposed)							
TEPF - Traditional Program	\$ 106,350	\$ 107,100	\$ 108,100	\$ 321,550	\$ 109,100	\$ 110,100	\$ 111,100
Development & Support Services	\$ 7,650	\$ 7,900	\$ 7,900	\$ 23,450	\$ 7,900	\$ 7,900	\$ 7,900
VERMOD	\$ 92,000	\$ 92,000	\$ 92,000	\$ 276,000	\$ 63,742	\$ 92,000	\$ 92,000
DES Support	\$ 179,287	\$ 176,997	\$ 57,430	\$ 413,714	\$ -	\$ 13,615	\$ 32,670
Total TEPF Budget	\$ 385,287	\$ 383,997	\$ 265,430	\$ 1,034,714	\$ 180,742	\$ 223,615	\$ 243,670

	2021	2022	2023	3 yr Cum. Total	2024	2025	2026
TEPF Savings (MMBTUs)							
Residential	280	280	280	840	280	280	280
Commercial	30	30	30	90	30	30	30
VERMOD	175	175	175	525	175	175	175
Total MMBTU	485	485	485	1455	485	485	485

² For 2027- 2030 TEPF proposed budgets, please refer to the Appendices. Additionally, net revenues available to BED account for expenses to be paid to the DPS for FCM evaluation expenses (see Appendix F). Additional expenses related to the State's administration of FCM and RGGI programs are also accounted for within the net revenue calculation.

Proposed Electric Resource Acquisition Programs

BED remains committed to investing ratepayer funds in effective programs that address the energy needs of all customer sectors: owner-occupied residences, residential rental units, income –eligible customers, small and large commercial customers and municipal customers, such as k – 12 schools. BED proposes to make these investments through the continuation of the following six resource acquisition programs:

- Retail Efficient Products (EPP)
- Residential New Construction (RNC)
- Residential Existing Buildings (REB)
- Income – eligible homeowners and renters
- Business New Construction (BNC)
- Business Existing Facilities (BEF)

As in previous periods, BED will implement its energy efficiency programs in accordance with 30 V.S.A. 209(d) and shall strive to acquire all reasonably available, cost effective electric energy savings. To acquire such savings, BED will need to effectively address multiple markets at the same time in a coordinated manner.

There are a number of factors that have informed BED’s planning projections. Chief among these factors is our belief that “traditional” electric energy efficiency savings will increasingly become more expensive to acquire as baseline efficiency levels improve. Baselines are increasing due to more stringent state energy codes and federal appliance and lighting standards. This results in declining increments of potential cost effective savings to pursue through advanced technology upgrades driven by program activities.

There are also other emerging forces helping to shape BED’s approach to energy program design and delivery. These include but are not limited to the on-going transformation of the utility industry (utility 2.0 as called by some), Vermont’s ACT 56 (Renewable Energy Standard) strategic electrification provision (aka Tier 3) and BED’s net-zero energy city strategic direction. All of these forces require more of BED. As both an electric distribution utility and an EEU, we are intently focused on delivering cost effective and affordable energy services that customers need to reduce their carbon footprint. In short, we are transforming our organization into an increasingly nimble and strategic 21st century energy services provider in order to help our customers transform the way they acquire and consume energy. As both a distribution utility, and an energy efficiency utility, BED is in a unique and strong position to offer our customers a full suite of efficiency and beneficial electrification solutions. BED continues to explore and adopt new strategies for electric efficiency as well as a much deeper expansion into the renewable, thermal, demand response and transportation arenas

The tables below provide an overview of proposed electric program budgets and savings goals for the 2021–2023 and 2024-2026 performance periods:

Resource Acquisition only Program Budgets				3 yr Cum.			3 yr Cum.		
	2021	2022	2023	Total	2024	2025	2026	Total	
Efficient Products	\$ 50,713	\$ 48,722	\$ 50,114	\$ 149,549	\$ 45,427	\$ 44,822	\$ 41,137	\$ 131,387	
Residential New Construction	\$ 101,425	\$ 97,444	\$ 100,228	\$ 299,097	\$ 90,854	\$ 89,645	\$ 82,274	\$ 262,773	
Residential Existing Homes	\$ 354,988	\$ 341,055	\$ 350,797	\$ 1,046,841	\$ 317,989	\$ 313,757	\$ 287,960	\$ 919,706	
Income Qualified	\$ 56,347	\$ 54,136	\$ 55,682	\$ 166,165	\$ 50,474	\$ 49,803	\$ 45,708	\$ 145,985	
Total Residential	\$ 563,473	\$ 541,358	\$ 556,821	\$ 1,661,652	\$ 504,744	\$ 498,027	\$ 457,080	\$ 1,459,851	
Business New Construction	\$ 591,647	\$ 568,425	\$ 584,662	\$ 1,744,734	\$ 529,981	\$ 522,929	\$ 479,934	\$ 1,532,844	
Business Existing Facilities	\$ 1,098,773	\$ 1,055,647	\$ 1,085,800	\$ 3,240,220	\$ 984,251	\$ 971,153	\$ 891,306	\$ 2,846,710	
Total Commercial	\$ 1,690,420	\$ 1,624,073	\$ 1,670,462	\$ 4,984,955	\$ 1,514,232	\$ 1,494,082	\$ 1,371,239	\$ 4,379,553	
Total RA Budget	\$ 2,253,894	\$ 2,165,430	\$ 2,227,282	\$ 6,646,606	\$ 2,018,976	\$ 1,992,109	\$ 1,828,319	\$ 5,839,404	

Resource Acquisition only MWh Savings				3 yr. Cum.			3 yr. Cum.		
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Residential Existing Homes	505	496	496	1,497	454	451	420	1,325	
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Total Residential	761	748	748	2,256	684	680	633	1,997	
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Business Existing Facilities	2,591	2,460	2,541	7,592	2,283	2,329	2,163	6,775	
Total Commercial	3,986	3,784	3,910	11,680	3,512	3,584	3,327	10,423	
Total RA Savings	4,748	4,532	4,657	13,937	4,196	4,264	3,960	12,420	

Retail Efficient Products (EPP) Program Proposal

The Retail Efficient Products program is designed to address market driven and replace-on-burnout opportunities by reducing the initial cost of Energy Star qualified lighting products, appliances and consumer electronics.

Primary Objectives

- Create price parity between efficient products and standard products
- Build and maintain relationships with retailers and distributors operating in the region
- Increase inventory of energy efficient products on retail/distributor shelves
- Elevate the level of consumer energy awareness and product knowledge

PROGRAM HIGHLIGHTS – 2021-2023

- Est. investment: \$149,550
- Forecasted saving: 214 MWh

Implementation

This program is part of BED's and Efficiency Vermont (EVT's) planned coordination agreement. EPP is managed and implemented by EVT with BED's input, financial assistance and promotion to customers.

In large part, EPP works with national organizations and other program administrators to promote the Energy Star® certified products. The objective is to develop a list of qualified products as a means to enhance the customer's confidence in products carrying the Energy Star logo. In this way, customers are then able to discern between quality efficient products and others. The EPP program spends additional ratepayer funds to further develop promotional literature and in-store display advertisements. EPP also works with retail sales staff to increase product awareness, savings and features.

Over the 2021-2023 & 2024-2026 performance periods, BED will augment EVT's outreach with its own public education and product awareness campaigns using social media channels and customer newsletters. EPP is also promoted through BED's and VGS's energyChamp efforts.

These performance periods will also focus on promoting specialty LED bulbs, LED fixtures and other appliances that are the most efficient within Energy Star. The potential study that informed this DRP excluded standard screw-based LED bulbs as Vermont's market has been largely transformed. Historically, A-lamps (screw-in general duty LED's) have made up a majority of program savings so a new focus on other LED lighting products (and other appliances) is required to meet prosed budgets and savings targets. Refrigerators, clothes washers, a variety of heat pump products and consumer electronics are projected to play a more prominent role during these periods.

Residential New Construction (RNC) Proposal

The RNC program provides technical and financial assistance to home owners, home builders, developers and architects to design new homes, or take on major renovations, that meet or exceed the Vermont Energy Star Home standard. This service is available to single-family homes, multi-family homes and low-income multi-family buildings.

PROGRAM HIGHLIGHTS – 2021-2023

- Est. investment: \$299,000
- Forecasted saving: 428 MWh

Primary Objectives

- Provide technical and financial assistance to building owners with projects that exceed current energy codes.

- Influence market actors to build high performance homes and multi-family buildings

Implementation

Working with Burlington’s planning and zoning office, City building inspectors, Vermont Gas, Yestermorrow Design School and Efficiency Vermont, the RNC program will engage designers, builders and homeowners by providing technical assistance, energy rating services, financial incentives and project management. The RNC program also intends to provide market actors with relevant and timely information on technologies and design - build strategies that address all major end uses in new buildings; such as, thermal envelope, space conditioning, water heating, ventilation, major appliances and lighting.

As part of Burlington’s net zero energy city announcement, RNC will encourage the development of low-load or net zero energy homes. 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 Yestermorrow Design School, Vermont Green Building Network, and the Vermont Passive [House](#) Association. Over the past several years, BED has already co-sponsored several design build seminars with Yestermorrow for local designers and builders.

BED’s DRP projects that the RNC program will 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 relatively low first installation cost. As part of BED’s on-going beneficial electrification efforts, BED will continue to focus on high performance thermal envelopes, and controls, to help mitigate possible future regrets from strategic thermal electrification.

Residential Existing Buildings (REB) Proposal

The REB program targets both market driven and discretionary, early replacement/retrofit opportunities to reduce energy consumption in single family homes, multifamily buildings and condominiums. Additionally, the program serves as a point of contact for customers seeking advice about electric vehicles; electric vehicle charging equipment and other transportation related measures, as well as heat pumps.

PROGRAM HIGHLIGHTS – 2021-2023

- Est. investment: \$1,047,000
- Forecasted saving: 1,497 MWh

Primary Objectives

- Address energy efficiency and strategic electrification opportunities across all-fuels by increasing customer awareness about all available EEU programs from BED and VGS, new technologies and practices.
- Develop and encourage the use of online tools that have the potential to empower customers to take more control of their energy consumption.
- Integrate whole building approach to enhancing energy efficiency in the built environment.

Implementation

REB works closely with high usage households for energy efficiency improvements that can reduce energy bills and solve comfort and moisture related issue. 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 LED's per apartment.

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

BED and VGS will continue the energyChamp (EC) collaboration in 2021-2013 & 2024-2026 periods. EC is designed to encourage more residential customers to participate in available efficiency programs. EC offers customers a one-stop option to help them take a more complete look at their total energy picture including the thermal shell, HVAC, lighting, appliances, along with solutions for comfort or moisture related issues.

REB Income Qualified Customers (REB-IC) Proposal

This program seeks to reduce energy consumption and bills for income-qualified customers through technical assistance, incentives and educational outreach. BED partners with the Champlain Valley Weatherization Service (CVWS) to delivery most of these services but also works with the Burlington Housing Authority, Champlain Housing Trust and Cathedral Square Corporation

PROGRAM HIGHLIGHTS – 2021-2023

- Est. investment: \$166,000
- Forecasted saving: 117 MWh

Primary Objectives

- Reduce the economic burden of energy consumption for customers with incomes equal to or less than 80 percent of the median incomes.
- Increase energy consumption awareness in order to help customers find ways to save money on their energy bills.
- Increase program participation.

Implementation

This program is partially implemented in partnership with CVWS who delivers the Low-income Weatherization Assistance Program (WAP) that is mostly focused on space heating improvements. BED has a program implementation agreement with CVWS so that they can more comprehensively assist income qualified residents implement all cost-effective energy efficiency upgrades. This partnership allows electrical efficiency measures to be delivered at the time customers receive thermal shell, space heating and water heating improvements from WAP.

REB-IC also works closely with high usage households, who may not be eligible for CVWS WAP services. For high – usage customers, BED staff provides on-site energy audits, customer energy education, appliance meter loans, and technical assistance and cash incentives for eligible measures. Additionally, energy services staff regularly encourage customers to access BED's [Energy Engage](#) on-line tool to self-assess their electric usage. The energy engage tool has been particularly helpful in demonstrating to customers how and when they use electricity. Armed with this type of usage granularity, customers are in a better position to determine how best to reduce their usage and lower their electric bills.

Similar to the market rate programs noted above, implementation of the REB-IC program emphasizes a holistic, whole building approach to energy efficiency including health and comfort issues.

BED will cultivate partnerships, and pursue initiatives that allow for additional opportunities to engage with the low income community. Examples of such include the following:

Business New Construction (BNC) Proposal

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

PROGRAM HIGHLIGHTS – 2021-2023

- Est. investment: \$1,745,000
- Forecasted saving: 4,088 MWh

Primary Objectives

- Provide financial incentives, technical assistance and project management for new construction and major renovation projects designed to meet or exceed existing commercial new and renovation construction codes.
- Help customers through the decision-making process and help them to maximize energy investments.
- Integrate heat pump technologies and transportation alternatives into the design and development of new buildings.

Implementation

The program offers financial incentives for the installation of cost effective efficiency measures. Customers gain technical assistance, verification services and financial incentives to help with energy modeling, third-party building commissioning services and efficient thermal envelope and equipment costs. BNC addresses all energy consuming equipment, components or practices, including thermal envelope, motors, lighting, heating, ventilation, air-conditioning (HVAC) and control packages.

