# 2014 Performance Measures Report

## We did it!

*On September 1, 2014, Burlington Electric Department purchased the 7.4 megawatt Winooski One Hydro Dam that feeds directly into our distribution system. With that purchase BED can proudly say that 100 percent of our electricity is now sourced from renewable generation, a claim very few utilities can make.*

BURLINGTON Electric DEPARTMENT
Burlington's Energy Efficiency Utility

**BURLINGTON ELECTRIC DEPARTMENT**

Successfully transitioning to a post-carbon economy

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To: All BED customers and citizens of Burlington

From: Spencer Newman, Chair

Date: March 3, 2015

**Re: 2014 Performance Measures Report**

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We are pleased to present Burlington Electric Department's (BED's) Performance Measures Report for 2014. We have been preparing these reports since 1998 for the benefit of the Burlington City Council and our customers. Each year, BED conducts a comprehensive self-examination and presents the findings in this report. Performance measurement helps us achieve several important goals for the organization, involving accountability, service, costs, strategic planning and management.

In 2014, BED celebrated several important milestones. At the end of June, we paid off our 30-year "mortgage" of the McNeil Generating Station, a key asset in our sustainable energy portfolio. In September, BED purchased the Winooski One Hydroelectric Facility, connecting 7.4 MW of renewable energy directly to the BED grid. With Winooski One in our portfolio, **BED achieved its goal of sourcing 100% of its power from renewable generation**. This is no small accomplishment: most utilities are trying to reach 20% renewable by 2020. Our sincere thanks to long-time General Manager Barbara Grimes, who retired in June 2014, and the dedicated team at BED for making the Electric Commission's decades-old vision a reality.

The Department also had its challenges in 2014. In the fall, several major billing errors were discovered by BED staff. Interim General Manager Neale Lunderville undertook a comprehensive review of our billing and metering systems to ensure system integrity and has been reporting progress regularly to the City Council and Electric Commission. As a result of this review, BED made changes to its IT structures to improve access to information and responsiveness.

Another important focus this past year was the continued implementation of the Smart Grid into our operating environment. We have begun to realize the benefits of this project with better outage management, far fewer truck rolls for various services, and easier integration of small scale local renewable projects into the BED distribution system.

A final note: This year, we decided not to print copies of this report, instead offering it as an electronic download on our website. It saves $1,500 in printing costs – and a whole lot of 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. This illustrates the importance of community-based decisions about our energy future because they reflect local values such as **renewable energy.** Residents have supported many bond items over the years, including the bond to acquire the Winooski One facility, which put us on the path to sourcing 100 percent of our power from renewable generation, and votes to support strong energy efficiency measures and improve system reliability. Additionally, the City government has been strongly supportive of proposed contracts for the purchases of energy from renewable resources. These were forward-thinking decisions that allowed BED to provide clean, green and stably priced power to its residents and businesses.

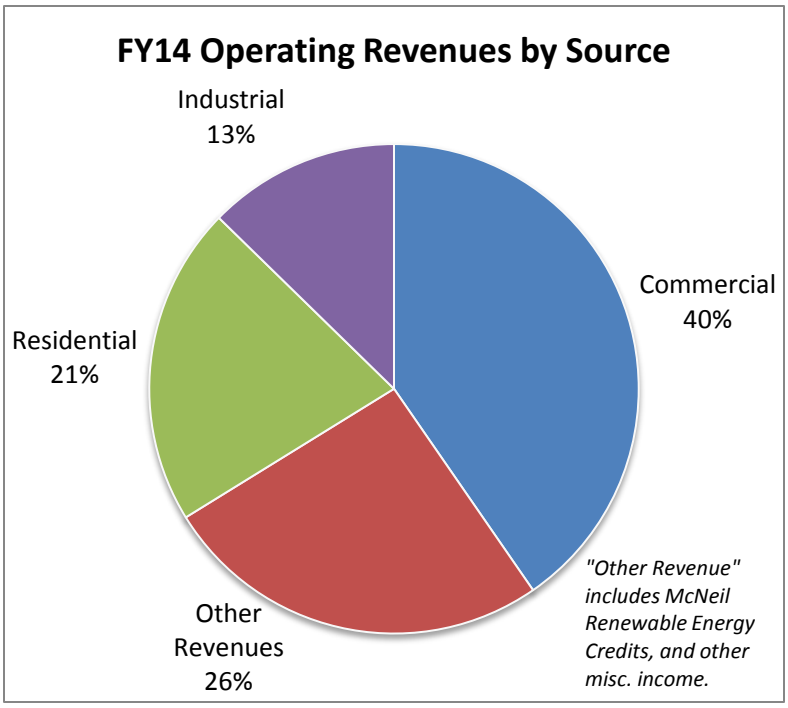
We're proud to serve Burlington and will continue to be responsive to the community. This report is intended to help explain what we do and to help us measure our progress over time. We invite your comments and suggestions.

