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To: Burlington Electric Department Customers and Residents of Burlington

From: Spencer Newman, Chair

Date: March 1, 2016

Re: 2015 Performance Measures Report

The members of the Burlington Electric Commission are pleased to present the 2015 Performance Measures Report of the Burlington Electric Department (BED). BED conducts this annual, comprehensive self-examination to help achieve organizational goals and shares the findings for the benefit of our customers and the Burlington City Council.

Burlington continues to gain international recognition as the first city in the country to **source 100% of its power from renewable generation**. BED had been working toward this goal for more than a decade and reached this extraordinary milestone with the purchase of the Winooski One hydroelectric facility in September 2014. Importantly, none of BED's primary energy producing resources – biomass, hydro, wind, solar – relies on fossil fuels and, therefore, BED is well-insulated from sudden and unpredictable swings in the energy market.

BED continues to push forward along its renewability path, having commissioned several solar projects that it now owns. The largest is a 500-kilowatt (kW) solar array on the parking garage roof at Burlington International Airport that went online in February 2015, and another project is the 124-kW solar array on the roof of BED's Pine Street facility that went online in summer 2015. Further evidencing its commitment to renewable energy, BED has been diversifying its upcoming hydro and wind contracts.

In 2015, BED launched a **new energy efficiency program** called [*Energy Champ Challenge*](#), which targeted hard-to-reach, multi-family homes with a complete range of efficiency solutions. Innovations like this are the reason BED's efficiency efforts remain national and global models. In fact, Burlington's annual electricity consumption is lower now than in 1989 due to the flattening of BED's energy load requirement from energy efficiency impacts.

Over the past year, BED began its transition from installing the **smart grid** backbone to beginning pilots for customer offerings. New rate designs included dedicated customer focus groups to help guide offerings to meet customer needs. BED partnered with the University of Vermont on a grant effort designed to study the ef-

fectiveness of in-home displays. The first stages of an electric vehicle (EV) charging network were brought online, and BED began gathering data on how the EV charging stations were used to help plan future efforts. The operational savings seen from the initial smart grid rollout are continuing to accrue, and BED is working to extend those benefits into customer homes.

In 2015, BED successfully completed the first phases of a **strategic transformation and reorganization** to position the utility to meet the changing demands of a dynamic energy sector with a focus on BED's long-term goal to become a "utility of the future." The reorganization implemented a flatter management approach with employees working in one of three Centers of Excellence: Innovation; Safety and Reliability; and Customer Care. Through every phase of our transformation, BED kept a laser focus on safety, reliability, and low-cost, high-quality customer service *without compromise*.

BED accomplished this reorganization without employee layoffs through a voluntary employee retirement opportunity, resulting in a nearly 10% staff reduction, from 133 to 120 employees, and **more than \$1 million in annual labor cost savings**. BED's new structure has created efficiencies, allowing the organization to do more with less staff. We extend our deepest gratitude and well wishes to our recently retired colleagues, whose dedicated service over many decades helped BED become highly regarded by our customers and a national and international leader in so many areas.

Finally, citing BED's renewable and reliable power supply, energy efficiency measures, and proactive strategic planning by BED management as important factors, Moody's Investors Service **upgraded BED's credit rating** to Baa1 from Baa2 in November 2015.

For the second year, we have created this report as an electronic download available on our website, rather than in print form, saving \$1,500 in printing costs and many trees.

INTRODUCTION

Burlington Electric Department (BED) is a department of City government and an essential part of Burlington's infrastructure. As a public utility, BED is an expression of the community's commitment to **not-for-profit rates, local control, and sustainability**.

BED offers customers the right to participate directly in the most important decisions about the future of the utility. Such participation demonstrates the importance of community-based decisions about our energy future because they reflect local values such as **renewable energy**. We thank our community members for their support of many ballot items over the years, including the revenue bond to acquire the Winooski One hydro-electric facility, putting us on the path to sourcing 100% of our power from renewable generation, and votes to support strong energy efficiency measures and improve system reliability. We also are fortunate that City government has been strongly supportive of proposed contracts for the purchases of energy from renewable resources. These forward thinking decisions allow BED to



provide clean, green, and stably-priced power to its residents and businesses.

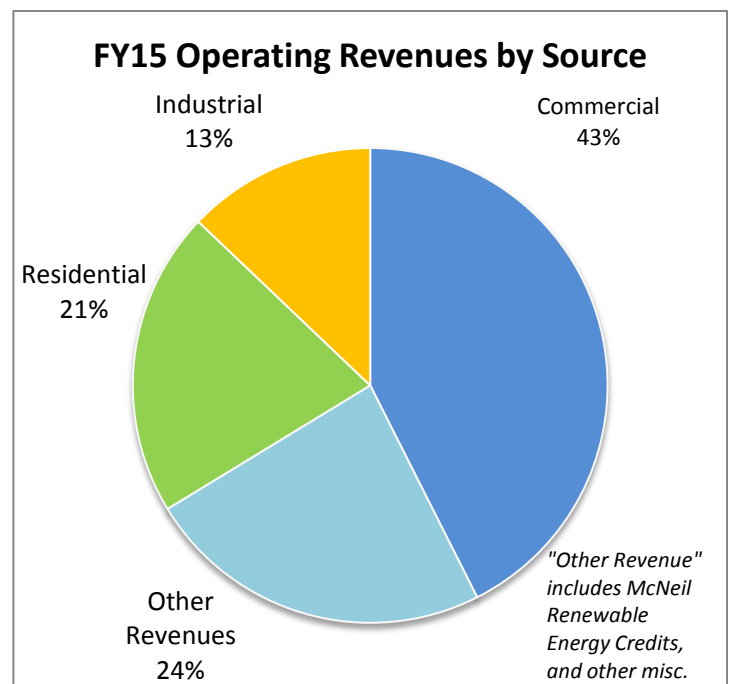
BED is proud to serve Burlington and will continue to be responsive to the community. This report is intended to help explain what we do and to help us measure our progress over time. We invite your comments and suggestions by clicking [here](#) to share them.