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

The program will provide performance-based tiered incentives. Under the “energy model” approach, BED pays 50 percent of the total estimated incentive upon project completion, provided the building has been built to the agreed upon specifications. The remaining incentive is then be paid about 12 months after project completion. Approval of the remaining balance is contingent on a comparison of the actual, post-occupancy energy use to the results of the baseline (CBES) energy model performed during the design phase. It is often the case that the baseline energy model needs to be calibrated to reflect actual operations of the occupied building including actual plug loads, HVAC set-points and operating hours.

The “energy model” approach acknowledges that it often takes about a year for larger commercial buildings to be fully occupied, equipped and debugged of its performance issues. This tiered approach allows for deeper BED involvement, more accurate savings claims when compared to prescriptive approaches and ensures that building operators are encouraged to optimize the performance of their buildings.

The 2021-2023 & 2024-2026 performance periods will see further coordination between BED’s EEU and Tier 3 programs. Heat pump technology is continuing to emerge as an alternative building space conditioning solution, even when natural gas service is available. Accordingly, BED will evaluate the costs and benefits of various HVAC systems such as air source and ground source heat pumps. To further advance the adoption of these technologies, and where appropriate, BED’s Tier 3 program will help offset the initial cost of ground source or variable refrigerant flow (VRF) heat pump systems.

Combining Tier 3 and EEU funds together can help to further the City’s transition away from fossil fuels to renewable electricity. Tier 3 funds can be used to influence heat pump adoption and EEU funds can be applied toward the highest efficiency water source heat pumps, lighting, controls and thermal shell measures. Ground source heat pump systems can provide for a more efficient central cooling system which can help to reduce summer peak issues.

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

BED, through its complimentary Tier 3 efforts, will also seek to influence developers' decisions with respect to electric vehicle charging equipment - or to at least ensure that appropriate trenching and/or other "make-ready" infrastructure is made available to accommodate future installations of EV charging equipment. Such encouragement helps to prepare building owners and developers to better serve their customers/tenants as EV's start to become more prevalent on Vermont's roads.

Business Existing Facilities (BEF) Proposal

The BEF program pursues market-driven and discretionary retrofit energy efficiency opportunities. Market driven opportunities include naturally occurring equipment replacements on burn out. Discretionary retrofits typically include custom projects focused on functioning but inefficient equipment and building systems. Such custom projects also take a holistic approach to identifying electric and thermal related savings.

PROGRAM HIGHLIGHTS – 2021-2023

- Est. investment: \$3,240,000
- Forecasted saving: 7,592 MWh

BEF program managers assist commercial customers of all sizes to fully understand their energy usage and bills. On-site assessments uncover cost effective opportunities to optimize building operations and processes, and ultimately reduce energy costs.

Primary Objectives

- Acquire cost effective market-driven and discretionary retrofit energy efficiency.
- Focus on total energy solutions that take into account demand response opportunities, system controls and building management systems.
- Expand the number of small to medium size businesses participating in the program.
- Further develop the HVAC solutions to prevent lost opportunities as customers consider alternative heating and cooling solutions.

Implementation

The BEF program assists commercial customers to evaluate their best options to optimize the overall energy performance of their business spaces. This work includes: meeting with customers and their contractors, reviewing and evaluating efficiency proposals, modelling building energy consumption and trends, sharing information and data on best practices; project management and documentation; proposing and processing incentives including on-bill financing options; and, evaluating, measuring and verifying energy savings upon project completion.

Customers, and contractors, will also be able to take advantage of statewide upstream incentives for eligible lighting, HVAC and refrigeration equipment.

This DRP period recognizes the growing trend away from lighting as the dominant measure in this market. HVAC, HVAC system controls, refrigeration and other measures, are projected to play a more prominent role.

To help to achieve proposed DRP savings targets BED will leverage Burlington's participation in the 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>

Electric Development and Support Services Proposal

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

Below is BED's proposed electric DSS spending for the 2021-2023 and 2024-2026 performance periods: ³

Electric DSS Budget				3 yr Cum.				3 yr Cum.
	2021	2022	2023	Total	2024	2025	2026	Total
Education & Training	\$ 32,640	\$ 33,300	\$ 33,900	\$ 99,840	\$ 34,500	\$ 35,100	\$ 35,800	\$ 105,400
Applied R&D	\$ 8,000	\$ 8,200	\$ 8,400	\$ 24,600	\$ 8,600	\$ 8,800	\$ 9,000	\$ 26,400
Planning & Reporting	\$ 46,733	\$ 47,600	\$ 48,600	\$ 142,933	\$ 49,700	\$ 50,800	\$ 51,900	\$ 152,400
Evaluation	\$ 17,000	\$ 17,300	\$ 17,700	\$ 52,000	\$ 18,100	\$ 18,500	\$ 18,900	\$ 55,500
Policy & Public Affairs	\$ 7,470	\$ 7,600	\$ 7,800	\$ 22,870	\$ 8,000	\$ 8,200	\$ 8,400	\$ 24,600
Information Tech	\$ 11,000	\$ 11,200	\$ 11,400	\$ 33,600	\$ 11,600	\$ 11,800	\$ 12,000	\$ 35,400
General	\$ 45,000	\$ 45,900	\$ 46,800	\$ 137,700	\$ 47,700	\$ 48,700	\$ 49,700	\$ 146,100
Total	\$ 167,843	\$ 171,100	\$ 174,600	\$ 513,543	\$ 178,200	\$ 181,900	\$ 185,700	\$ 545,800

Education and Training

This category captures BED's work throughout the year on increasing customer awareness about energy efficiency and how to take specific actions to lower energy use. BED provides education to builders and contractors, real estate professionals, K-12 students and teachers, college and universities and the general public.

Additional activities include:

- Energy Codes and Standards Support
- Energy Literacy Project Support
- General Public Energy Education
- Better Building by Design Conference
- Building Energy Labeling & Benchmarking

³ Please refer to the Appendices for information related to 20 yr forecasts of DSS budgets.

Applied Research & Development

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

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

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

Sub-categories of activity in this area include

- Emerging Data services and analytics

Planning and Reporting

This budget line item covers the cost of informing the Vermont PUC, the DPS, and other stakeholders about BED's EEU activities. BED regularly submits monthly, quarterly, annual reports and an annual plan to the Commission and DPS. This activity also supports BED's engagement with the VSPC and the ISO-NE FCM program.

Sub-categories include:

- Annual Plan
- Demand Resource Plan
- Vermont State Planning Committee (VSPC)
- ISO-NE FCM Participation
- Reporting

Evaluation

Evaluation, measurement and verification (E,M&V) is integral to energy efficiency. Accordingly, BED will continue to conduct E, M&V of its programs over the next triennial period. Such *ex post* analyses not only boost BED's confidence that its programs are resulting in persistent and real savings, but E,M&V findings also point out how program managers can implement improvements as market conditions evolve. Many activities in this work area are coordinated with the DPS and Efficiency Vermont.

Sub-categories include:

- Annual Savings Verification
- Technical Advisory Group (TAG)
- Technical Reference Manual (TRM)

Policy & 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, the media, the public and other stakeholders.

Sub-categories include:

- Public Affairs
- Regulatory Affairs

Information Technology

BED's IT activities mainly consists of continuing the support of, and improvement to, the DSM database system for the collection and processing of project data and program information critical to tracking, reporting and planning functions. There is a fairly regular need to alter 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 EEU programs not specific to the individual programs and includes 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.

This activity funds over 50 general energy services staff meeting per year, over 30 meetings with EVT, VGS, CVWS and other stakeholders annually and almost weekly communications with broader BED staff on efficiency matters.

Act 151 Programs

Introduction

Consistent with Act 151, BED proposes to pursue 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 may result in additional greenhouse gas ("GHG") emissions reductions in a cost-effective manner. In the sections below, we provide a summary of each proposed activity, the objectives we aim to achieve, and a proposed budget of annual expenditures for the three-year period ending in 2023.

In general, the proposed activities support existing Tier III programs by addressing known market gaps and customer barriers to adopting technologies and/or changing behaviors that would further the State's efforts to reduce GHG emissions. In some cases, the proposed 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 proposed activities are intended to increase the inventory of beneficial electrification technologies from which customers can choose. Other proposed 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.

Proposed Act 151 activities include the following:

- Enhanced incentives for all-electric vehicles, including more efficient plug-in electric vehicles ;
- Preferred EV dealer network support;
- Electric vehicle supply equipment ("EVSE") expansion into neighborhoods.
- 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.

BED anticipates spending up to \$720,000 over the 2021-2023 DRP performance period. The table below shows the annual expenditures by activity/program. In the

sections that follow, we describe our expectations of what can be accomplished with this level of expenditure and the metrics for evaluating program effectiveness.

Proposed Annual Act 151 Expenditures by Program

	2021	2022	2023	Tot
II Electric and Eff. PHEV's	\$ 29,750	\$ 25,500	\$ 21,250	\$ 76,500
Admin	\$ 5,250	\$ 4,500	\$ 3,750	\$ 13,500
Subtotal	\$ 35,000	\$ 30,000	\$ 25,000	\$ 90,000
Preferred Dealer Network				
Support	\$ 51,000	\$ 51,000	\$ 51,000	\$ 153,000
Admin	\$ 9,000	\$ 9,000	\$ 9,000	\$ 27,000
Subtotal	\$ 60,000	\$ 60,000	\$ 60,000	\$ 180,000
MF EVSE Support	\$ 21,250	\$ 21,250	\$ 21,250	\$ 63,750
admin	\$ 3,750	\$ 3,750	\$ 3,750	\$ 11,250
Subtotal	\$ 25,000	\$ 25,000	\$ 25,000	\$ 75,000
Advanced heat pumps	\$ 55,250	\$ 55,250	\$ 55,250	\$ 165,750
Admin	\$ 9,750	\$ 9,750	\$ 9,750	\$ 29,250
Subtotal	\$ 65,000	\$ 65,000	\$ 65,000	\$ 195,000
Geo Testing wells	\$ 21,250	\$ 21,250	\$ 21,250	\$ 63,750
Admin	\$ 3,750	\$ 3,750	\$ 3,750	\$ 11,250
Subtotal	\$ 25,000	\$ 25,000	\$ 25,000	\$ 75,000
DeltaClime_VT	\$ 30,000	\$ 30,000	\$ 30,000	\$ 90,000
Admin	\$ -	\$ -	\$ -	\$ -
Subtotal	\$ 30,000	\$ 30,000	\$ 30,000	\$ 90,000
Act 151 program totals	\$ 240,000	\$ 235,000	\$ 230,000	\$ 705,000
Department EM&V				\$ 15,000
Total Expenditures				\$ 720,000

Transportation Focus

In the transportation market, Act 151 programs will focus on increasing the uptake of All Electric Vehicles, (AEVs”) and efficient Plug in Electric vehicles (“PHEVs”), providing additional dealer support and incentives to sell more EVs, and expanding the number of wifi-connected level 2 EVSEs in neighborhoods.

Enhanced Incentives for AEV's and Efficient PHEVs

Starting in 2021, BED will begin to provide an enhanced \$500 financial incentive, over and above current Tier III incentives, to Burlingtonian AEV purchasers at the point of sale. The enhanced incentive shall apply to all types of eligible AEV's, provided the MSRP of the vehicle is \$50,000 or less. At the same time, BED will provide a \$500 incentive for more

efficient PHEVs with a MSRP of \$50,000 or less. This initiative builds upon our existing Tier III incentive program, which provides financial incentives to customers at point of sale when they purchase from one of our preferred EV dealers. When combined with existing Tier III incentives, Burlingtonians could receive up to \$2,300 for new AEVs⁴, up to \$2,000 in incentives for a new more efficient plug-in hybrid electric vehicle (“PHEV”), and up to \$1,300 for preowned vehicles. Income-qualified customers may also receive the existing incentive adders on top of the enhanced efficient EV incentive. For purposes of this program, an “efficient” PHEV means those vehicles capable of travelling 25 miles or more on a single charge.

This type of incentive structure is similar to the midstream incentives that Vermont’s energy efficiency utilities provide for heat pumps and other products (i.e. motors, lighting, etc.) where incentives are provided by Efficiency Vermont and BED to wholesalers and contractors. For example, when a contractor installs a heat pump in Burlington, they pick up the customer’s heat pump at a distributor (e.g., F.W. Webb) and receive a \$200-\$300 discount at the counter. Later, BED pays the distributor for each incentive they provided during the previous month. This is how BED proposes to administer this aspect of the program. Each preferred dealer will provide a monthly invoice, along with supporting documentation for each EV sale made the previous month, including any efficiency upgrade, and BED will reimburse the dealer for each eligible sale to a Burlington resident or business. Documentation shall include, but not be limited to, the sales invoice clearly showing the amount of the incentive provided, the customer’s address and BED electric account number or similar proof, and the efficiency of the PHEV vehicle sold.

The anticipated expenditure for this sub-activity is currently \$90,000 over the next three years, as shown in the table below.