# MARKET & REVENUES

**BED provides electric service to 16,600 residential customers and 3,755 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. This is a sizeable amount of account management for a utility of our size and contributes to somewhat higher than average customer service costs.

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.

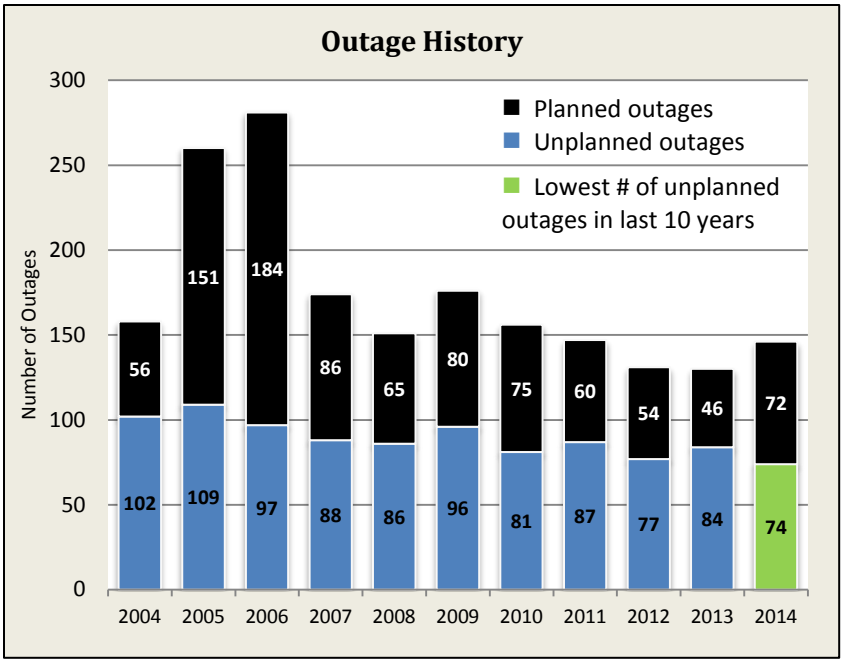
Whether residential, commercial or industrial, BED customers expect and deserve certain fundamental services: reliable and safe electricity, exceptional customer service, and affordable bills.



# SERVICE QUALITY & CUSTOMER SATISFACTION

Like all Vermont utilities, BED is required to submit a quarterly **Service Quality and Reliability Plan** (SQRP) to the 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 three areas, as explained below.



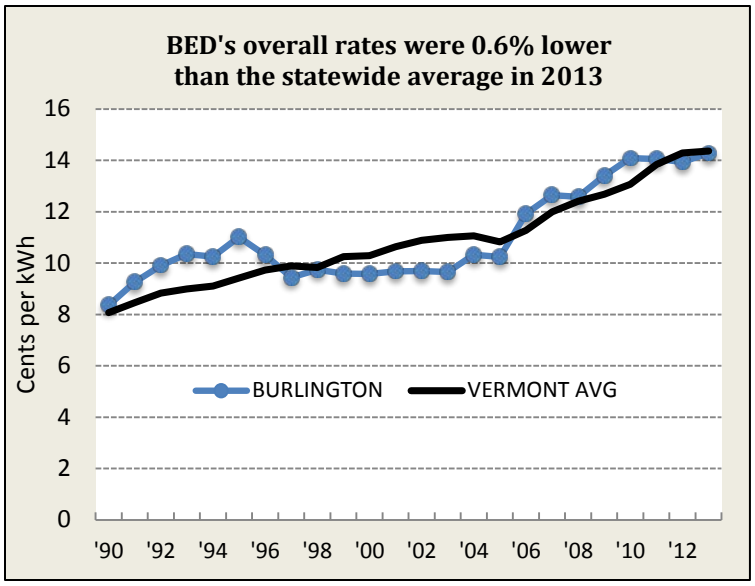

Number and duration of outages: BED experienced 146 outages that exceeded five minutes during 2014 vs. 130 outages in 2013. However, BED experienced only 74 unplanned outages, which is the lowest in the past 10 years. BED's System Average Interruption Frequency Index (SAIFI) was 1.3 interruptions per customer and we successfully met our SAIFI goal of 2.1 interruptions per customer. BED's Customer Average Interruption Duration Index (CAIDI) for 2014 was 1.5 hours and, unfortunately, we did not meet our goal of 1.2 hours. The direct cause for not meeting BED's CADI goal was an intense storm on July 8, 2014 that blew over several privately owned trees onto our circuits. Without the July 8th storm, BED's SAIFI would have been 1.1 interruptions per customer and our CAIDI would have been 1.1 hours.