MARKET & REVENUES

BED provides electric service to 16,763 residential customers and 3,829 commercial and industrial customers. For a variety of reasons, including a very large number of students, BED's turnover in residential accounts is more than 6,000 per year.

On the other hand, BED has two large customers that represent 29% of total sales. Commercial and industrial customers use much more electricity than residential customers and account for 53% of revenues.

Whether residential, commercial or industrial, BED customers expect and deserve certain fundamental services: reliable and safe electricity, exceptional customer service, and affordable bills.



SERVICE QUALITY & CUSTOMER SATISFACTION

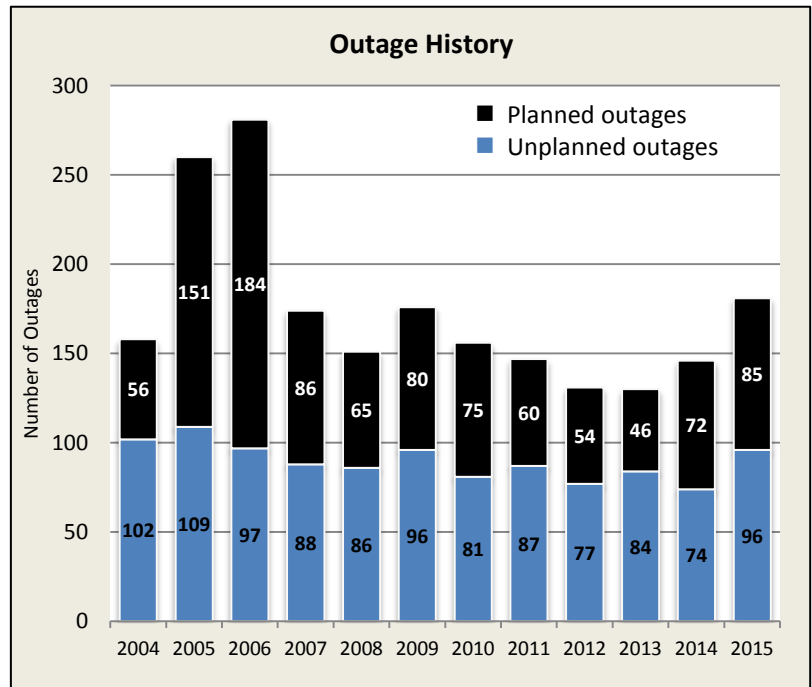
Like all Vermont utilities, BED is required to submit a quarterly **Service Quality and Reliability Plan (SQRP)** to the Vermont Department of Public Service. The SQRP establishes standards for a variety of performance criteria (see a selection of measures below).

Each utility is expected to meet these minimum performance standards. Although BED performed better in most categories than required, we did not achieve the standard in only one area, as explained below.

Number and duration of outages:

BED experienced 181 outages of zero voltage that exceeded five minutes during year 2015 and 146 outages in year 2014. BED's System Average Interruption Frequency Index (SAIFI) for 2015 was 0.4 interruptions per customer, significantly better than our SAIFI goal of 2.1 interruptions per customer. BED's Customer Average Interruption Duration Index (CAIDI) for 2015 was 1.7 hours, unfortunately above our CAIDI goal of 1.2 hours.

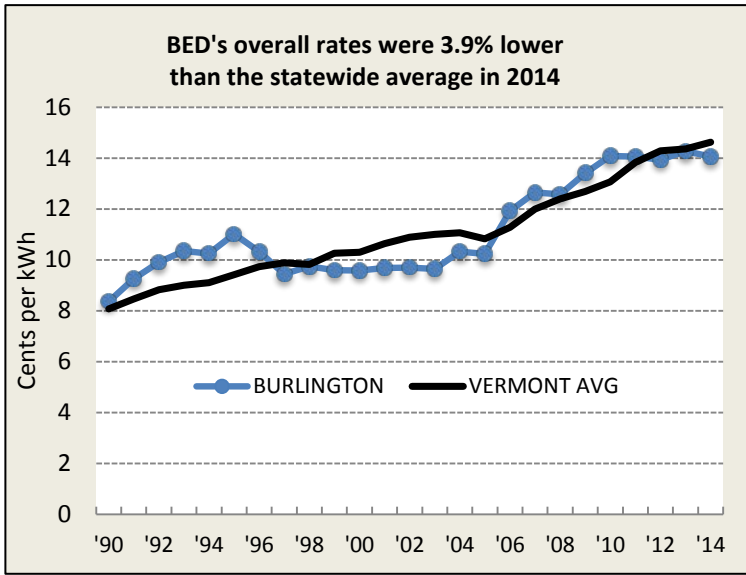
Calendar year 2015 was the first year BED used outage data from the advanced metering in-



frastructure (AMI) system to calculate indices. BED expected the duration of outages to increase due to the accuracy of the AMI outage data compared to our past practice of estimating the number of customers impacted by outages and duration of outages.