	2021	2022	2023	Total
Incentives	\$ 29,750	\$ 25,500	\$ 21,250	\$ 76,500
Admin	\$ 5,250	\$ 4,500	\$ 3,750	\$ 13,500
Subtotal	\$ 35,000	\$ 30,000	\$ 25,000	\$ 90,000

Program Benefits:

BED’s goal for this program is primarily to reduce the customer’s upfront costs as a means to help transform the market toward electric vehicles and increase the uptake of electric vehicles in the early stages of adoption. Over time, the program will also seek to increase awareness about the efficient use of electricity for transportation. Increasing

⁴ State incentives may also be added to BED’s incentives, if eligible.

customer awareness about more efficient PHEVs, and eventually AEVs, would be beneficial over time to all customers, including non-participating customers, as BED's costs would be lowered relative to a scenario without an enhanced EV incentive program.

Depending on how the electric vehicle market evolves, BED may re-introduce an efficient AEV program in 2022 or 2023. Before doing so, BED will provide the Department and Commission with at least 30-day advanced notice for comment and approval.

Proposed Program Evaluation Metrics:

We anticipate the program will lead to as many as 150 additional electric vehicles registered in Burlington by the end of 2023. It is important to note that in establishing this metric, we relied on our professional judgment to derive the impact of an enhanced incentive on customers' decision to purchase AEV's and more efficient PHEV's. In this instance, we calculated the increase in the total number of AEVs and PHEVs incented per year since 2017, adjusted for COVID impacts and increased Tier III incentives, and applied that growth rate to the universe of eligible AEVs and PHEVs (i.e. driving range of 25+ miles on a single charge). Over time, BED may need to adjust the eligibility criteria to account for changes in customers' purchasing decisions and the efficiency of newer PHEVs as they become available.

Preferred EV and PHEV Dealer Network Support

Preferred dealer network support includes expanding BED's activities and relationships with local automobile dealers focused on reducing market barriers to EV adoption. Key program objectives are to increase dealer and public awareness, education, and outreach. Successfully accomplishing these objectives would, we believe, elevate dealer-customer engagement, improve customer experience, shorten the sales cycle (i.e. time between initial customer engagement to closing a sale), and increase EV inventory. A secondary objective is to convince area dealerships to recognize and prepare for the inevitable transformation of the transportation sector that is (too) slowly transitioning away from internal combustion engines to electric motors. To become or continue to be a BED Preferred Dealer, the dealerships and their staff would need to commit to advancing the activities described below in partnership with BED.⁵

Activities under this program entail in-kind and financial (cost-sharing) support to the dealerships. In-kind support includes activities that seek to increase customer

⁵ Although BED has established a preferred dealer network, the types of support outlined here cannot be provided without additional resources and funding. If our Act 151 proposal is rejected or substantially reduced, BED would likely continue promoting its existing Preferred Dealer Network at its current level – which is insufficient to materially impact the market.

awareness about the benefits of driving electric. It may include co-branded advertising, BED generated social media campaigns, public announcements, and/or “Ride & Drive” Electric events. Dealer direct incentives could include financial support for additional EV/PHEV-specific training, subsidies to reduce short-term EV lease costs for customers (i.e., “Try before you Buy” program support), and, finally, cost sharing for the development and maintenance of a web-based shopping tool.

Supporting and sustaining a preferred dealer network is estimated to cost about \$180,000 over the next three years.

	2021	2022	2023	Total
Preferred Dealer Network Support	\$ 51,000	\$ 51,000	\$ 51,000	\$ 153,000
Admin	\$ 9,000	\$ 9,000	\$ 9,000	\$ 27,000
Subtotal	\$ 60,000	\$ 60,000	\$ 60,000	\$ 180,000

EV Awareness, Education, and Outreach

In this activity area, BED and preferred dealers will partner to launch several types of media campaigns. Some activities will entail co-branded print and radio advertisements. Other marketing communications will be distributed through existing social media channels. It is expected that our joint media communications will focus on increasing awareness about EVs generally but also on specific details that customers need to know before they become EV owners, especially regarding the options and economics for charging their EV, including BED’s EV charging tariff. Details may include, for example, EV driving ranges (compared to average miles driven daily), cold weather impacts on range, charging times (i.e., driving range per hour of charging), fuel and maintenance savings, and the basics of home charging, including wiring requirements and what devices are eligible for BED’s EV charging tariff. Such efforts have been discussed with Drive Electric Vermont and the Agency of Transportation and will be coordinated so that communications to the public will be consistent. Of course, any marketing content will also provide additional information about Vermont’s statewide incentive program, such as the amount of the State’s incentive, how to access state incentives, and qualification criteria.

While BED currently provides some outreach and public education information on its website as part of the Tier III program, our ability to expend funds to effectively push this type of necessary information to a wider audience via multiple channels is limited by regulations (i.e., alternative compliance payment caps). With additional funds, BED could increase the number and type of marketing channels to reach a much wider audience.

Increased funding would allow for more expansive content that goes into greater detail about the total costs and benefits of driving electric. The funds could also be used to craft public educational/outreach materials that would better address language and cultural barriers by converting English text into other languages prevalent in the City.

Marketing, public outreach, and educational efforts would be augmented by BED’s and its preferred dealerships’ participation in public events such as Drive Electric week, Ride-and-Drive events, and conferences. On this front, BED would sponsor several events annually, offer educational presentations, and field questions from interested stakeholder attendees.

Another marketing activity could include the development and maintenance of a web-based shopping tool similar to one that is operational in Massachusetts. This will be provided on a cost-share basis, as well. Naturally, it would be necessary to coordinate closely with Drive Electric Vermont, VTRANS, and potentially other DUs—to the extent they may want to be involved in such a customer educational effort. Thus, BED is not able to provide an in-depth description of this type of web-based customer shopping tool yet. However, for some insight into the potential features that this type of tool could offer Vermonters, please visit: <https://www.greenenergyconsumers.org/drivegreen>. At a high level, the tool allows shoppers to compare EVs along a variety of features such as battery size, mileage range, and efficiency (electric miles per kWh). Once the shopper selects her vehicle, she is directed to several participating dealers that have the vehicle on their lot. Once on this webpage, shoppers can compare vehicle prices, incentives, and lease terms. This type of tool provides customers with important information and helps them to make informed decisions about their next vehicle purchase.

The main objectives for the above-noted efforts would be to serve as an objective source of information to customers about EVs generally, and to demonstrate how EVs can meet the needs of most Vermonters. By providing this kind of information with preferred network dealers, the amount of time and effort on the part of dealers may be reduced.

Performance metric

Specific metrics for this sub-activity include:

Marketing and social media campaigns	Continuous throughout the year
No. of Ride & Drive events annually	4 – 10

Conference attendance and sponsorships annually	2-4
Billing notices annually	8

Dealer Direct Financial Support

Dealer direct support will take two main forms. First, we will set aside funds to partially offset the cost of EV/PHEV-specific training events. Second, we will help dealers to establish and fund a “Try-Before-You-Buy” program.

With respect to EV/PHEV-specific training, it is BED’s understanding that dealerships are reluctant to provide EV-specific training to their sales personnel. There are several reasons why. Dealerships have noted to BED that salespeople often leave after a relatively short time for a competitor in the area. Also, the time a salesperson spends out of a dealer’s showroom (and in training) means less time selling cars. Finally, many dealers are already operating under strained operating margins, especially during the pandemic. These reasons make it challenging for dealerships to commit to EV-related training for their sales staff.

However, this lack of training creates barriers to EV adoption. Customers are justifiably curious about EVs and PHEVs. EVs are fairly new products that require owners to modify their driving habits slightly. Customers naturally ask questions about these new products and need to be assured that an EV/PHEV purchase is the right decision for them. Salespeople therefore need to acquire additional knowledge about EVs and PHEVs to effectively meet their customers’ needs and respond to EV-related questions. If they can’t address these questions, customers will be more inclined to purchase a traditional vehicle with which the salesperson is more familiar. Training may also shorten the sales cycle of EV decisions since sales personnel would become more adept at answering customer questions promptly.

To help address this critical knowledge gap, BED intends to share the cost of providing EV/PHEV-specific training to interested sales staff of preferred dealers. Training could include access to training videos or even travel to the manufacturer’s U.S. headquarters for more formal, in-person training. In the aggregate, BED will offer to pay up to 50% of the cost of training, capped at \$20,000 for 2021, \$10,000 for 2022, and \$5,000 for 2023.

Performance metric: Our goal for the program is to provide up to 3-4 training sessions reaching 50 salespersons at more than one dealership serving the Burlington region.

The second dealer support initiative is a “Try Before You Buy” program. Under this initiative, BED would purchase (or otherwise underwrite the cost of) a vehicle for a preferred dealer to lend out to customers for an extended time, potentially for a nominal fee. The dealer would be responsible for managing all aspects of this program and would assume customer liabilities. This program would provide potential EV owners the opportunity to take an EV home for a few days to fully explore the drive electric experience and replace a program that BED had previously explored in detail but which failed due to lack of suitable funding.

Most times, customers visit a dealer and drive a vehicle for a short period of time, often with the salesperson. This short drive time is insufficient for EVs. Potential EV owners may not currently be afforded the time necessary to determine whether driving electric would fit their lifestyle. Given additional time to drive an EV on a daily basis, customers would gain the confidence needed to make a decision to transition to an EV. This temporary, but more meaningful experience, would prove to customers that the mileage range of EVs is more than sufficient most days of the week. They would learn how to charge vehicles and how long it takes. They would become more familiar with the locations of publicly available charging facilities and the cost of driving electric. They would learn more about the features and capabilities of EVs, which would potentially alleviate any “range anxiety” they may be feeling. The overall objectives of the “Try Before You Buy” program would be to increase customer knowledge of and experience with driving electric and reduce customer anxiety related to EVs.

Performance metric:

Initially, BED expects to provide one AEV for “Try Before You Buy” use. If the program is successful, BED may expand the program to include additional EVs with other dealerships that demonstrate an additional need or with other organizations. It is likely the AEV may be rotated among two or more preferred dealers. For this effort, BED anticipates spending up to \$40,000 for one vehicle.

Electric Vehicle Supply Equipment Expansion

Over the past year BED has been working to overcome barriers to widespread adoption of EVs. One noticeable barrier, especially in Burlington with its large stock of multi-family dwellings, is the difficulties surrounding EV charging for multifamily residential customers and condominium associations. These barriers include split landlord-tenant incentives for installing EV charging facilities at rental or multifamily properties, the upfront cost of the installed hardware, the software required to account for charging by multiple tenants or households, and general project management requirements that are time consuming without support.

In Burlington, over half of the residential units are rentals, many of which are multifamily, and 65% of all residential units are multifamily when condominiums are included, as shown in the table below. (Even for condominium owners, gaining approval to install electric vehicle charging infrastructure can be challenging.)

Residential Type	Total Properties	Rental Units	Owned Units
1 Family	5,346	452	4,927
2 Family	1,041	1,529	236
3 Family	369	1,022	27
4 Family	239	920	16
Apartments 5+Units	367	3,944	55
Condo	2,156	619	1,639

Renter / Owner	55%	45%
MF / Single Family	65%	35%

Over the last year, BED ran a pilot project to expand access to EV charging in multifamily properties by providing fifteen level 2 charging stations to eligible properties. BED worked with EVmatch, which provides an app-based platform that allows EV charging station owners to “rent out” their non-commercial EV chargers, much like an “Airbnb” for EV owners. The EVmatch platform handles the payments and enables the owner to limit access to select user groups. For example, the residents of an apartment building can be allowed to charge at night while public charging is permitted during the day. This platform also offers a reservation feature to allow EV drivers to plan ahead. BED offered an additional \$500 to help cover the installation of each charger that the property owner or association agreed to make publicly available during the day. The program was a direct result of the 2019 DeltaClimeVT program (see description below).

There were several key takeaways from this pilot project that is nearing its last installation. First, there is significant demand for this type of program that focuses on multifamily housing, co-housing and condominium associations. There is also a clear need for technical assistance in supporting and guiding installations to completion. The successful installations in this pilot have had property owner and/or resident electric vehicle champions who have assumed the task of researching, educating, and managing projects. BED staff has helped to guide these projects and have answered questions along the way. Without the continuation of BED support, we expect that interest in installing EVSEs in neighborhoods would wane, perhaps precipitously, so there is therefore a need to fund this effort through Act 151 programming.

The second takeaway is the multiplier effect of this program. An owner of an “EVMatch” charger in the Old North End provided feedback to BED about their neighbors and friends are more interested in driving electric knowing that they can charge up their vehicles at his residence. Finally, a condominium association recently conducted a survey of its community before applying to the EVmatch pilot and discovered that the number of EVs could triple from 4 to 12 if charging stations were installed.

This proposed program will mirror the successful pilot project and will provide continued funding to support the growth of level 2 charging at multifamily properties and condominium associations. An online application for property owners will go live in January and June of each year similar to the application used for the EVmatch pilot, shown below. Applicants will be selected on eligibility criteria as well as their ability to provide charging access to a community that is not currently being served by Tier III programs.

The annual budget for this this initiative is shown in the table below.