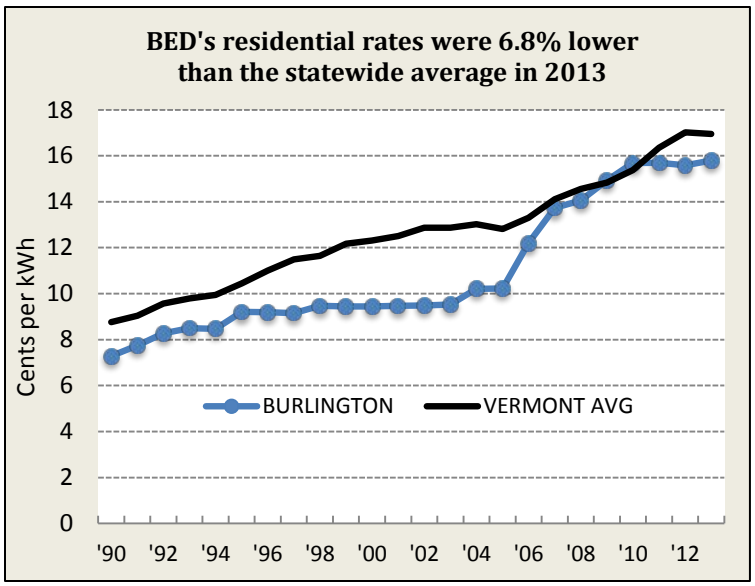
Lost time incident rate and lost time severity rate: BED employees worked a total of 228,778 hours and had only had five recordable accidents that resulted in days away from work. Of these accidents, 87% of the total days away from work were as a result of two (2) significant injuries.

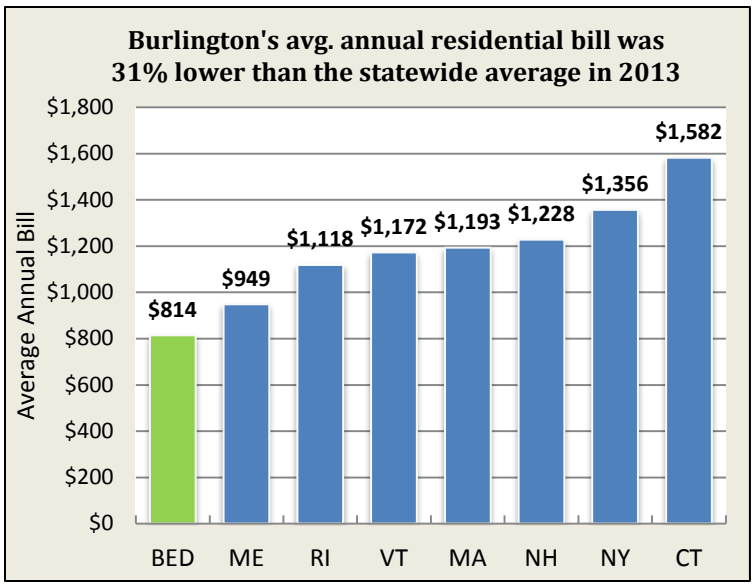
BED will continue to work hard on service quality and reliability. We know our customers expect no less.

| Performance Area | Standard | BED |
|---|---|---|
| % Bills found inaccurate | 0.1% | 0.1% |
| % Bills estimated | 5% | 0.0% |
| % Customer requested work completed by promised delivery date | 92% | 100% |
| Average # of customer interruptions per year | 2.1 | 1.3 |
| Average duration of customer interruption (hours) | 1.2 | 1.5 |
| Lost time incidents / year (injury leading to lost work time) | < = 3.5 | 4.4 |
| Lost time severity (total work days missed due to injury) | < = 71 | 125.9 |

# 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 2013.

BED last raised its rates six years ago, in 2009, and does not expect an increase in FY 2015.

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 *6.8% lower* than the statewide average in 2013.**

In addition to competitive rates, Burlington residents have managed their electric use through energy efficiency (see page 5 for more information). The combination has produced relatively stable bills for Burlington residents.

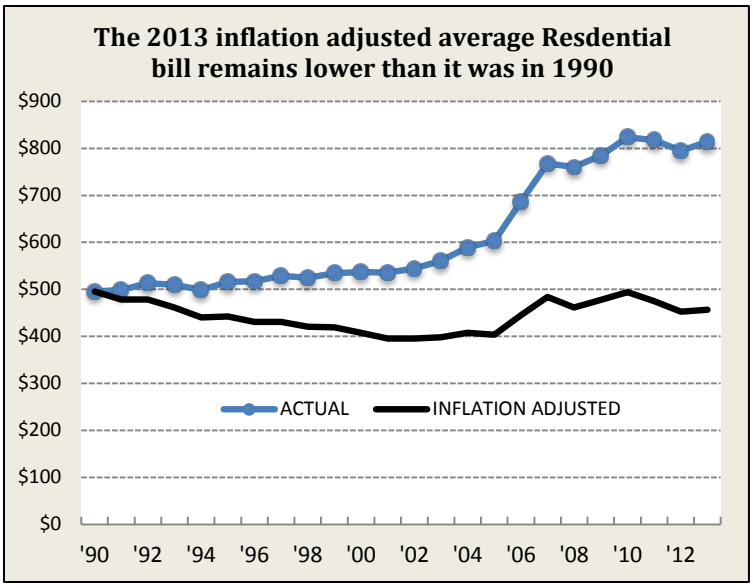
**Burlington's average residential bills were *31% less* than the statewide average in 2013.**

| | Avg. Res. Rate / kWh | Avg. Res. Annual Bill |
|---|---|---|
| Burlington | 15.80¢ | $814 |
| Vermont | 16.95¢ | $1,172 |

**In 2013, an average Burlington residential customer paid *$358 less* per year than the statewide average** and lower than the average for every state in the region. Overall, this represented aggregate savings of $5.9 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 reflects the number of small rental units in Burlington.