Performance Area	Standard	BED
% Bills found inaccurate	0.1%	0.0%
% Bills estimated	5%	0.0%
% Customer requested work completed by promised delivery date	92%	100%
Average # of customer interruptions per year	2.1	0.4
Average duration of customer interruption (hours)	1.2	1.7
Lost time incidents / year (injury leading to lost work time)	< = 3.5	1.9
Lost time severity (total work days missed due to injury)	< = 71	41.7

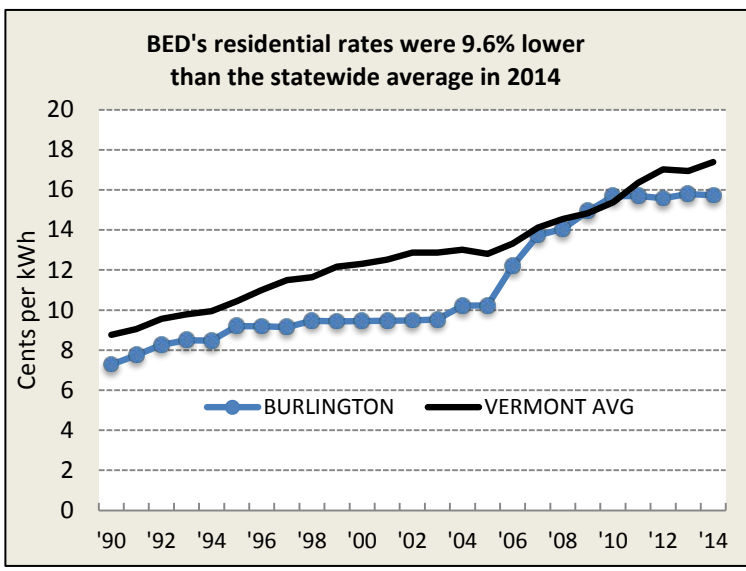
RATES AND BILLS



Utilities have different rate designs that make comparisons difficult. The easiest way to measure performance is to compare *average revenues per kilowatt-hour* – total revenue divided by kWh sales. This is called “average rates” and is a standard measure for the price of electricity to the consumer. The most recent rate data from the Vermont Department of Public Service is for calendar year **2014**.

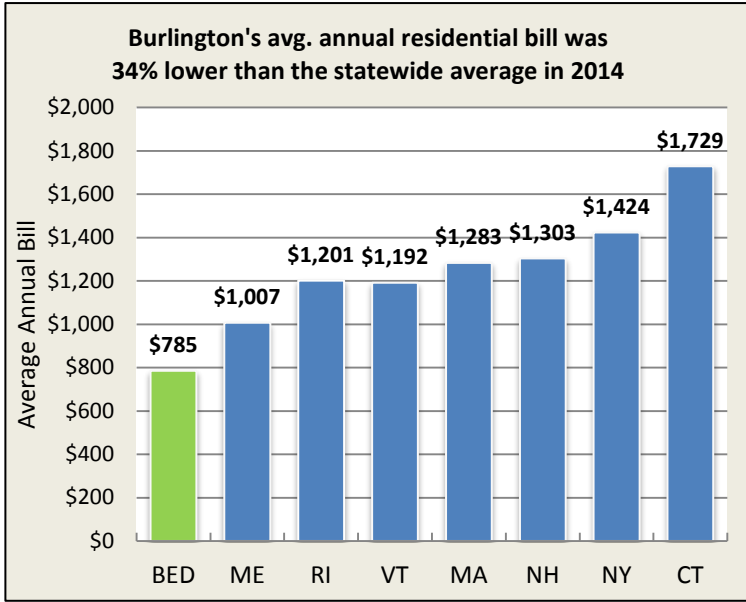
BED last raised its rates six years ago, in 2009, and does not expect an increase in 2016.

Although rates are an important indicator, they tell only part of the story. A customer's bill reflects the rate times the amount of electricity used. Thus, customers who are more efficient and use less power have lower bills.



RESIDENTIAL CUSTOMERS

BED's residential rates were 9.6% lower than the statewide average in 2014. In addition to competitive rates, Burlington residents have managed their electric use through energy efficiency. The combination has produced relatively stable bills for Burlington residents over the years. Burlington's average residential bills were **34% less** than the statewide average in 2014.



	Avg. Res. Rate / kWh	Avg. Res. Annual Bill
Burlington	15.72¢	\$785
Vermont	17.38¢	\$1,192

In 2014, an average Burlington residential customer paid \$407 less per year than the statewide average and lower than the average for every state in the region. Overall, this represented aggregate savings of \$6.8 million – money that could be saved or spent in the local economy. These savings also help lower housing costs, which is important in Burlington's tight housing market. Some of the difference in usage and bills reflect the number of small rental units in Burlington.

RATES AND BILLS

The **2014 inflation-adjusted average residential bill was still lower than in 1990**. This is especially noteworthy in contrast to the rising costs of other energy sources. For example, according to the U.S. Department of Energy, the inflation-adjusted price of natural gas for residential customers in 2014 was 40% higher than in 1990.