	2021	2022	2023	Total
MF EVSE Support	\$ 21,250	\$ 21,250	\$ 21,250	\$ 63,750
admin	\$ 3,750	\$ 3,750	\$ 3,750	\$ 11,250
Subtotal	\$ 25,000	\$ 25,000	\$ 25,000	\$ 75,000

Program Benefits: This program is intended to address a major market gap that exists currently. In several neighborhoods and condominium associations there is a lack of access to readily available EVSE near residences. This lack of access deters EV ownership. By providing incentives to building owners and technical support to successful install EVSE, we can work toward closing this gap. If this gap is closed overtime, additional EVs will be registered in Burlington resulting in lower GHG emissions.

Proposed Program Evaluation Metrics:

BED anticipates 50 level 2, wifi-connected EVSEs will be installed in neighborhoods throughout the City by the end of 2023.

Building Thermal Focus

This focus area will seek to boost the number of advanced heat pumps installed over time and defray the costs of drilling test wells for geothermal heat pumps.

Advanced Heat Pumps and Building Controls

Since BED launched its [Green Stimulus](#) package shortly after the COVID-19 pandemic began, we have seen a three-fold increase in the number of residential heat pump incentives. Most of the installations include ductless cold climate heat pumps (“ccHPs”), but we are also receiving inquiries about centrally ducted heat pumps (“CDHP”) and air-to-water heat pumps (“AWHP”). The aggressive incentive structure for heat pumps has been extremely effective in increasing participation. It has also caught the attention of the contractor community, which has been relying on the incentives as part of their marketing strategy throughout the City. Aggressive incentives have also increased economic activity in the City despite the challenges of the pandemic.

Once Green Stimulus funds are depleted, or unspent portions returned, BED would like to utilize Act 151 funds to continue providing aggressive incentives to customers. As with Green Stimulus funding, the Act 151 funds will be used to increase customer incentives above and beyond our Tier III incentives. Additional Act 151 incentives will also encourage the installation of integrated building controls between heat pumps and existing fossil fuel based heating systems, which are not required to receive a standard Tier III incentive. With this added incentive, Act 151 funds will be helping to continue to accelerate adoption of heat pumps and advancing the still developing integrated controls market.

Aggressive heat pump incentives have helped the contractor community to expand their businesses to include alternative heating and cooling equipment and services, while reducing their reliance on perpetuating long-term customer decisions to replace existing natural gas boilers and furnaces with new ones (potentially locking in fossil fuel consumption for another 20 to 25 years). With business expansion, contractors are more likely to hire additional staff, maintain sufficient inventory, and engage in customer education, thus increasing economic activity.

As additional heat pumps are installed, GHG emissions decrease, potentially at a faster rate than with lower levels of incentives. It is estimated that each ccHP installed displaces between 40% and 60% of a Burlington household’s fossil fuel-supplied heating requirement. And, for a typical single-family residence, this would mean that between 2.1 and 3.1 tons of CO₂ will be avoided annually.

If incentives are reduced to pre-Green Stimulus levels, BED is concerned that participation levels would decline substantially and the momentum toward economic

recovery would dissipate. So too would our efforts to transform the building thermal market in a meaningful way and in a manner designed to help realize the aggressive climate change goals of the City of Burlington and Vermont. Accordingly, we propose to use Act 151 funds as an additive incentive to the existing Tier III incentives, as was done under the Green Stimulus Program currently in place, as a means to further reduce upfront capital costs to install even more ccHPs with integrated controls than has been estimated under our current Tier III plan.

In aggregate, BED forecasts needing to spend up to \$195,000 on this activity to further the transformation of the building thermal sector.

	2021	2022	2023	Total
Advanced heat pumps	\$ 55,250	\$ 55,250	\$ 55,250	\$ 165,750
Admin	\$ 9,750	\$ 9,750	\$ 9,750	\$ 29,250
Subtotal	\$ 65,000	\$ 65,000	\$ 65,000	\$ 195,000

Program Benefits: By maintaining a consistent and aggressive total incentive structure, BED’s primary objective is to reduce the upfront capital cost of installing heat pump technologies, which has acted as a market barrier to participation for some customers. A secondary objective is to further economic development opportunities in the region. We expect an increase in the early adopter deployment rate of heat pumps with controls in Burlington over the status quo, and that increased early adoption will lead to greater adoption at a faster rate than experience has demonstrated to date and by the broader population.

Proposed Program Evaluation Metrics:

In BED’s 2021 Tier III plan, we anticipate providing incentives for up to 100 ccHP units. With the additional Act 151 funds, we could increase incentives by \$1,500 per unit, raising the total incentive package to \$3000 or \$4100, depending on ccHP size. At these incentive levels, customers would be able to convert to heat pumps at a much lower upfront cost. These aggressive incentives would likely result in another 110 heat pumps over the next three years, based on BED’s Green Stimulus experience to date.

The additional Act 151 incentive would not be limited to ccHPs, however. BED would also provide an Act151 bonus incentive for centrally ducted and air-to-water heat pumps. BED believes that additive incentives for these technologies will marginally improve the cost-competitiveness of these emerging technologies. Currently, BED anticipates that 10 CDHPs and 10 AWHPs will be installed in 2021. With additional funding, we believe that one more of each could be installed during the year.

Geothermal Testing

BED proposes to use a portion of Act 151 funds to promote the benefits of geothermal heat pump systems (“GTHP”) by providing incentives up to \$15,000 per project, within an annual program limit of \$25,000 per year. Incentives would offset the cost of drilling a geothermal test well to determine if a GTHP system would be a viable primary heating and cooling system for a building. All incentives shall also be capped at 50% of the total costs. Prior approval of each project by BED will be required along with enrollment in BED’s New Construction program, if applicable.

Importantly, for these projects, customers could be reimbursed the full cost of the test well (up to a \$20,000 maximum) if the building ultimately uses a ground source, variable refrigerant flow (VRF), or other air source heat pump-based system as the primary heating and cooling system for the building and successfully participates in BED’s New Construction program, if applicable. Separate from the incentive related to the well drilling, customers pursuing GTHPs would qualify for incentives through BED’s Tier III program.

Based on informal discussions with area contractors, BED estimates that there may be enough interest in pursuing three, possibly four, geo-test wells to determine the viability of a GTHP serving the space conditioning needs of customers in the City. Each test well is expected to cost between \$16,000 to \$25,000.

	2021	2022	2023	Total
Geo Testing wells	\$ 21,250	\$ 21,250	\$ 21,250	\$ 63,750
Admin	\$ 3,750	\$ 3,750	\$ 3,750	\$ 11,250
Subtotal	\$ 25,000	\$ 25,000	\$ 25,000	\$ 75,000

Well-designed and operated GTHP systems (especially when serving well weatherized buildings) can provide high-efficiency central heating and cooling with minimal to no use of fossil fuels as a back-up heating source during extreme cold weather. BED’s Tier III program can incent buildings owners to not use fossil fuel heating systems and BED’s EEU programs can incent both high-efficiency heat pump equipment and enhanced thermal envelopes that will reduce both electric usage and peak demands.

The challenge is that drilling a test well at substantial cost is the only sure way to determine if a site is viable for a GTHP system. This cost barrier is especially acute in Burlington due to the universal availability of natural gas, which decreases the potential benefits of the GTHP versus the normal heating fuel choice. Many customers are not willing to risk the money and current EEU and Tier 3 programs are not structured to absorb the cost of test wells without some assurance that a good number of GTHP installs

will result. Act 151 would give BED the opportunity to let customers and contractors know that there is strong support for GTHP technology, which will hopefully increase the number of contractors available to do test wells and design and install systems. Additionally, increased successful deployment should reduce reluctance to incur the research-related costs. Sharing the research costs with customers for a period of time is a prudent approach to stimulate this market, which can be very beneficial to Vermont's climate action goals.

Program Benefits: Prove viability and increase deployment of GTHP technology in Burlington by reducing the risk for customers to incur large research-related costs without return.

Proposed Program Evaluation Metrics:

As noted, sufficient funding could encourage the development of three, possibly four, GTHPs.

Innovation Focus

Support of DeltaClimeVT Program Activities

BED proposes to use a portion of Act 151 funds to continue its support of the DeltaClimeVT program through both program sponsorship and pilot program awards.

The DeltaClimeVT business accelerator is a Vermont-based program serving startup and seed-stage ventures focusing on climate economy innovation across multiple industries. The program is run in three immersive sprints to help participating companies refine their vision, solidify their strategy, and enable rapid growth.

BED has supported DeltaClimeVT since its inception and believes there is continued merit to doing so pursuant to Act 151. The DeltaClimeVT programs from prior years have resulted in the following pilot projects that would meet the requirements of Act 151:

- BED selected EVmatch to run a pilot project focused on increasing EV charging in multifamily housing. EVMatch is an EV charger software company that enables smart chargers to be reserved and processes financial payments. This project provided 15 charging stations to multifamily housing around Burlington and provided an additional incentive if the charger was made available to the public during the day. Anecdotal information indicates that even at this early stage, this program has positively affected decisions to purchase EVs where, absent charging infrastructure, fossil fuel vehicles might have been purchased instead.

- Continued partnership with Packetized Energy to deploy control devices on electric resistance water heaters and smart EV chargers under the EV Charging rate and expansion of these offerings to include a pilot project of submetering and controls for heat pumps.
- A pilot project in conjunction with BED facilities staff and Medley Thermal to explore the possibility for price-dispatchable electric load in the form of electric boilers located in parallel with fossil fuel boilers. This technology allows for the displacement of fossil fuels when wholesale electric prices are depressed. A demonstration of this technology at BED's Pine Street location is the primary focus for this pilot since company property avoids the rate implications during the pilot phase.
- BED is working on a pilot project in conjunction with VGS staff and WexEnergy to test the thermal savings from WexEnergy's product, Window Skins. This product is a lightweight, transparent, plastic window treatment that increases the insulation of windows. BED will work with VGS to select a building in Burlington for installation of Window Skins and to run measurement and verification analysis to determine the thermal savings achieved. Considering recent building occupancy changes due to COVID-19, BED and VGS are planning to use benchmarking with comparative building types to better understand savings by controlling for occupancy changes that historical data would not be able to achieve.

BED's support for DeltaClimeVT has been shared by the majority of Vermont's other DUs, either directly or through support via their membership in VPPSA. Pilot projects have not only been awarded by BED, DeltaClimeVT has yielded pilot projects for its other sponsors, and in one case for a group of sponsors working together. Being aimed at emerging technologies and startups, activity in this space serves to keep Burlington and Vermont in the forefront on combating climate change and yields tangible new opportunities to achieve GHG reductions.

With the passage of Act 151, BED would like to continue to support DeltaClimeVT for the next three years using funding sourced from EEC funds. The activity under this program is clearly targeted toward GHG reductions. This year's (i.e., 2021) Challenge Statement is expected to be:

"The challenge: to be part of a competitively-selected cohort of startup ventures that reduce greenhouse gas emissions through energy-related products or services for residential and small business customers. Selection will focus on

companies that are currently at a pilot or demonstration stage and planning for scale.”

In the event an awarded pilot project did not meet the specific criteria of Act 151, BED would continue to fund that pilot program from operating funds if it elected to proceed.

Programs	2021	2022	2023	Total
Sponsorship & Pilot funding	\$30,000	\$30,000	\$ 30,000	\$90,000
Admin	\$ -	\$ -	\$ -	\$ -
		\$30,000		
	\$ 30,000	0	\$ 30,000	\$ 90,000

Program Benefits:

This program provides support for early stage, innovative companies to further develop technologies and services aimed at addressing our climate challenges. A secondary benefit is that successful awardees could further enhance economic development opportunities.

Program Metrics:

BED will seek to support between 3 and 6 unique and innovative companies.

Thermal Energy & Process Fuels (TEPF) Proposal

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

BED’s proposed TEPF program is comprised of three main components designed to both continue offering existing traditional services and to also take advantage of two emerging opportunities. The components include:

- Traditional Weatherization Services
- Advanced Manufactured Homes (a/k/a Zero Energy Modular or ZEM)
- District Energy System Development (DES)

Overall TEPF Budget Proposal & Savings Projections

Over the next three-year DRP performance period, BED proposes to invest up to approximately \$1.034 million in the above referenced initiatives, as well as carry over accumulated funds in the TEPF account from the current performance period. Naturally all new funding is contingent upon future net revenues generated from RGGI and the forward capacity market. ⁶

Net Revenue Projections from BED's Participation in FCM & RGGI				3 yr Cum.				3 yr
	2021	2020	2023	Total	2024	2025	2026	Cum.Total
Total Net Revenues	\$ 385,287	\$ 383,997	\$ 265,430	\$ 1,034,714	\$ 180,742	\$ 223,615	\$ 243,670	\$ 648,027
TEPF (proposed)								
TEPF - Traditional Program	\$ 106,350	\$ 107,100	\$ 108,100	\$ 321,550	\$ 109,100	\$ 110,100	\$ 111,100	\$ 330,300
Development & Support Services	\$ 7,650	\$ 7,900	\$ 7,900	\$ 23,450	\$ 7,900	\$ 7,900	\$ 7,900	\$ 23,700
VERMOD	\$ 92,000	\$ 92,000	\$ 92,000	\$ 276,000	\$ 63,742	\$ 92,000	\$ 92,000	\$ 247,742
DES Support	\$ 179,287	\$ 176,997	\$ 57,430	\$ 413,714	\$ -	\$ 13,615	\$ 32,670	\$ 46,285
Total TEPF Budget	\$ 385,287	\$ 383,997	\$ 265,430	\$ 1,034,714	\$ 180,742	\$ 223,615	\$ 243,670	\$ 648,027

At this time, cumulative TEPF savings are anticipated to approach 1455 MMBTUs, assuming BED is able to achieve its traditional weatherization goals and incent up to 2 VERMOD homes annually.