# RATES AND BILLS

**The 2013 inflation-adjusted average annual 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 2013 was 54% higher than in 1990.




## COMMERCIAL & INDUSTRIAL CUSTOMERS

Average commercial and industrial rates have increased 8.0% since 2007. Although BED's rates remain slightly higher than the statewide average, the gap has closed in recent years.

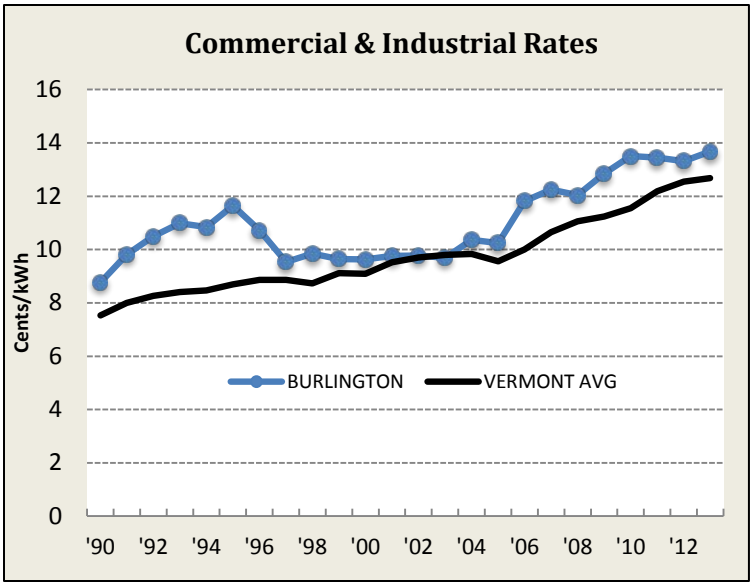
As the long term contracts entered by BED in recent years have started to deliver energy, and BED has needed to depend less on the New England spot markets, BED's average rates have stabilized.

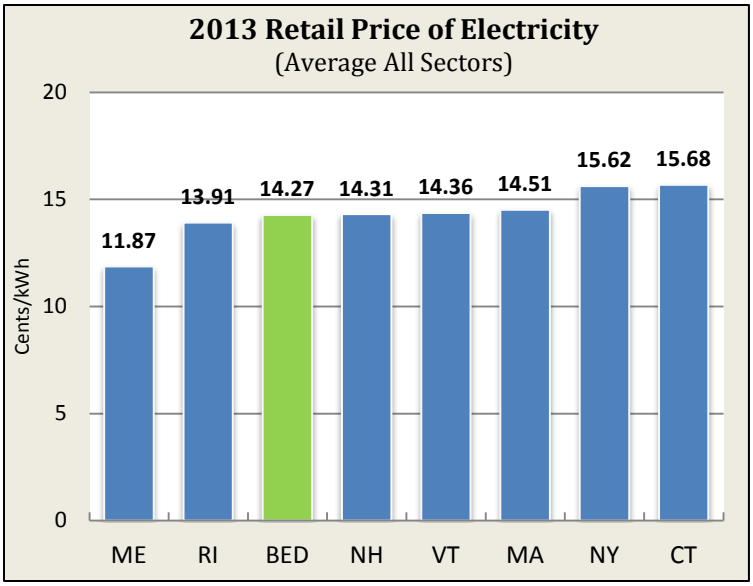
Other Vermont utilities have not yet absorbed as much of the new market prices, and will need to do so as they replace expiring contracts. At that point, their rates (and the statewide average) will very likely catch up with BED's.

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.