COMMERCIAL & INDUSTRIAL CUSTOMERS

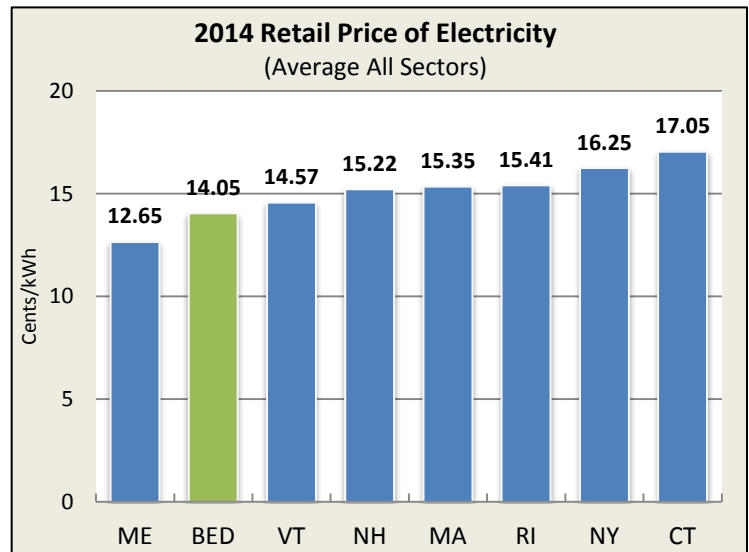
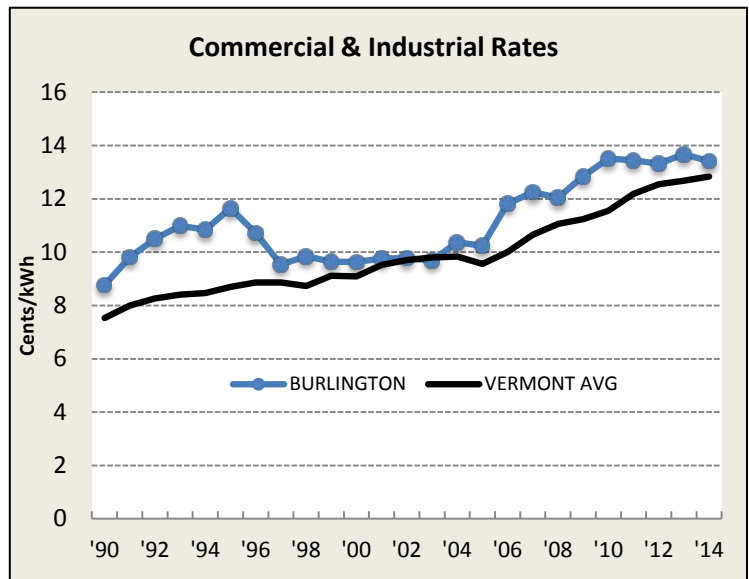
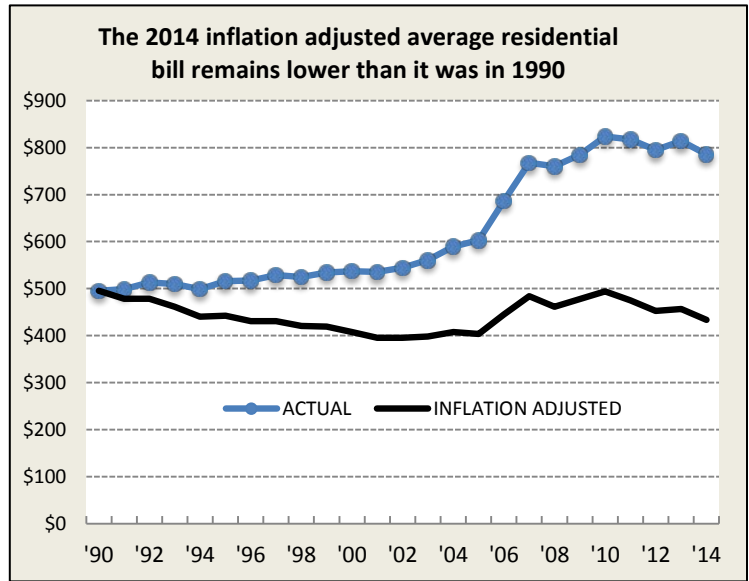
Average commercial and industrial rates have increased 9.0% since 2007. Although BED's rates remain slightly higher than the statewide average, the gap has closed in recent years.

As the long term contracts entered into by BED in recent years have started to deliver energy, and BED has needed to depend less on the New England spot markets, BED's average rates have stabilized.