⁶ As noted above, the DPS FCM/RGGI evaluation budget have been removed from Net Revenues available to BED, as are other payments to the State for administering the FCM/RGGI programs. For information related to 2027-2030 forecasted TEPF budgets, please refer to Appendix C.

TEPF Savings (MMBTUs)	2021	2022	2023	3 yr Cum.	2024	2025	2025	3 yr Cum.
				Total				Total
Residential	280	280	280	840	280	280	280	840
Commercial	30	30	30	90	30	30	30	90
VERMOD	175	175	175	525	175	175	175	525
Total MMBTU	485	485	485	1455	485	485	485	1455

Traditional Weatherization Programs

This service focuses on providing non-VGS residential homeowners and businesses with energy audits to identify cost-effective weatherization opportunities and to provide incentives to help pay for eligible work.

BED’s customers can access a number of statewide services and incentives through the following programs:

Home Performance with ENERGY STAR

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

Commercial Building Performance

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

BED projects that there are about 400 homes in the TEPF market. The single-family market is made up of homes that are predominately located in the more affluent Burlington neighborhoods where the properties have been relatively well maintained and updated over the years. The potential for energy efficiency savings in the condominium market is also limited (about 200 units heated mostly by LP-gas) but it too presents challenges as about 35% of the units are rentals. The rental property owner, who does not typically pay the energy bill, and will not benefit from the energy savings, is typically unmotivated to participate. For rentals, BED offers a 50% incentive for eligible weatherization improvements.

BED will promote this service through a variety of channels including direct mailings to property-owners. BED will also promote the service through the regional contractor network.

BED's budget and savings proposals are aggressive when compared to historic results but BED is hopeful that the recent net zero energy city announcement may encourage greater customer participation in the years to come.

Zero Energy Modular Homes (ZEM)

In partnership with VEIC, North Avenue Cooperative ("NAC") and Champlain Housing Trust ("CHT"), BED has been actively promoting ultra-efficient VERMOD homes since 2017. Thus far, three VERMODs have been installed in the NAC. One is owner-occupied; two are currently owned by Green Mountain Habitat for Humanity and will be re-sold in the coming months.



As before, the objective is to provide financial and technical assistance to income qualifying customers seeking to purchase an affordable home for their families, increase housing options and address fuel poverty. The program focuses primarily on the residents of the NAC but we may also provide assistance to other residents living outside of this neighborhood so long as the eligible home complies with the city's zoning ordinances. Participation in the program is thus far limited to only VERMOD homes due to their efficiency relative to HUD compliant manufactured homes. In the future, we may expand product eligibility to include how modular or manufactured homes so long as the efficiency and quality of such homes is equal to or better than the current VERMOD home.

Technology Description

VERMODs are an affordable and superior alternative to HUD compliant mobile homes. They are more energy efficient, durable and can be financed for up to 30 years (as opposed to 20 years for most manufactured homes). VERMODs are constructed under factory – controlled conditions in Wilder, Vermont, and delivered to the home site. Each home is reported to contain insulation levels in the walls (R-43), floor systems (R-40) and roof trusses (R-60) well in excess of code – compliant manufactured homes. VERMODs are built with a great attention to air sealing in order to minimize cold drafts and thermal bridges. Accordingly, the homes are perfect locations for cold climate heat pumps as their primary source of space heating and cooling. In addition, CERV ventilation systems are installed in each Vermod. CERV systems continuously circulate and filter indoor air, as well as deliver fresh air to occupants. Also, they have built-in dehumidifiers which prevent the growth of mold and mildew. More importantly, the homes are designed to reduce energy consumption by as much as 75 percent (or more) relative to HUD compliant homes and can even become net zero energy with the installation of a 7 kW PV

array. And, because VERMODs are electrically heated, home owners are mostly shielded from fossil fuel price inflation and volatility.

Program Objective & Design

The primary purpose of this program is to help income-qualifying residents purchase higher quality, ultra-efficient manufactured homes, like the VERMOD, instead of traditional manufactured homes either used or new. We can accomplish this objective by providing a significant incentive to income eligible homeowners, as further described below. Another objective is to help industry stakeholders increase the quality and number of affordable home product options that can realistically reduce fossil fuel consumption to zero.

Far too often, prospective income-qualifying home buyers are directed toward traditional mobile homes or, worse, old and neglected mobile homes that can be purchased off Craig's lists. These "traditional" home products remain attractive to some prospective home owners because their upfront cost is extremely low. But, these products are inexpensive for a reason. Their construction is inferior relative to other high efficiency manufactured homes, and their weatherization is sub-optimal. In the long run, these products almost always cost our customers much more to heat, cool and maintain. As further explained below, VERMOD homeowners can save money annually even though the upfront purchase is greater than other traditional homes. More importantly, income-qualifying VERMOD homeowners may begin to earn equity in their home and improve their long-term financial stability.

As current residents consider their options to either move to a new location or upgrade their existing NAC home, BED believes there is significant market potential to acquire cost-effective thermal savings based on the VERMOD's efficiency, durability and potential to reduce overall housing costs. Indeed, a majority of the existing NAC homes are old. Many exceed their useful lives and, as a consequence, are expensive to occupy. Based on a review of property assessment data, we estimate that as many as 84 NAC homes are 20 or more years old. All of these older NAC homes could be converted to net zero energy buildings.

But, transforming this market to affordable, net zero energy manufactured homes will take time, persistence, objective customer education and outreach, technical support and, most importantly, investment capital. For these reasons, BED – in partnership with CHT and Green Mountain Habitat for Humanity– intends to continue offering the program well into the foreseeable future or until most NAC homes are converted to high efficiency homes like the VERMOD.

Operating under a memorandum of understanding, CHT will provide – at no cost to BED or the potential homeowners – all loan origination, closing and administrative services on BED’s behalf. BED’s incentive will mirror CHT’s existing Manufactured Housing Down payment Loan program (“MHDP”), which targets households earning at or below 120 percent of the area median income. CHT offers up to \$35,000 as a zero percent (0.00%) interest deferred loan (payable at sale, transfer or refinance of the property, or assumable by the next eligible buyer). Subject to unanticipated budget constraints and annual program evaluation of results, BED shall continue to offer a maximum of \$40,000 per unit incentive. The combined CHT and BED incentive benefits the borrower by reducing the amount of a First Mortgage loan that is needed to purchase the home. CHT and BED loans will be secured with a Second and Third mortgage, respectively. Like CHT’s loan, homeowners will not need to pay back the incentive to BED. Instead, if the homeowner sells the home in the future, BED’s incentive can be assumed by the next income-eligible homeowner so that the home remains relatively affordable in perpetuity. If the next homeowner is income ineligible, the funds shall be paid back to BED without interest.

As before, the number of units for which BED intends to offer financial incentives will be capped per year in accordance with the budget table provided below; although, BED also proposes to retain the option to lift the annual cap so long as the total three year TEPF budget does not exceed the approved budget caps. Assuming that the housing site is suitable and alternative funding sources are available, the program design shall also include an option to install a PV array on the roof of the VERMOD. PV incentives from a third party (VLITE) may be provided for 7W systems or smaller.

Elements of the program design shall also include close collaboration with the North Avenue Cooperative Association, Burlington’s Community and Economic Development Office (CEDO), CVOEO, CHT, VERMOD, Green Mt. Habitat for Humanity and VEIC.

VERMOD Specific TEPF Program Budget

BED anticipates that as eligible homes are installed overtime, more residents will want to upgrade their homes when opportunities arise. In some cases, opportunities may occur when existing homes reach the end of their useful lives and the current resident transfers the land lot to a new resident who wants a better home; other opportunities will occur when existing homes are abandoned and the land lot is taken over by the NAC for redevelopment by Green Mountain Habitat for Humanity or some other organization. Both of these examples are prime market opportunities to encourage adoption of an ultra-efficient manufactured home, such as the VERMOD, and they should not be missed. But in order to make these homes cost competitive relative to traditional homes, as well as to

improve the “bank-ability” of income qualified NAC homebuyers, a substantial incentive will be necessary. Accordingly, BED is seeking approval to carryover \$0.276 million from the last DRP performance period into the 2021 -2023 period. With a \$40,000 per unit incentive, BED anticipates that the program should result in 6 installations and reduce consumption of fossil fuels by as much as 818 MMBTUs.

Year	# of homes	per unit		per unit		Total MMBTU	
		incentive	Admin Cost	Total Budget	Savings		
2021	2	\$ 40,000	\$ 6,000	\$ 92,000	273		
2022	2	\$ 40,000	\$ 6,000	\$ 92,000	273		
2023	2	\$ 40,000	\$ 6,000	\$ 92,000	273		
3 yr cumulative total					\$ 276,000		818

Key assumptions and Cost Effectiveness

- Base cost of 14 by 60 ft double wide Manufactured home unit does not exceed \$145,000 (Resale value of a Green Mtn Habitat for Humanity home), about \$89,000 more than a traditional HUD compliant home;
- Champlain Housing Trust interest deferral of no less than \$35,000;
- BED incentive of \$40,000 per home; and, additional overhead costs do not exceed \$6,000;
- Energy (MMBTUs) savings of 75 to 100 percent or more;
- PV incentive program is fully funded over the three-year planning period;
- PV installation costs do not exceed \$2.25 per watt;
- PV incentives to income qualified residents are no less than \$1.45 per watt;
- 1300 kWh/kW solar production;
- VERMOD energy loads do not exceed 23 MMBTUs annually;
- VERMOD achieves Net Zero Energy with PV installation;
- 2.2 percent annual fossil fuel inflation, 0.5 percent electric price inflation ;
- 30 year term, 4.00% financing for VERMOD, compared to 20 years for HUD compliant manufactured home.
- 3.0 percent discount rate

Assuming the above assumptions hold over time, BED estimates that the program will yield positive societal net benefits using the 2018/19 state cost effectiveness screening tool. Indeed, the benefit cost ratio ranges from 1.08 to 1.60 for low income households.

Benefit-Cost Ratio	PV of Net Benefits	Measure Name	Installed Cost (2018\$)	Fuel Type:	Fossil Fuel Consumption Change (MMBtu/yr)
1.37	\$28,089	ZEM - No PV	\$89,000	Residential Space heat	-136
1.08	\$6,343	ZEM - no PV	\$89,000	Residential Space heat	-136
1.60	\$46,118	ZEM - 4 kW	\$89,000	Residential Space heat	-136
1.32	\$24,372	ZEM - 4kW	\$89,000	Residential Space heat	-136
1.60	\$46,312	ZEM - 7kW	\$89,000	Residential Space heat	-136
1.32	\$24,566	ZEM - 7 kW	\$89,000	Residential Space heat	-136

Customer Economics

VERMOD's and other ultra-efficient manufactured homes cost more than traditional manufactured and mobile homes. Depending on the make, model and site conditions, the incremental cost of a VERMOD could range between \$50,000 and \$125,000. For purposes of this analysis, we set the incremental cost of the VERMOD at \$89,000. For this analysis, the incremental costs represent the difference between a traditional double-wide, HUD compliant home, measuring 14' by 60', and a comparably sized VERMOD. While some other VERMODs may be more expensive, Green Mt. Habitat for Humanity is reselling the two units currently under-construction in the NAC for \$145,000. The reason for the lower price of these units relative to the price of VERMODs sold in other mobile home parks is that the Green Mt. Habitat's model for reselling homes is predicated on volunteer labor to complete home construction.

Due to the higher incremental cost of efficient manufactured homes, BED believes that a substantial incentive is necessary to increase the cost competitiveness of eligible homes. Accordingly, BED proposes to continue providing income qualified buyers with a maximum incentive of \$40,000 per unit until further notice, as noted above. Meanwhile, the Champlain Housing Trust (CHT) will also provide eligible homebuyers a \$35,000 "silent second" mortgage. CHT loans are offered at 0.00% interest, and all payments are deferred until the property is sold, transferred, or refinanced. The loans are also assumable, which allows the next home buyer to take advantage of this loan if they meet the program qualifications. Combined, BED's incentive and CHT's silent mortgage make these types of efficient homes more affordable on an annual basis, after accounting for energy savings, than a HUD complaint home.

As the table below highlights, the monthly cost (principal, interest, taxes, insurance & NAC fees) of a VERMOD is slightly more than a HUD compliant manufactured home (\$45/month to \$150/month). Increased costs are due to higher capital costs, insurance and real estate taxes. However, once energy costs are factored into a resident's total housing expense, VERMOD home owners who elect to install a 4 kW PV could achieve annual savings of approximately \$1,200. If solar is installed, the units could essentially result in

zero net energy bills at the end of 12 months, which would greatly improve housing affordability as well as stabilize a resident's energy bills over the longer term. With a 7 kW array installed, VERMOD homeowners could save as much as \$1,800 annually relative to a HUD compliant manufactured home. It is important to note that solar incentives are contingent on the availability of grant funds from VLITE. Even if solar is not installed, the total cost (PITI and energy costs) of home ownership is still \$44 a month less than a HUD compliant home. Such savings may even be higher as the analysis below excludes maintenance costs. If the VERMOD is unable to attain cost parity with existing new housing alternatives, it is highly likely that residents will continue to purchase less efficient homes.