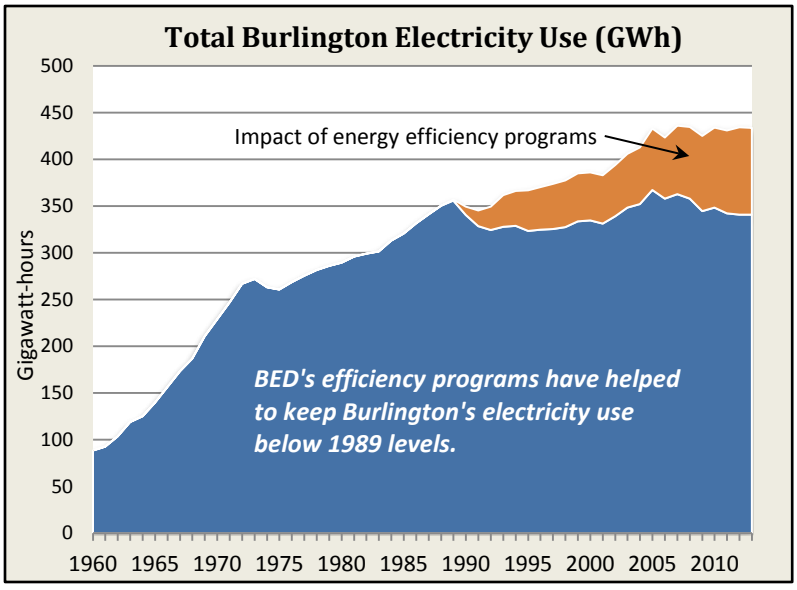
The bottom graph shows a comparison of BED's overall rates with other New England states. To the extent electric rates are a real or perceived issue for economic development, Burlington is in good shape within the region.

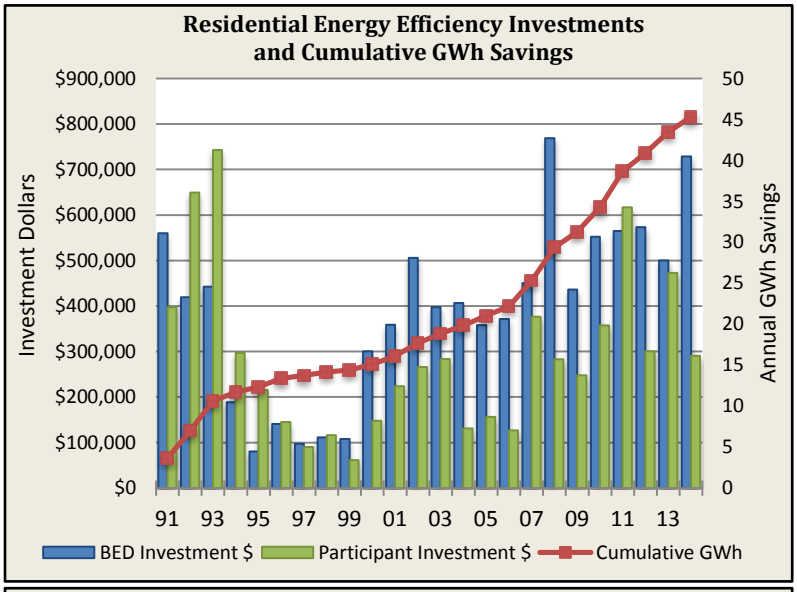
In any case, rates are still only half the picture. Along with the efforts to reduce rates, BED's Energy Services staff have helped C&I customers reduce their consumption through energy efficiency initiatives (see pages 6-7).

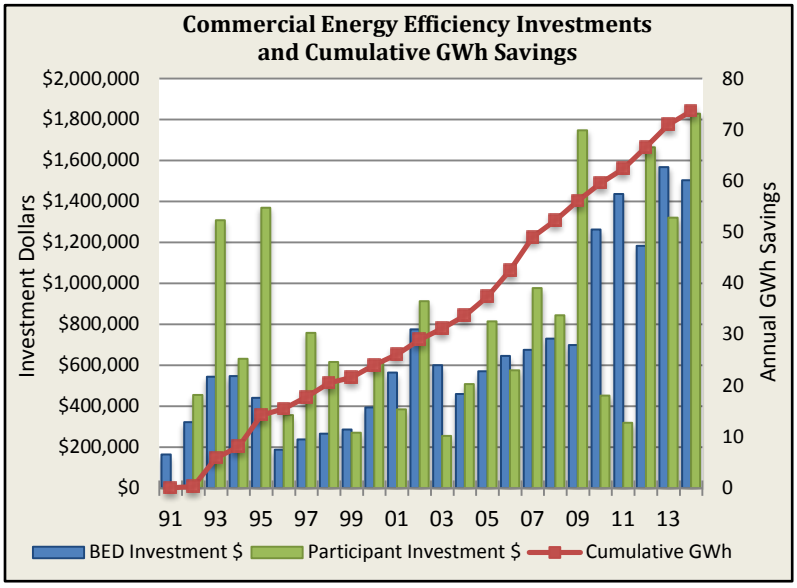


# ENERGY EFFICIENCY




BED has used its energy efficiency dollars wisely. Altogether, **BED has invested $23.9 million in energy efficiency and has leveraged another $25.9 million in private funds** from our customers. Almost all of these dollars re-circulate in the local economy. The efficiency investments saved Burlington customers $13 million in 2014 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 a quarter century ago. During the same period, statewide use of electricity increased by 9.0%.*

BED partners with Efficiency Vermont on the retail products program. Customers receive rebates for buying Energy Star lighting and appliances at local retailers. In 2014, BED customers purchased 43,300 compact fluorescent and LED bulbs and fixtures, 140 washing machines and 400 refrigerators.