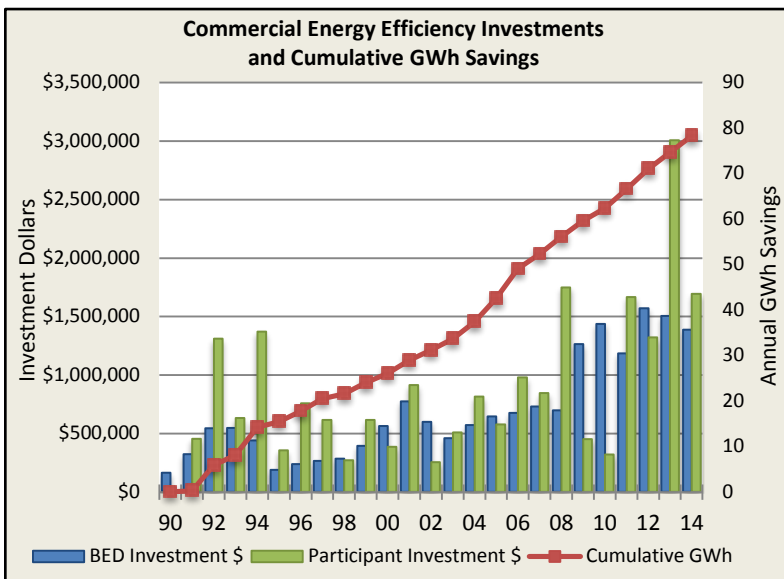
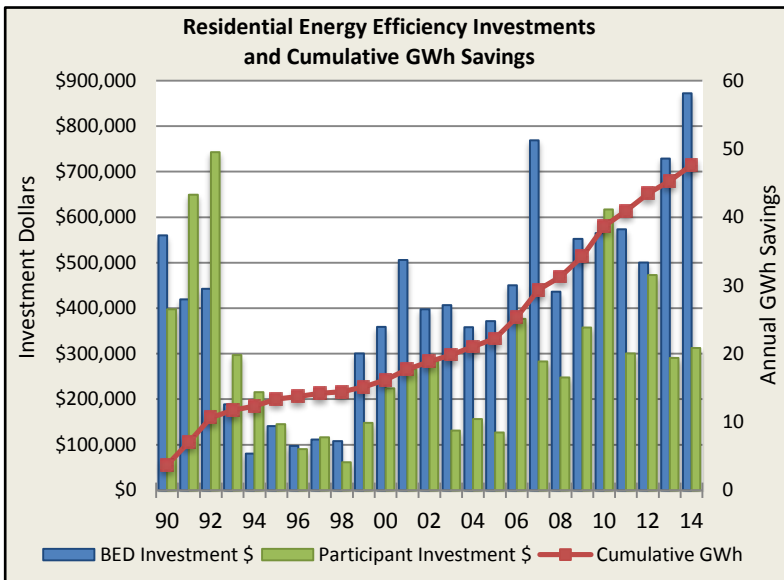
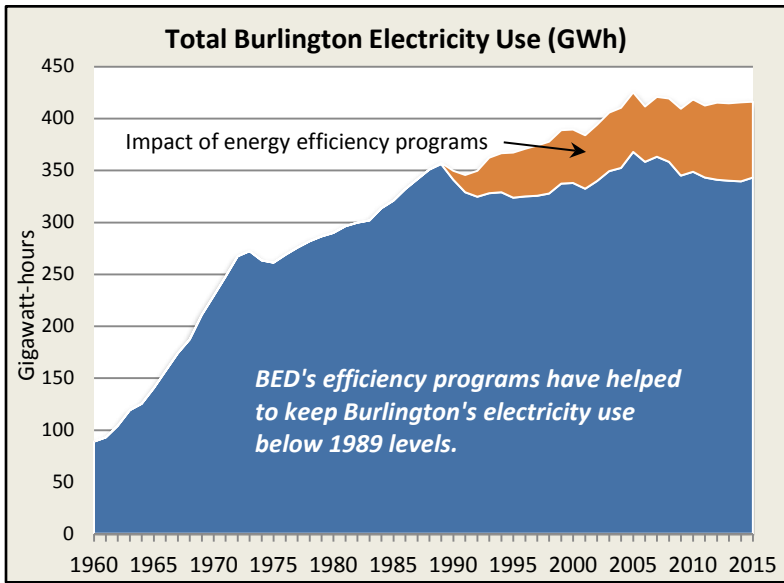
In addition, BED made its final payment on the majority of its outstanding revenue bonds in 2014 (including those for the McNeil Plant). This will reduce costs and help stabilize rates going forward.

The bottom graph shows a comparison of BED's overall rates with other New England states. **To the extent electric rates are a real or perceived issue for economic development, Burlington is in good shape within the region.**

In any case, rates are still only half the picture. Along with the efforts to reduce rates, BED's Energy Services staff has helped commercial and industrial customers reduce their consumption through energy efficiency initiatives.



ENERGY EFFICIENCY



BED has used its energy efficiency dollars wisely. Altogether, **BED has invested \$26.4 million in energy efficiency and has leveraged another \$28.4 million in private funds** from our customers. Almost all of these dollars re-circulate in the local economy. The efficiency investments saved Burlington customers about \$11.1 million in 2015 alone.

Overall electricity use in 2014 was 5.3% lower than in 1989. In other words, we are meeting the needs of a growing local economy with less electricity than we used more than a quarter century ago. During the same period, statewide use of electricity increased by 9%.

Furthermore, efficiency investments helped Burlington avoid the release of 24,000 tons of CO₂ in 2015, equivalent to removing 6,300 cars from the highways.

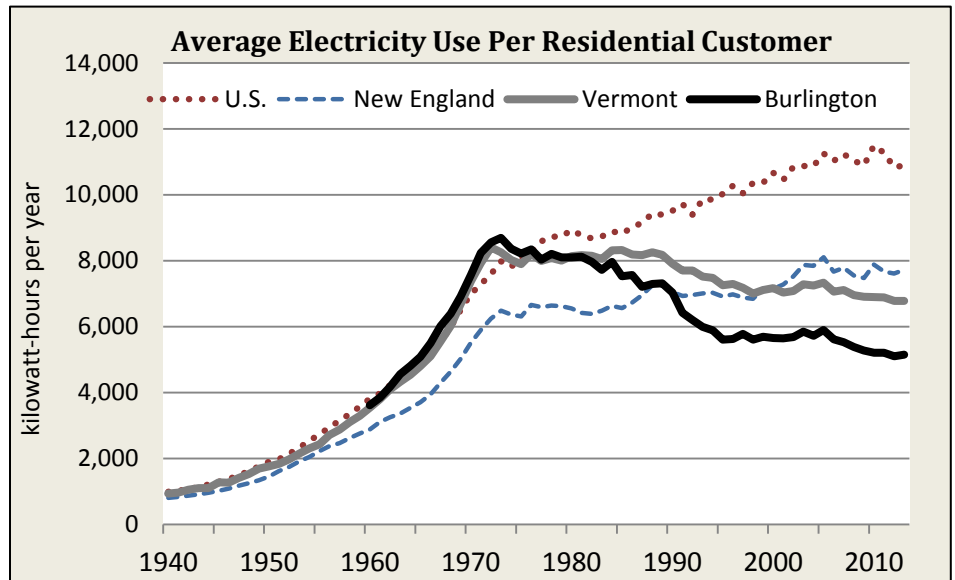
All customers pay for efficiency in their bills, so BED has programs tailored for all rate classes. The graphs at left and below show the distribution of resources and savings for residential and commercial and industrial customers.