Customer Economics				
	Code compliant Manuf. Home	VERMOD w/oPV	VERMOD w 4 kW PV	VERMOD w/7 kWPV
Base Cost	\$ 56,000	\$ 145,000	\$ 145,000	\$ 145,000
Vt Sales Tax	\$ 3,360	\$ 5,220	\$ 5,220	\$ 5,220
Site work	\$ 9,500	\$ 9,500	\$ 9,500	\$ 9,500
Delivery/Crane set up	\$ 5,000	\$ 10,000	\$ 10,000	\$ 10,000
PV Cost	\$ -	\$ -	\$ 9,000	\$ 15,750
Total Cost	\$ 73,860	\$ 169,720	\$ 178,720	\$ 185,470
Solar Incentive	\$ -	\$ -	\$ (5,800)	\$ (10,150)
BED Incentive	\$ -	\$ (40,000)	\$ (40,000)	\$ (40,000)
CHT Interest deferral	\$ (27,500)	\$ (35,000)	\$ (35,000)	\$ (35,000)
Final Cost	\$ 46,360	\$ 94,720	\$ 97,920	\$ 100,320
Downpayment	\$ 4,636	2500	2500	\$ 2,500
Interest Rate	6.50%	4.00%	4.00%	4.00%
Term (yrs)	20	30	30	\$ 30
Monthly Mortgage Payment	\$311	\$440	\$456	\$467
No.A Coop fee	393	393	393	393
Real Estate Tax	123	174	174	174
Insurance	50	60	60	60
Total PITI	\$ 877	\$ 1,067	\$ 1,083	\$ 1,094
Incremental costs		\$ 190	\$ 206	\$ 217
Energy Cost				
Total MMBTU Loads	136.31	38.22	38.22	38.22
PV MMBTU Offset	0	0	18	31
Net Energy Loads	136.31	38.22	20.29	6.84
Avg. Mo. Energy Bills	\$ 370	\$ 135	\$ 70	\$ -
Mo. PITI and Avg. Energy cost	\$ 1,247	\$ 1,203	\$ 1,153	\$ 1,094
Incremental Monthly Savings		\$ (44)	\$ (94)	\$ (153)

Marketing & Outreach

BED’s marketing campaign will focus primarily on providing prospective buyers and stakeholders with objective information about the various benefits of owning a VERMOD or another similar product. Such benefits include but are not limited to:

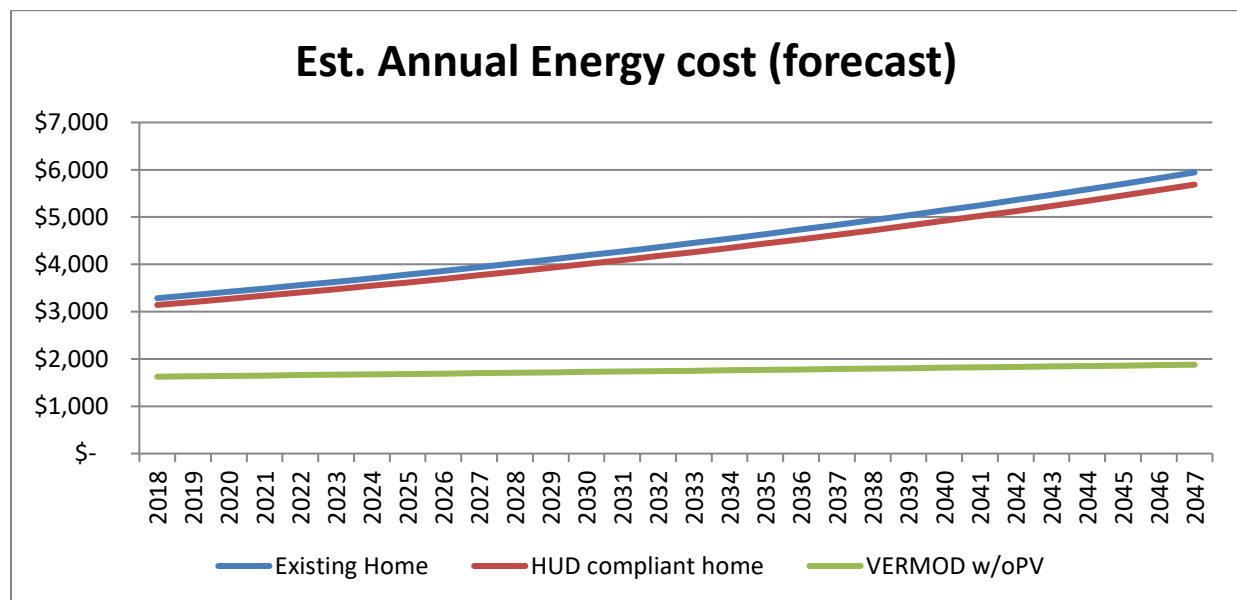
- Increased comfort, health and safety;
- Opportunity to build home equity;
- Reduced home maintenance costs; and,
- Lower energy bills.

However, the main point of providing this type of information is to demonstrate how VERMOD owners can save money in the long run and shield themselves from fossil fuel price inflation and volatility, as shown in the graph below.

Stakeholders in this project will also include:

- North Avenue Cooperative Association
- VERMOD manufacturing
- Champlain Housing Trust (Loan Program and Home Education Program)
- Green Mountain Habitat for Humanity
- VEIC

BED expects to work closely with the above stakeholders to maximize our collective outreach efforts to fully inform NAC residents of their options to buy a VERMOD. An important aspect of BED’s outreach will be to incorporate CHT’s consumer education programs. These programs help ensure that prospective buyers are well informed about their mortgage option and how to manage their household budgets.



Implementation/Action plan

If the budget is renewed, BED will continue working with its stakeholder network to further promote ultra-efficient manufactured homes in the NAC. Such efforts will include but not be limited to on-site energy coaching visits, occasionally attending NAC board meetings and presenting the benefits of efficient homes and jointly marketing the program with VEIC, CHT, Green Mt Habitat and others. BED also will continue to work with the Department to develop an effective evaluation strategy, when appropriate.

District Energy System Development

30 V.S.A. §209(e.)(1) states that the Commission

... may authorize an entity appointed to deliver such services under subdivision (d)(2)(B) of this section to use monies subject to this subsection for the engineering, design, and construction of facilities for the conversion of thermal energy customers using fossil fuels to district heat if the majority of the district's energy is from biomass sources, the district's distribution system is highly energy efficient, and such conversion is cost effective.

In accordance with the above referenced statute, BED requested and received authorization to reserve up to \$1.254 million in TEPF funds during the current performance period for the purposes of designing, engineering and/or constructing facilities capable of converting natural gas customers to a future district heating system or systems. In this proceeding, BED is requesting to rollover existing TEPF funds that have accumulated in the fiscal agent's account, and to continue setting aside additional funds over the next three year performance period, for the DES. Of the funds that have been collected for the DES project, thus far, only \$5,100 has been dispersed for engineering feasibility work.

Since filing the 2018 – 2020 Triennial plan, BED has engaged multiple stakeholders including potential customers, DES consultants, VGS, public institutions, private companies and other interested citizens to fully evaluate the net benefits of a proposed district energy system. After screening multiple proposals, BED and the City selected a DES consultant – Corix Utilities, Inc. – to develop an in-depth plan with the intention of moving the DES from a concept to an actionable implementation plan. The agreement with Corix covered these activities, as well as the period through the execution of agreements that would have led to a detailed engineering study and final DES cost estimates.

As noted in the 2018 – 2020 DRP, Corix was hired to develop a three-part DES action plan, prepare initial estimates, and draft customer agreements for a potential DES. The study started by evaluating whether a DES could be economically feasible in Burlington.

Corix examined the net benefits of various heat sources (i.e. McNeil and the wastewater treatment facility) and various underground service routes. These efforts, which were built on the work of previous studies, included the development of models for designing, building, financing, owning, and operating a large DES serving the University of Vermont Medical Ctr. (“UVMCMC”), select UVM buildings, the Burlington Town Center and other Burlington buildings located in the City’s downtown core district.

Corix’s work included an assessment of whether the cost of DES provided heat could be cost competitive with a customer’s existing heating service, including operating and maintaining new and existing boilers. Draft contracts (“Letters of Intent”) committing potential customers to underwrite the cost of a needed detailed engineering and cost study were prepared and reviewed with customers. The next step in the DES project, which was never completed, would have been the performance of a more detailed engineering and construction study. Such a study would have helped BED and other DES supporters to move forward with final contracting discussions with prospective customers for thermal services and, accordingly, would have allowed for the construction of the system.

As part of the work that was completed, Corix provided potential customers with prospective, individual DES service rates that were intended to be competitive with their existing heating costs. Corix’s proposed DES would have required potential customers to incur additional operating risks to connect with the hot water DES system, and potentially incur additional costs to maintain conventional heating systems. However, Corix’s proposed hot water based system and terms were not ultimately accepted by potential customers, and BED was unable to secure LOI commitments to underwrite the aforementioned detailed engineering analyses. Therefore, the detailed engineering specifics and final contracting have not occurred. Accordingly, BED elected not to renew its consulting contract with Corix (and at the same time Corix’ exclusivity rights also expired).

Despite these past challenges, the DES project has not been terminated. BED is now engaged with Vermont Gas and Evergreen Energy to evaluate the merits, viability and cost-effectiveness of a streamlined and modified DES. This new proposed DES would be based on steam rather than hot water, and serve – at least, initially – a smaller subset of customers located closer to the McNeil plant than Corix’s design had envisioned. Senior management at the UVM Medical Center and UVM remain actively engaged in these discussions. Although BED is presently unsure whether the newly revised DES design will be able to compete with natural gas prices, we remain hopeful that climate conscious customers will determine that our proposed DES will still be an economic means to decarbonize a significant portion of their heating loads. Also, the current proposed system

would likely reduce some of the risk associated with the customer's conversion costs relative to Corix's DES design, since they would not need to retrofit their existing heating plant to accept hot water. Moreover, the smaller footprint of the new DES – which would serve the UVMMC and potentially select nearby UVM buildings – reduces the capital cost for building the DES relative to the potential thermal sales we expect the new DES to serve.

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

BED is now in the process of applying for \$200,000 in grant funding from the Future Forest Economy Initiative to help underwrite the aforementioned detailed engineering analysis in combination with funds from BED and its partners. We anticipate total costs for the revised DES will be approximately \$400,000 to perform the necessary detailed engineering estimates and associated work. Completing this critical analysis is imperative because potential customers, who want to reduce their carbon footprint, need to also have detailed engineering costs and the resulting thermal energy price estimates that are firm enough to feel comfortable entering into binding contracts for thermal energy. Without first obtaining these detailed engineering cost estimates based on the revised DES proposal, BED will be unable to secure letters of intent from potential customers, nor would we be able to enter into additional DES related engineering service contracts. And, absent such customer commitments, it would be impossible to secure funds or financing to commence DES construction. Our intent is to complete the detailed engineering analysis, and update the thermal energy prices for potential customers in 2020.

Once this is completed, BED, its partners and potential DES customers will reconsider the available options and determine whether further developing a DES in Burlington is a prudent course of action. If the analyses demonstrate that a DES could reliably and cost effectively serve and de-carbonize the heating needs of our select customers and those customers enter into letters of intent to continue to support the development of the DES, BED will continue to invest those funds allocated to the DES in additional measures to convert customers from natural gas to the DES.

Estimated overall capital costs for the revised steam based system are on the order of \$16.2 to \$22.4 million. Estimated customer conversion costs for the revised DES could amount to \$2.6 million of this amount. As we expected, both of these values are materially lower than Corix's proposal.

As noted above, BED is seeking authorization, in accordance with 30 V.S.A. §209(e.)(1), to rollover existing TEPF funds that have accumulated in the fiscal agent’s account for the DES, and to continue setting aside additional funds over the next three year performance period for the same purposes. If the new analyses demonstrate that the DES is cost ineffective and customers do not make a commitment to participate in a future DES, BED will notify the Commission of its intent to cease DES planning and return the remaining TEPF funds that have been allocated to the DES or propose another cost effective program.

TEPF Development & Support Services Proposal

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

Below is BED’s proposed electric DSS spending for the 2021-2023 and 2024-2026 performance periods: ⁷

TEPF DSS Budget	2021	2022	2023	3 yr Cum. Total	2024	2025	2026	3 yr Cum. Total
Education & Training	\$ 2,275	\$ 2,300	\$ 2,300	\$ 6,875	\$ 2,300	\$ 2,300	\$ 2,300	\$ 6,900
Applied R&D	\$ 250	\$ 300	\$ 300	\$ 850	\$ 300	\$ 300	\$ 300	\$ 900
Planning & Reporting	\$ 1,650	\$ 1,700	\$ 1,700	\$ 5,050	\$ 1,700	\$ 1,700	\$ 1,700	\$ 5,100
Evaluation	\$ 400	\$ 400	\$ 400	\$ 1,200	\$ 400	\$ 400	\$ 400	\$ 1,200
Policy & Public Affairs	\$ 350	\$ 400	\$ 400	\$ 1,150	\$ 400	\$ 400	\$ 400	\$ 1,200
Information Tech	\$ 375	\$ 400	\$ 400	\$ 1,175	\$ 400	\$ 400	\$ 400	\$ 1,200
General	\$ 2,350	\$ 2,400	\$ 2,400	\$ 7,150	\$ 2,400	\$ 2,400	\$ 2,400	\$ 7,200
Total	\$ 7,650	\$ 7,900	\$ 7,900	\$ 23,450	\$ 7,900	\$ 7,900	\$ 7,900	\$ 23,700

The TEPF DSS proposed budget will support the following activities:

Education and Training

⁷ For TEPF DSS costs through 2030, please refer to Appendix D.