Furthermore, efficiency investments helped Burlington avoid the release of 26,300 tons of $CO_2$ in 2014, equivalent to removing 6,900 cars from the highways.

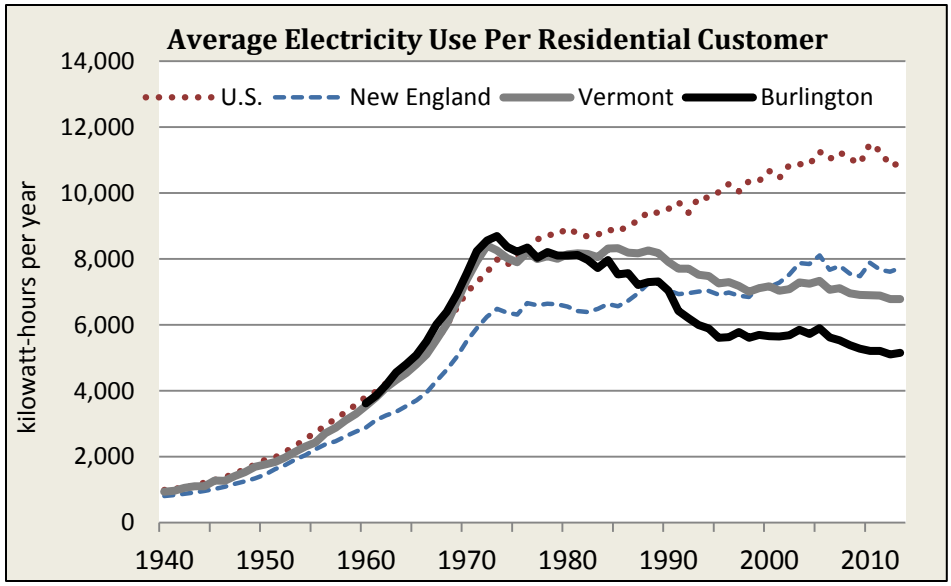
All customers pay for efficiency in their bills, so BED has programs tailored for all rate classes. The graphs at left and below show the distribution of resources and savings for residential and commercial & industrial customers.

BED's Energy Services staff worked with dozens of customers in 2014 to implement efficiency projects that save energy, enhance facilities, and improve competitiveness. Total customer savings were $1,331,000.

* Population growth was similar for Burlington and the state (8% v. 11% respectively), but statewide job growth was greater than Burlington's (17% v. 5%). This explains some portion of the variance.

# ENERGY EFFICIENCY

In 2014, BED's Energy Services staff worked successfully with many business customers to switch to LED lighting, which saves both energy and maintenance costs while providing high quality light. It is difficult to find a downtown retail store that has not taken advantage of BED's LED lighting service. BED also partnered with City Market to offer discounted LED bulbs to customers.




In 2014, BED continued to work closely with the Burlington School District (BSD) that completed dozens of lighting, ventilation and refrigeration efficiency projects in 2014. With BED's assistance, a complete LED lighting retrofit (with controls) was completed at the Champlain Elementary School resulting in significant energy savings and much improved light quality.

# 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 arrestor guards with the new guards that cover the entire arrestor top/connector, and install 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.

# POWER SUPPLY

BED's power supply reflects a number of considerations including cost, renewability, predictability & 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.

**Global Warming & Future Power Supply:** Generating electricity with fossil fuels contributes to climate change. In addition, fossil fuel based generation has considerable price volatility. BED has been a leader in renewable energy development. BED's 2008 Integrated Resource Plan established a goal to meet 100% of Burlington's needs with renewable resources by the end of 2012. BED reached this goal with the purchase of the Winooski One Hydroelectric Facility on September 1, 2014. The purchase was made possible using proceeds from a citywide bond vote that passed with more than 79% of the voters approving.

*Winooski One Hydroelectric Facility*

The Georgia Mountain Community Wind Project in Milton, Vermont operated at 94% of expected production in its first full year of operation 2013 and in 2014 produced materially in excess of expected production.

Lastly, by late 2014, the 500 kW solar project on the roof of the airport parking garage, developed in partnership with the Burlington International Airport, was substantially complete.

*Wind turbines on Georgia Mountain*

BED continues to expect that by 2015 energy from its renewable supply sources owned, contracted, or in process of being acquired will be sufficient to meet 100% of the city's electricity needs, before accounting for renewable energy credit transactions *(see below for the effect of REC transactions on BED's ability to claim renewability).* This milestone will give BED enormous flexibility in reacting to fossil fuel price swings, meeting future greenhouse gas regulation changes, and providing Burlington residents with affordable, environmentally friendly electricity well into the future.

**Integrated Resource Plan / Renewability**: 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. In order 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 that the energy from that resource as renewable.

BED's calendar 2013 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. After accounting for the sale of REC's, 33% of BED's needs were met with renewable energy in 2013.