BED partners with Efficiency Vermont on the statewide retail products program. Customers receive rebates for buying Energy Star lighting and appliances at participating retailers. For example, in 2015, BED customers purchased close to 60,000 LED and compact fluorescent bulbs and fixtures, 115 washing machines, and 1,800 efficient monitors and televisions.

BED's Energy Services staff worked with dozens of customers in 2015 to implement efficiency projects that save energy, enhance facilities, and improve competitiveness. Total estimated customer savings were \$926,000.

ENERGY EFFICIENCY

In 2015, BED's Energy Services staff worked successfully with many business customers to upgrade to LED lighting and to install high efficiency heating, cooling and ventilation equipment. BED, in partnership with Vermont Gas Systems, also worked closely with many residential and commercial new construction projects around the City. These buildings are considerably more energy efficient than energy code requires.



RELIABILITY

An interruption of power is considered an outage if it exceeds five minutes. Outages are either planned or unplanned. Planned outages are generally shorter in duration, affect a smaller number of customers, and are warned in advance giving customers time to prepare. Planned outages allow BED staff to safely perform routine maintenance and upgrade facilities. Unplanned outages usually impact a larger number of customers, occur without warning, and are generally longer in duration. Most are caused by weather, equipment failure, wildlife, or tree contact.

BED has eliminated all of the seven 13.8/4.16 kV substations, replaced all substation switchgears, replaced old aerial circuits by converting 4.16 kV circuits to



13.8 kV, and upgraded switches, reclosers, and communications equipment to allow remote switching.

Going forward BED will continue replacing the old style lightning arrester guards with the new guards that cover the entire arrester top/connector, and installing animal guards on all the circuit equipment not equipped with animal wildlife protectors. BED has also replaced many old underground distribution circuits identified in its capital construction plan. BED will continue to implement its capital construction plan that has been successful in reducing the total number of unplanned outages and,

in particular, the number of outages caused by equipment failures.

BED's power supply reflects a number of considerations including cost, renewability, predictability and reliability, diversity, and other economic and environmental impacts. While cost is always critical, other factors influence purchase decisions. BED has succeeded in maintaining comparatively low and stable rates, while continuing our commitment to renewables and, to the extent possible, keeping money in Vermont by supporting Vermont-based renewable generation.

In 2015, Vermont enacted a renewable portfolio standard. A renewable portfolio standard is a requirement that utilities serving Vermont customers provide specific amounts of the energy that their customers use from renewable resources. Beginning in 2017, Vermont utilities will need to ensure that 55% of the energy they provide comes from existing renewable resources, and that an additional 1% comes from new net metered or small renewable resources. Lastly, Vermont utilities will be required to look for ways to substitute electric energy for fossil fuels where it can be done economically (such as in electric vehicles). The target percentages for all of these requirements increase periodically thereafter.



Winooski One Hydroelectric Facility

BED has essentially already met the full targets for providing existing renewable energy already, i.e. the 75% level for existing renewable resource that will apply in 2032. Likewise, based on its resource portfolio, BED has filed a petition with the State Public Service Board



Wind turbines on Georgia Mountain

documenting that, as of 2015, BED possessed, owned, and contracted renewable resources sufficient to meet 100% of its expected retail sales in 2017. If approved, BED may be able to modify its targets for new renewable resources.

BED's next major resource acquisition, Hancock Wind in Maine, is under construction. At this time, energy deliveries from BED's 13.5 MW entitlement to Hancock are expected to begin in January 2017. BED is excited about this new resource and, furthermore, the energy prices under this contract do not increase over time. BED is beginning to look into the economics of storage technologies, in conjunction with renewable resources, as a new focus in the next several years.

Beginning in 2004, BED's analyses of supply options have consistently found that **renewable resources were the best course of action.** However, such resources generally come at a premium price. To maintain stable rates, BED can sell the rights to the renewable aspects of the output from the McNeil Plant and other renewable resources such as wind and solar projects (in the form of Renewable Energy Credits or RECs). When RECs are sold, however, BED loses the right to claim the energy from that resource as renewable.

BED's calendar 2014 purchases (the last full year settled with New England Power Pool Generation Information System) were sourced 95% from renewable resources before accounting for renewable energy credit transactions.

POWER SUPPLY

BED sold many of the RECs from McNeil and its wind solar resources. After accounting for the sale of RECs, 35% of BED's needs were met with renewable energy in 2014. The REC's from these valuable sources were sold to reduce the rate impacts of purchasing long-term renewable resources. The Burlington Electric Commission currently has approved the sale of RECs through fiscal year 2019 and continues to review the economics of selling RECs to control rates versus retaining the ability to claim renewability.

BED also buys RECs from some generators that have existed for many years and, therefore, command a lower price. By doing so, **BED creates revenue from REC sales to keep rates lower, while still maintaining a renewable power supply and supporting the operations of these existing renewable resources.** After accounting for all REC transactions, including purchases of renewable energy credits, BED's supply portfolio was served 100% from renewable resources (the increase from 95 to 100% was due to the purchase of RECs by UVM under a voluntary program). In fact, between RECs reserved/retired on BED's own behalf, and those reserved/retired for UVM, BED possessed RECs in excess of its energy needs.

Integrated Resource Plan. In late 2015, BED initiated the next round of its Integrated Resource Plan (IRP) process. BED's last two IRPs were finalized in 2004 and 2008, and this iteration of the process is expected to be filed in the Fall of 2016. With BED's energy needs largely met, the focus of this IRP is expected to be on emerging technologies (that occur on the customer side of the meter, in many cases).