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

Applied Research and Development

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

Planning and Reporting

This work includes BED's responsibility to provide the Board with detailed 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:

- DSM Annual Report- submitted each spring
- BED Monthly and Quarterly Reports
- Periodic Ad hoc reporting requests

Evaluation

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

Policy and Public Affairs

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

Information Technology (IT)

BED's IT activities mainly 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.

Rate and Bill Impact Analysis

The Commission’s process⁸ requires BED to submit an estimate of the rate and bill impacts resulting from an approved demand resource plan. This analysis was originally performed by the Department’s consultants; GDS Associates and Cadmus (“Department consultants”). It measures only the impacts of traditional electric MWh savings and electric resource acquisition, DSS and EM&V budgets. Subsequent to the submission of the original impact analysis study, Senate bill 337 was enacted on September 23, 2020. Shortly after passage, BED proposed to increase its overall efficiency budget by \$720,000 to fund the proposed Act 151 programs and activities described above. In the section below, BED provides the results of the original rate and bill impact study and the potential short term impacts of increasing the overall budget to include Act 151 program support.

The results of the Department consultant’s original impact analysis are shown in the table below.⁹ These results assume that BED continues to annually acquire MWh savings equal to the so-called program achievable scenario over the next 20 years and that its traditional efficiency programs are appropriately funded at the levels shown in Appendix A, below. It does not include any Act 151 expenditures.

	Rates 2021 - 2040	Average Bill Impacts
Residential	3.5%	-0.9%
Commercial	3.4%	-7.7%
All Customers	3.4%	-6.0%

As shown in the table above, traditional energy efficiency savings and budgets are forecasted to result in average rates that are 3.4 percent higher than they are today over the next 20 years. Similarly, customer bills, on average, are expected to be 6 percent lower. This analysis does not take into account savings and spending that have occurred in the past. If such historical savings and spending were included, then the rate impacts would have been lower than shown above and the bill savings greater.

⁸ See the Process & Administration document, November 2019.

⁹ The rate & bill impact analysis is further described in GDS/CADMUS’s report “Vermont Energy Efficiency Market Potential Study” filed by the DPS on November 6, 2019 via ePUC in Case No. 19-3272-PET.

Using the Department consultant’s rate and bill spreadsheet tools, BED recreated the above summary table to include additional Act 151 expenditures. The results are highlighted below:

	Rates	2021 - 2040	Average Bill Impacts
Residential		3.53%	-0.86%
Commercial		3.49%	-7.58%
All Customers		3.50%	-5.47%

The above results indicate that increasing the overall energy efficiency budget by \$720,000 over the next three years would increase rate pressure over the next 20 years by 0.10%, and lower ratepayer benefits (i.e. bill impacts) by 0.53%. The changes in rate and bill impacts relative to the original impact study assume BED spends the full \$720,000 in three years and that Act 151 expenditures amount to no more than \$240,000 for each of the next three years. BED’s recreated analysis does not, however, include any additional customer or societal benefits associated with the proposed Act151 programs at this time. In essence, the forecasted impacts shown above represent a worst case scenario. Naturally, the rate and bill impacts are expected to be more acute during the 2021 – 2023 performance period than is shown in the table immediately above due to the timing of spending in the near term and accumulation of MWh savings. Those shorter term impacts are highlighted below:

Average Rate impacts only	2021	2022	2023
Residential	5.84%	5.51%	5.52%
Commercial	5.90%	5.60%	5.50%
All Customers	5.88%	5.58%	5.50%

Average Bill Impacts Only	2021	2022	2023
Residential	4.34%	3.40%	2.82%
Commercial	4.21%	2.44%	0.92%
All Customers	4.25%	2.68%	1.39%

As the proposed Act 151 spending winds down, the impacts of such spending will begin to converge in the direction noted in the above longer term table, meaning that adverse rate impacts will diminish and bill savings will improve for all customers.

Appendices

Appendix A: Proposed 20 year Electric RA Budgets and Savings Goals (MWh and MW), combined with ACT 151 program expenditures for the 3 year period ending 2023 and DPS Evaluation and Other EEU Costs

Ann. Incremental										
Budget	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Incentives	273,688	259,826	329,704	294,433	295,277	273,213	273,270	277,194	255,064	252,048
Admin	289,785	281,531	227,116	210,311	202,750	183,867	183,433	184,098	173,726	173,396
Total Res	\$ 563,473	\$ 541,358	\$ 556,821	\$ 504,744	\$ 498,027	\$ 457,080	\$ 456,702	\$ 461,292	\$ 428,789	\$ 425,444
Incentive	1,137,539	1,099,618	1,128,870	1,028,353	998,977	912,464	911,674	921,184	835,872	830,497
Admin	552,881	524,454	541,592	485,880	495,105	458,775	458,433	462,693	450,496	445,835
Total Com	\$ 1,690,420	\$ 1,624,073	\$ 1,670,462	\$ 1,514,232	\$ 1,494,082	\$ 1,371,239	\$ 1,370,107	\$ 1,383,877	\$ 1,286,368	\$ 1,276,332
Act 151 Programs	\$ 240,000	\$ 235,000	\$ 230,000							
Act 151 EMV	\$ -	\$ -	\$ 15,000							
Total	\$ 2,493,894	\$ 2,400,430	\$ 2,472,282	\$ 2,018,976	\$ 1,992,109	\$ 1,828,319	\$ 1,826,809	\$ 1,845,169	\$ 1,715,157	\$ 1,701,776

Ann. Incremental										
Budget	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Incentives	272,594	272,045	250,874	240,707	247,552	398,597	381,943	359,514	336,661	320,314
Admin	184,682	185,475	175,625	170,030	174,219	271,743	260,809	249,668	236,422	225,100
Total Res	\$ 457,276	\$ 457,520	\$ 426,499	\$ 410,737	\$ 421,772	\$ 670,340	\$ 642,752	\$ 609,182	\$ 573,083	\$ 545,414
Incentive	895,874	896,531	801,132	785,933	816,650	1,351,859	1,309,621	1,235,971	1,166,906	1,108,335
Admin	475,953	476,029	478,365	446,279	448,665	659,161	618,636	591,576	552,343	527,906
Total Com	\$ 1,371,827	\$ 1,372,561	\$ 1,279,497	\$ 1,232,212	\$ 1,265,315	\$ 2,011,019	\$ 1,928,257	\$ 1,827,546	\$ 1,719,249	\$ 1,636,241
Total	\$ 1,829,102	\$ 1,830,081	\$ 1,705,996	\$ 1,642,950	\$ 1,687,087	\$ 2,681,359	\$ 2,571,009	\$ 2,436,728	\$ 2,292,332	\$ 2,181,655

Department Evaluation & Other EEU				3 yr Cum.				3 yr Cum.
Costs	2021	2020	2023	Total	2024	2025	2026	Total
Fiscal Agent (inc: court reporter share)	\$ 2,850	\$ 2,907	\$ 2,965	\$ 8,722	\$ 3,024	\$ 3,085	\$ 3,147	\$ 9,256
Annual EEU Fund Audit	\$ 1,300	\$ 1,326	\$ 1,353	\$ 3,979	\$ 1,380	\$ 1,407	\$ 1,435	\$ 4,222
Triennial Independent Audit	\$ 1,425	\$ 1,454	\$ 1,483	\$ 4,361	\$ 1,512	\$ 1,542	\$ 1,573	\$ 4,628
DPS Evaluation (Traditional EEU)	\$ 61,979	\$ 41,975	\$ 20,194	\$ 124,148	\$ 21,010	\$ 86,981	\$ 62,807	\$ 170,798
DPS Evaluation (Act 151)	\$ -	\$ -	\$ 15,000	\$ 15,000	\$ -	\$ -	\$ -	\$ -
Total Proposed Budget	\$ 67,554	\$ 47,662	\$ 40,994	\$ 156,210	\$ 26,926	\$ 93,016	\$ 68,962	\$ 188,904
TOTAL DRP BUDGET	\$ 2,729,291	\$ 2,619,192	\$ 2,672,877	\$ 8,021,359	\$ 2,224,103	\$ 2,267,024	\$ 2,082,981	\$ 6,574,109

2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
\$ 3,210	\$ 3,274	\$ 3,339	\$ 3,406	\$ 3,474	\$ 3,544	\$ 3,614	\$ 3,687	\$ 3,761	\$ 3,836	\$ 3,912	\$ 3,991	\$ 4,071	\$ 4,152
\$ 1,464	\$ 1,493	\$ 1,523	\$ 1,554	\$ 1,585	\$ 1,616	\$ 1,649	\$ 1,682	\$ 1,715	\$ 1,750	\$ 1,785	\$ 1,820	\$ 1,857	\$ 1,894
\$ 1,605	\$ 1,637	\$ 1,670	\$ 1,703	\$ 1,737	\$ 1,772	\$ 1,807	\$ 1,843	\$ 1,880	\$ 1,918	\$ 1,956	\$ 1,995	\$ 2,035	\$ 2,076
\$ 21,430	\$ 88,721	\$ 64,063	\$ 65,280	\$ 85,403	\$ 67,434	\$ 68,718	\$ 89,285	\$ 71,000	\$ 72,354	\$ 93,378	\$ 74,774	\$ 76,202	\$ 97,694
\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
\$ 27,708	\$ 95,125	\$ 70,595	\$ 71,943	\$ 92,199	\$ 74,366	\$ 75,788	\$ 96,497	\$ 78,356	\$ 79,857	\$ 101,031	\$ 82,580	\$ 84,164	\$ 105,816

Ann. Incremental MWh savings	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	761	748	748	684	680	633	625	606	554	539
Commercial	3,986	3,784	3,910	3,512	3,584	3,327	3,327	3,361	3,278	3,246
Total	4,748	4,532	4,657	4,196	4,264	3,960	3,952	3,967	3,832	3,785

Ann. Incremental MWh savings	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Residential	568	562	507	484	504	786	743	687	623	578
Commercial	3,466	3,468	3,486	3,255	3,273	4,807	4,517	4,323	4,042	3,866
Total	4,034	4,029	3,993	3,739	3,777	5,594	5,261	5,010	4,664	4,444



BED Summer - Ann. Incremental Peak Demand Savings (MWs)										
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	0.09	0.08	0.08	0.07	0.07	0.06	0.06	0.05	0.04	0.04
Commercial	0.51	0.47	0.47	0.42	0.43	0.40	0.39	0.40	0.35	0.35
Total	0.60	0.56	0.55	0.49	0.49	0.46	0.45	0.45	0.40	0.39
	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Residential	0.04	0.04	0.03	0.02	0.03	0.06	0.05	0.05	0.03	0.03
Commercial	0.40	0.40	0.50	0.44	0.42	0.65	0.61	0.56	0.53	0.50
Total	0.44	0.43	0.53	0.46	0.44	0.71	0.66	0.61	0.56	0.52

BED Winter - Ann. Incremental Peak Demand Savings (MWs)										
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residential	0.12	0.12	0.11	0.11	0.11	0.10	0.10	0.10	0.09	0.09
Commercial	0.56	0.53	0.55	0.50	0.50	0.46	0.46	0.47	0.47	0.47
Total	0.68	0.65	0.66	0.60	0.61	0.56	0.56	0.57	0.56	0.56
	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Residential	0.10	0.10	0.09	0.09	0.09	0.13	0.13	0.12	0.11	0.11
Commercial	0.50	0.50	0.48	0.45	0.46	0.65	0.61	0.59	0.55	0.52
Total	0.60	0.60	0.57	0.54	0.55	0.79	0.74	0.71	0.66	0.63

Appendix B: Proposed 20 year Electric DSS Budgets (2021- 2040)

	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2021-2023</u>	<u>2024</u>	<u>2025</u>	<u>2026</u>	<u>2024-2026</u>	<u>2027</u>	<u>2028</u>	<u>2029</u>	<u>2030</u>
Education & Training	\$32,640	\$33,300	\$33,900	\$99,840	\$34,500	\$35,100	\$35,800	\$105,400	\$36,600	\$37,400	\$38,200	\$39,000
Applied Research & Development	\$8,000	\$8,200	\$8,400	\$24,600	\$8,600	\$8,800	\$9,000	\$26,400	\$9,200	\$9,400	\$9,600	\$9,800
Planning and Reporting	\$46,733	\$47,600	\$48,600	\$142,933	\$49,700	\$50,800	\$51,900	\$152,400	\$53,000	\$54,100	\$55,200	\$56,300
Evaluation	\$17,000	\$17,300	\$17,700	\$52,000	\$18,100	\$18,500	\$18,900	\$55,500	\$19,300	\$19,700	\$20,100	\$20,500
Policy and Public Affairs	\$7,470	\$7,600	\$7,800	\$22,870	\$8,000	\$8,200	\$8,400	\$24,600	\$8,600	\$8,800	\$9,000	\$9,200
Information Technology	\$11,000	\$11,200	\$11,400	\$33,600	\$11,600	\$11,800	\$12,000	\$35,400	\$12,200	\$12,400	\$12,600	\$12,900
General Administration - Non-Program Specific	\$45,000	\$45,900	\$46,800	\$137,700	\$47,700	\$48,700	\$49,700	\$146,100	\$50,700	\$51,700	\$52,700	\$53,800
Total	\$167,843	\$171,100	\$174,600	\$513,543	\$178,200	\$181,900	\$185,700	\$545,800	\$189,600	\$193,500	\$197,400	\$201,500