# POWER SUPPLY

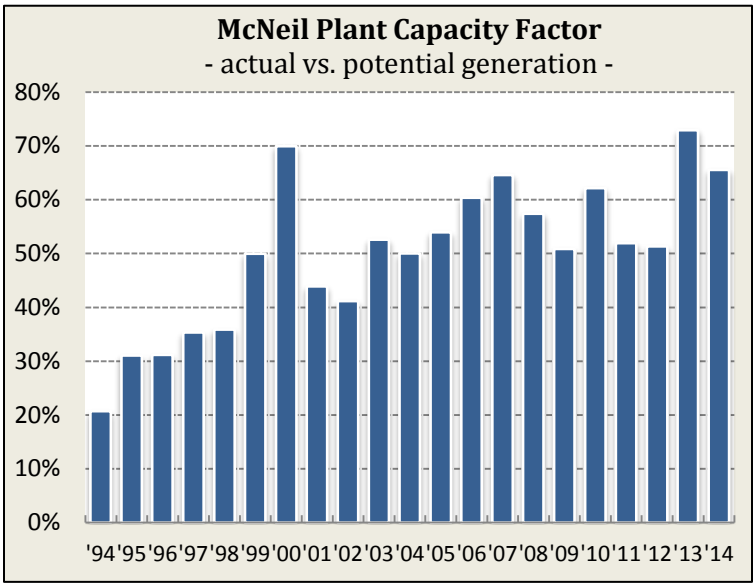
The REC's from these valuable sources were sold to reduce the rate impacts of purchasing long-term renewable resources. The BED Electric Commission has currently approved the sale of RECs through FY 2015 and continues to review the economics of selling REC's to control rates versus retaining the ability 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 can create 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 percent was due to 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.

*BED solar array under construction at Burlington International Airport*


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

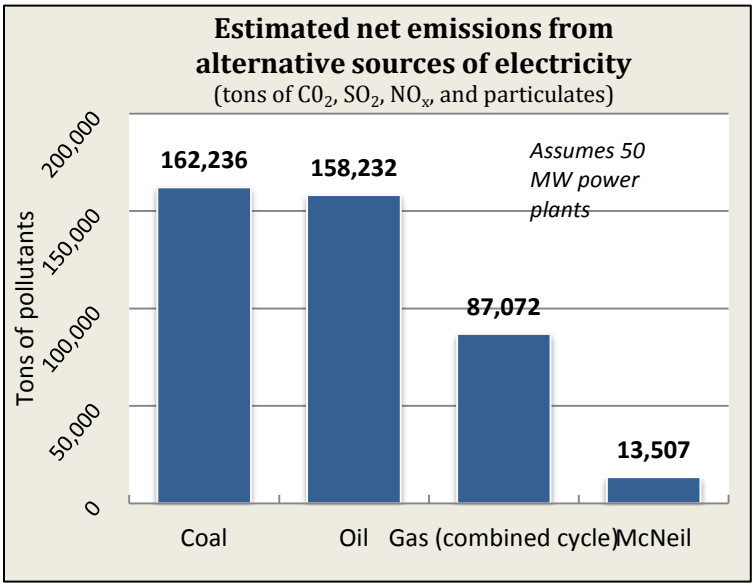
# GENERATION – THE McNEIL PLANT




Located in Burlington's Intervale, the 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 2014, McNeil Station produced 287,186 MWH of power and the plant had a 65.6% capacity factor. In addition to power, McNeil produced 287,186 Connecticut Class 1 Renewable Energy Certificates.

In 2008, McNeil Station voluntarily installed a Regenerative Selective Catalytic Reduction unit which reduces the NOx emissions from the plant to 1/3 of those allowed by the State of Vermont.