BED solar array at Burlington International Airport



The BED control center is staffed 24 hours a day, 365 days a year

BED staff has made initial presentations at the Neighborhood Planning Assembly meetings and a committee of two members each of the Burlington Electric Commission and the public has begun holding meetings to develop the new IRP. BED also has met with the Vermont Department of Public Service staff to discuss the methodology BED plans to use in its 2016 IRP. Customers are encouraged to visit the BED web page at <http://www.burlingtonelectric.com/irp> where updates on this process are being posted.

GENERATION – THE McNEIL PLANT



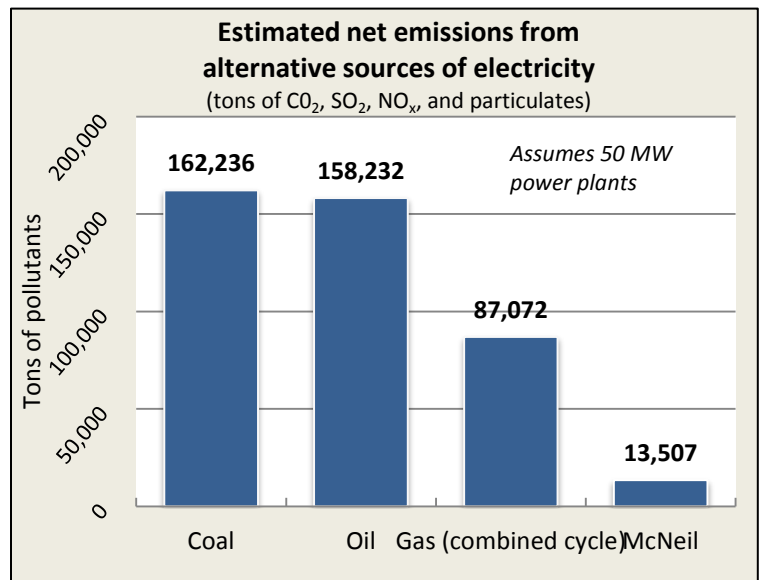
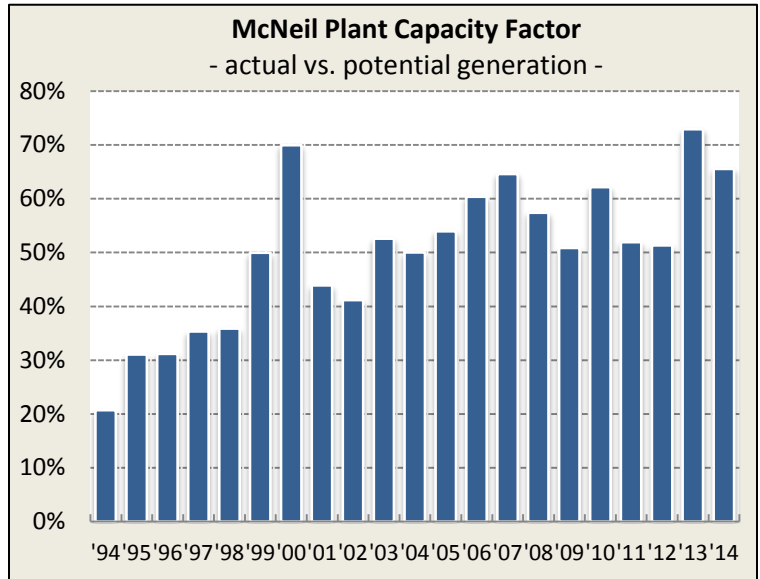
Located in Burlington's Intervale, McNeil Station is managed and operated by BED, but dispatched by ISO New England, which controls the region's power plants. The decision to run a plant is based on regional demand, reliability needs, and the bid price.

In calendar year 2015, McNeil produced 290,361 MWH of power and the plant had a 66.3% capacity factor. In addition to power, McNeil produced 290,370 Connecticut Class 1 RECs.

HARVESTING BIOMASS

McNeil's wood harvesting standards are comprehensive, field-proven means to harvest biomass fuel sustainably and have been used as a model in developing forest management certification criteria. McNeil is net neutral from a carbon perspective. In 2015, McNeil used 441,256 tons of wood: 92% harvest residue, 6% sawmill residue, and 2% clean waste wood. McNeil foresters plan and monitor harvests on more than 5,000 acres per year within a 100-mile radius of Burlington.