	<u>2031</u>	<u>2032</u>	<u>2033</u>	<u>2034</u>	<u>2035</u>	<u>2036</u>	<u>2037</u>	<u>2038</u>	<u>2039</u>	<u>2040</u>	<u>2021-2040</u>
Education & Training	\$39,800	\$40,600	\$41,400	\$42,200	\$43,000	\$43,800	\$44,600	\$45,400	\$46,200	\$47,100	\$790,540
Applied Research & Demonstration	\$10,000	\$10,200	\$10,400	\$10,600	\$10,800	\$11,000	\$11,200	\$11,400	\$11,600	\$11,800	\$198,000
Planning and Reporting	\$57,400	\$58,500	\$59,600	\$60,800	\$62,000	\$63,300	\$64,600	\$65,900	\$67,200	\$68,500	\$1,141,733
Evaluation	\$20,900	\$21,300	\$21,700	\$22,100	\$22,500	\$22,900	\$23,300	\$23,700	\$24,100	\$24,500	\$414,100
Policy and Public Affairs	\$9,400	\$9,600	\$9,800	\$10,000	\$10,200	\$10,400	\$10,600	\$10,800	\$11,000	\$11,200	\$186,070
Information Technology	\$13,200	\$13,500	\$13,800	\$14,100	\$14,400	\$14,700	\$15,000	\$15,300	\$15,600	\$15,900	\$264,600
General Administration - Non-Program Specific	\$54,900	\$56,000	\$57,100	\$58,200	\$59,400	\$60,600	\$61,800	\$63,000	\$64,300	\$65,600	\$1,093,600
Total	\$205,600	\$209,700	\$213,800	\$218,000	\$222,300	\$226,700	\$231,100	\$235,500	\$240,000	\$244,600	4,088,643

Appendix C – 10 year TEPF Budget (RA & DSS) and Savings Goals

Net Revenue Projections from BED's Participation in FCM & RGGI				3 yr Cum.				3 yr				
	2021	2020	2023	Total	2024	2025	2026	Cum.Total	2027	2028	2029	2030
Total Net Revenues	\$ 385,287	\$ 383,997	\$ 265,430	\$ 1,034,714	\$ 180,742	\$ 223,615	\$ 243,670	\$ 648,027	\$ 505,192	\$ 505,192	\$ 505,192	\$ 505,192
TEPF (proposed)												
TEPF - Traditional Program	\$ 106,350	\$ 107,100	\$ 108,100	\$ 321,550	\$ 109,100	\$ 110,100	\$ 111,100	\$ 330,300	\$ 111,100	\$ 111,100	\$ 111,110	\$ 111,100
Development & Support Services	\$ 7,650	\$ 7,900	\$ 7,900	\$ 23,450	\$ 7,900	\$ 7,900	\$ 7,900	\$ 23,700	\$ 7,900	\$ 7,900	\$ 7,900	\$ 7,900
VERMOD	\$ 92,000	\$ 92,000	\$ 92,000	\$ 276,000	\$ 63,742	\$ 92,000	\$ 92,000	\$ 247,742	\$ 92,000	\$ 92,000	\$ 92,000	\$ 92,000
DES Support	\$ 179,287	\$ 176,997	\$ 57,430	\$ 413,714	\$ -	\$ 13,615	\$ 32,670	\$ 46,285			\$ -	\$ -
Total TEPF Budget	\$ 385,287	\$ 383,997	\$ 265,430	\$ 1,034,714	\$ 180,742	\$ 223,615	\$ 243,670	\$ 648,027	\$ 211,000	\$ 211,000	\$ 211,010	\$ 211,000
TEPF Savings (MMBTUs)				3 yr Cum.				3 yr Cum.				
	2021	2022	2023	Total	2024	2025	2026	Total	2027	2028	2029	2030
Residential	280	280	280	840	280	280	280	840	280	280	280	280
Commercial	30	30	30	90	30	30	30	90	30	30	30	30
VERMOD	175	175	175	525	175	175	175	525	175	175	175	175
Total MMBTU	485	485	485	1455	485	485	485	1455	485	485	485	485

Appendix D – Proposed 10 year TEPF DSS Budgets (2021-2030)

Years	2021	2022	2023	2021-2023	2024	2025	2026	2024-2026	2027	2028	2029	2030	2021-2030
<i>Education & Training</i>	\$2,275	\$2,300	\$2,300	\$6,875	\$2,300	\$2,300	\$2,300	\$6,900	\$2,300	\$2,300	\$2,300	\$2,300	\$22,975
<i>Applied R&D</i>	\$250	\$300	\$300	\$850	\$300	\$300	\$300	\$900	\$300	\$300	\$300	\$300	\$2,950
<i>Planning and Reporting</i>	\$1,650	\$1,700	\$1,700	\$5,050	\$1,700	\$1,700	\$1,700	\$5,100	\$1,700	\$1,700	\$1,700	\$1,700	\$16,950
<i>Evaluation</i>	\$400	\$400	\$400	\$1,200	\$400	\$400	\$400	\$1,200	\$400	\$400	\$400	\$400	\$4,000
<i>Policy and Public Affairs</i>	\$350	\$400	\$400	\$1,150	\$400	\$400	\$400	\$1,200	\$400	\$400	\$400	\$400	\$3,950
<i>IT</i>	\$375	\$400	\$400	\$1,175	\$400	\$400	\$400	\$1,200	\$400	\$400	\$400	\$400	\$3,975
<i>General Administration</i>	<u>\$2,350</u>	<u>\$2,400</u>	<u>\$2,400</u>	<u>\$7,150</u>	<u>\$2,400</u>	<u>\$2,400</u>	<u>\$2,400</u>	<u>\$7,200</u>	<u>\$2,400</u>	<u>\$2,400</u>	<u>\$2,400</u>	<u>\$2,400</u>	<u>\$23,950</u>
<i>Total DSS TEPF</i>	\$7,650	\$7,900	\$7,900	\$23,450	\$7,900	\$7,900	\$7,900	\$23,700	\$7,900	\$7,900	\$7,900	\$7,900	\$78,750

Appendix E – Quantified Performance indicators Electric and TEPF (2nd revision)

QPI#	Title	Indicator	2021 - 2023 Target	2024 - 2016 Target	Policy Goal Advanced	Weighting (%)
1	Total Resource Benefits	Present worth of lifetime electric, fossil, and water benefits	\$14,354,750	\$12,793,064	Encourage EEU's to design and implement efficiency initiatives that will maximize the lifetime electric, fossil fuel, and water benefits	25
2	Electricity Savings	Annual incremental net MWh expected savings	13,937	12,420	Annual incremental MWh savings indicator intended to encourage EEU's to design and implement efficiency initiatives that will maximize annual incremental electrical energy savings	30
3	Summer Peak Demand Savings (MW)	Cumulative net summer peak demand expected savings	1.8	1.5	Cumulative summer peak demand savings indicator is intended to encourage EEU's to design and implement efficiency initiatives that will maximize the capacity reduction coincident with summer demand.	17
4	Winter Peak Demand Savings (MW)	Cumulative net winter peak demand expected savings	2.1	1.9	Cumulative winter peak demand savings indicator is intended to encourage EEU's to design and implement efficiency initiatives that will maximize the capacity reduction coincident with winter demand.	14
5	Weighted Lifetime MWh Savings	Cumulative Lifetime MWh Savings	160,272	136,625	Encourage BED to design and implement efficiency initiatives that will maximize lifetime electric benefits.	9
6	Administrative Efficiency	Total Administrative cost as a % of total budget	\$42,627	5% savings based on total Admin costs in next DRP - TBD	This indicator is intended to encourage BED to continually assess its operations and to continue to deliver services that maximize rate payer value.	5

TEPF QPIs & MPR's						
QPI#	Title	Performance Indicator	2021-2023 Target	2024- 2026 Target	Policy Goal Advanced	Proposed Weighting % for 2021-2023 & 2024-2026
1	Thermal & Mechanical Energy Efficiency Savings(Residential and Commercial)	Incremental net MMBTU Savings (3 yr total)	1455	1455	Intended to encourage BED to design and implement efficiency initiatives that will maximize unregulated thermal energy savings.	60%
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	1) 30% reduction per project 2) 16% of premises	Intended to ensure that energy efficiency initiatives are designed and implemented to acquire comprehensive savings.	40%
3	Equity for Residential Customers	Minimum level of overall efficiency, as reflected in "traditional TEPF" program spending, is dedicated to residential customers or 95% of total budget	\$305,500	\$313,800	Equity for residential customers by assuring that a minimum level of overall efficiency efforts, as reflected in spending, will be dedicated to residential customers	MPR

These TEPF performance indicator (QPIs) recommendations are a continuation of the 2018-2020 QPIs.

Minimum Performance Indicators Electric & TEPF

Proposed Electric MPR's				
Title	Minimum Performance Requirement	2021-2023 Target	2024-2026 Target	Policy Goal Advanced
Minimum Electric Benefits (equity for all electric rate payers)	Total electric benefits divided by total costs	Equal to or greater than 1.2 BCR	Equal to or greater than 1.2 BCR	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 EEC
Equity for residential rate payers	A minimum level of overall efficiency efforts, as reflected in RA spending, will be dedicated to residential customers	A minimum of 85% (\$1,412,400 over the three-year period.	A minimum of 85% (\$1,240,870 over the three-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
Equity for low-income customers	A minimum level of overall efficiency efforts, as reflected in RA spending, will be dedicated to low-income customers	A minimum of 85% (\$141,240 over the three-year period.	A minimum of 85% (\$124,090 over the three-year period.	Equity for low-income customers by assuring that a minimum level of overall efficiency efforts, as reflected in spending, will be dedicated to low-income households
Equity for small business customers	Number of total non-residential premises with annual electric use of 40,000 kWh/yr. or less participating in energy efficiency programs	180	180	Equity for small business customers by assuring that a minimum level of overall efficiency efforts, as reflected in spending, will be dedicated to small business accounts

TEPF MPRs

TEPF QPIs & MPR's						
					Proposed	
					Weighting % for	
QPI#	Title	Performance Indicator	2021-2023 Target	2024- 2026 Target	Policy Goal Advanced	2021-2023 & 2024-2026
1	Thermal & Mechanical Energy Efficiency Savings(Residential and Commercial)	Incremental net MMBTU Savings (3 yr total)	1455	1455	Intended to encourage BED to design and implement efficiency iniatives that will maximize unregulated thermal energy savings.	60%
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	1) 30% reduction per project 2) 16% of premises	Intended to ensure that energy efficiency initiatives are designed and implemented to acquire comprehensive savings.	40%
3	Equity for Residential Customers	Minimum level of overall efficiency, as reflected in "traditional TEPF" program spending, is dedicated to residential customers or 95% of total budget	\$305,500	\$313,800	Equity for residential customers by assuring that a minimum level of overall efficiency efforts, as reflected in spending, will be dedicated to residential customers	MPR

Appendix F – Department of Public Service Evaluation budget for electric RA programs

DPS EEC EMV Budget		DPS TEPF EMV Budget		DPS FCM EMV Budget	
	Exh. BM 2		Exh. BM 2		Exh. BM 2
2021	\$61,979	2021	\$12,831	2021	\$110,285
2022	\$41,975	2022	\$8,353	2022	\$84,753
2023	\$20,194	2023	\$4,501	2023	\$84,873
2024	\$21,010	2024	\$5,667	2024	\$112,480
2025	\$86,981	2025	\$16,284	2025	\$86,448
2026	\$62,807	2026	\$12,012	2026	\$86,570
2027	\$21,430	2027	\$5,780	2027	\$114,740
2028	\$88,721	2028	\$16,609	2028	\$88,177
2029	\$64,063	2029	\$12,252	2029	\$88,301
2030	\$65,280	2030	\$5,896	2030	\$117,035
2031	\$85,403	2031	\$16,941	2031	\$89,940
2032	\$67,434	2032	\$12,497	2032	\$90,067
2033	\$68,718	2033	\$6,014	2033	\$119,367
2034	\$89,285	2034	\$17,280	2034	\$91,739
2035	\$71,000	2035	\$12,747	2035	\$91,869
2036	\$72,354	2036	\$6,134	2036	\$121,763
2037	\$93,378	2037	\$17,626	2037	\$93,574
2038	\$74,774	2038	\$13,002	2038	\$93,706
2039	\$76,202	2039	\$6,257	2039	\$124,198
2040	\$97,694	2040	\$17,978	2040	\$95,445