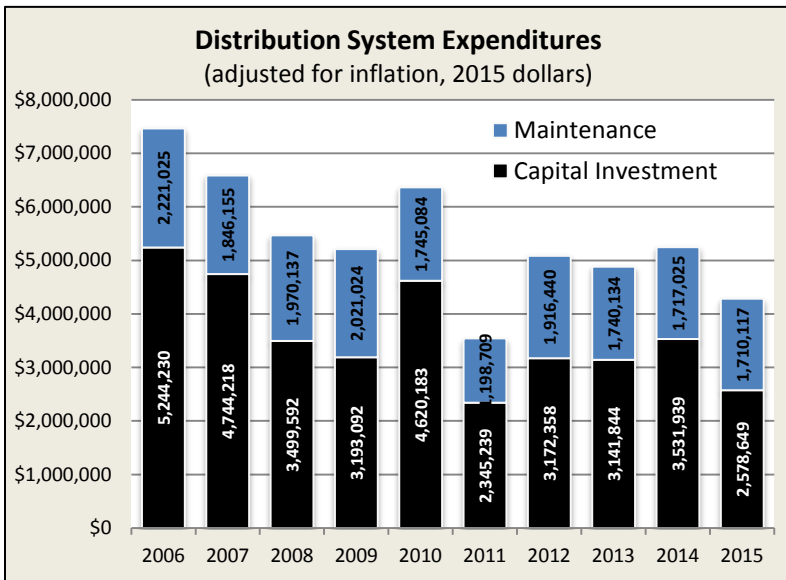
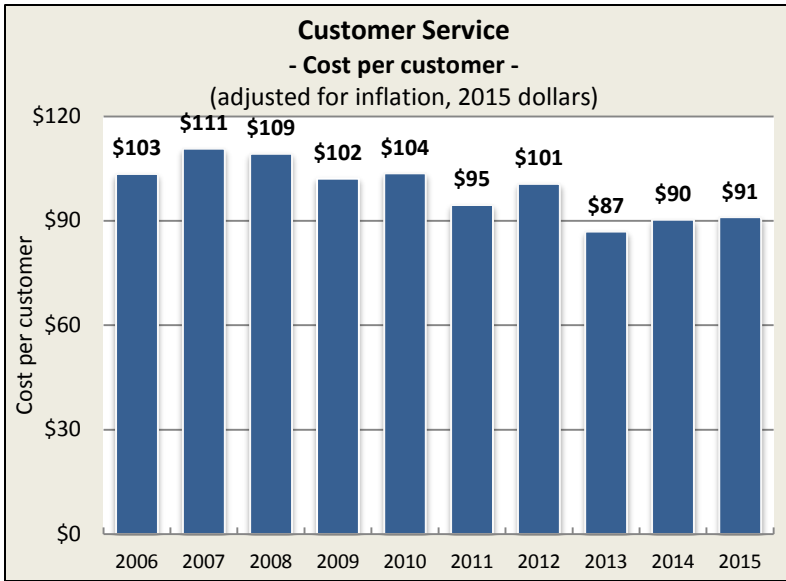
Harvest plans include protecting critical habitats and wetlands, by employing the following measures: McNeil foresters encourage the use of low impact harvesting equipment on sensitive sites; and McNeil manages its wood fuel inventory to minimize delivery disruptions during inclement



weather and to avoid environmental impacts of harvesting during sensitive times of the year.

McNeil continues to operate the Burlington Waste Wood Yard, which provides local residents with a central location to dispose of clean waste wood at no charge. **In 2015, McNeil received 5,422 tons of waste wood which saved McNeil \$74,980 in fuel costs.**

OPERATING EFFICIENCY



Approximately 6,000 of our 16,763 residential customers change locations each year, which is a primary driver of customer service costs. BED has managed to lower and stabilize these costs over the last 10 years. **Adjusted for inflation, the cost per customer has declined 15% since 2005.** Among other things, this reflects considerable savings from consolidating job functions and the productivity of our staff.

Adjusted for inflation, the average cost of maintaining the distribution system is \$1.7 million a year. In addition, BED makes long-term investments to improve the system, to extend its useful life, and to accommodate new development. Capital projects include equipment upgrades, line extensions and new underground conduits and cables. These improvements increased slightly from last year as we accelerated upgrades of the distribution system.

These investments improve system reliability and reduce unplanned outages. Distribution system efficiency measures include conversion from 4.16 KV to 13.8 KV, load balancing and installation of capacitor banks. The changes have reduced line losses by 50% to an estimated 2% and are projected to reduce power costs by \$250,000 to \$300,000 annually.

The administrative costs of running BED have declined significantly since the late 1990s as a result of staff reductions (down from 164 employees in 1996 to 120 today) and greater efficiencies through technology. Since the customer base is stable, any cost increases (e.g., health care, salaries, insurance) result in higher costs per customer. In 2015, BED engaged in a comprehensive effort in 2015 to reduce base operating costs. Adjusted for inflation, the administrative cost per customer has declined 2% since 2005.

TAXES AND FEES

As a municipal entity, BED is not required to pay property taxes. However, BED makes an annual payment in lieu of taxes (PILOT) that makes us the largest property taxpayer in the City. BED also collects a 3.5% franchise fee for the City.

This is significant because these payments come from all customers, including nonprofit entities such as UVM and UVM Medical Center that don't pay property taxes. This is a more equitable distribution of the burden of financing City operations and is an important benefit of public power.

BED Payments in Lieu of Taxes and Franchise Fee Transfers			
Fiscal Year	Payment in Lieu of Taxes (PILOT)	City Franchise Fees	Totals
2011	\$1,570,954	\$1,678,281	\$3,249,235
2012	\$1,645,920	\$1,646,997	\$3,292,917
2013	\$1,770,701	\$1,637,827	\$3,408,528
2014	\$1,872,967	\$1,659,807	\$3,532,774
2015	\$1,950,434	\$1,648,148	\$3,598,582
5 Yr. Totals	\$8,810,976	\$8,271,060	\$17,082,036

COMMUNITY INITIATIVES

In 2015, our employees participated in several community charity events such as the Penguin Plunge benefiting the Special Olympics Vermont, a yearly bake sale on Town Meeting Day to benefit the United Way, Kids Day at the Burlington Waterfront, Energy Efficiency Calendar contest, and hosted a toy drive for Operation Fire Cuffs 2015, benefiting the University of Vermont Children's Hospital.

These are just a few examples of how our employees give back to the community we love throughout the year.



2016 Energy Efficiency Calendar contest winners



Operation Fire Cuffs 2015

All photos by Cathy Chamberlain, except control center and solar array on page 9 and Operation Fire Cuffs on page 13.