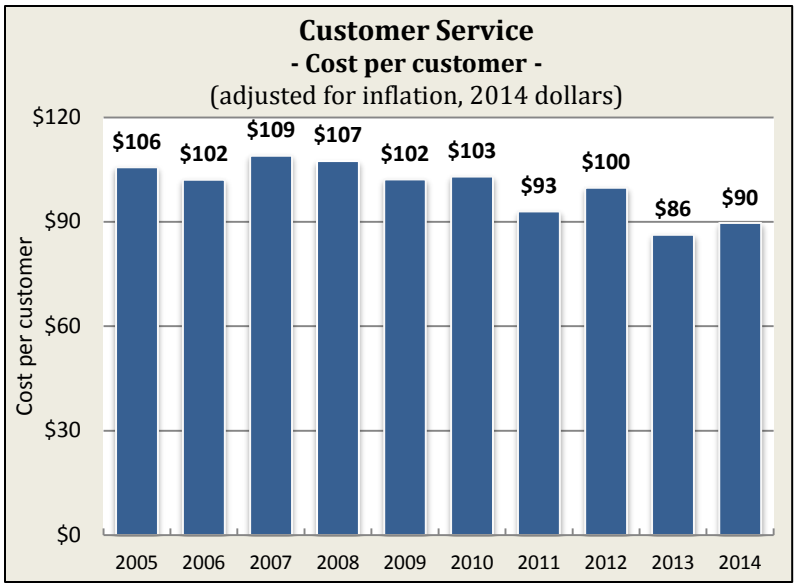

# HARVESTING BIOMASS

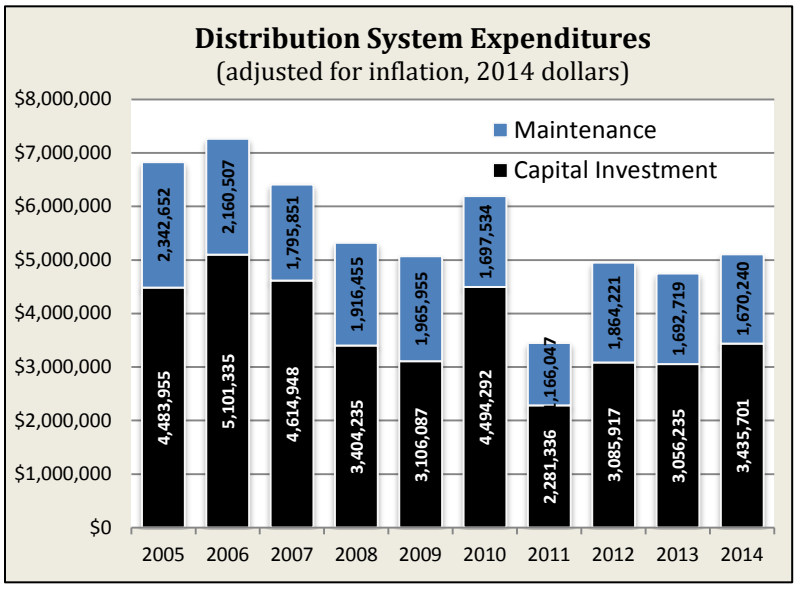
McNeil's wood harvesting standards are comprehensive, field-proven means to harvest biomass fuel sustainably, and have been used as a model in developing forest management certification criteria. Because the fuel is sustainably harvested, McNeil is net neutral from a carbon perspective. In 2014, McNeil Station used 440,803 tons of wood; 95% harvest residue, 3% 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.

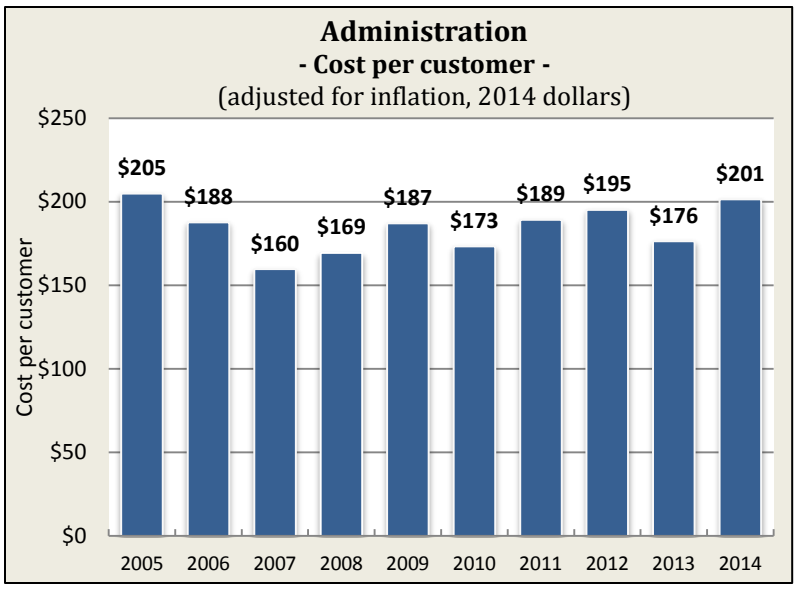
Harvest plans include protecting critical habitats and wetlands, including the following measures: McNeil foresters encourage the use of low impact harvesting equipment on sensitive sites; and McNeil manages its wood fuel inventory to minimize delivery disruptions during inclement weather and to avoid environmental impacts of harvesting during sensitive times of the year.

McNeil continues to operate the Burlington Waste Wood Depot, which provides local residents with a central location to dispose of clean waste wood at no charge. **In 2014 McNeil received 5,422 tons of waste wood which conserved over 16,000 cubic yards of landfill space and saved McNeil $74,980 in fuel costs.**

# OPERATING EFFICIENCY




Approximately 6,000 of our 16,600 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 ten 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 ticked up slightly from last year as we accelerated upgrades of equipment on 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, installation of capacitor banks, etc. The changes have reduced line losses from 4% in 1996 to an estimated 2% in 2013 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 126 today) and greater efficiencies through technology. Since the customer base is stable, any cost increases (e.g., health care, salaries, insurance, etc.) result in higher costs per customer. BED is undertaking 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**

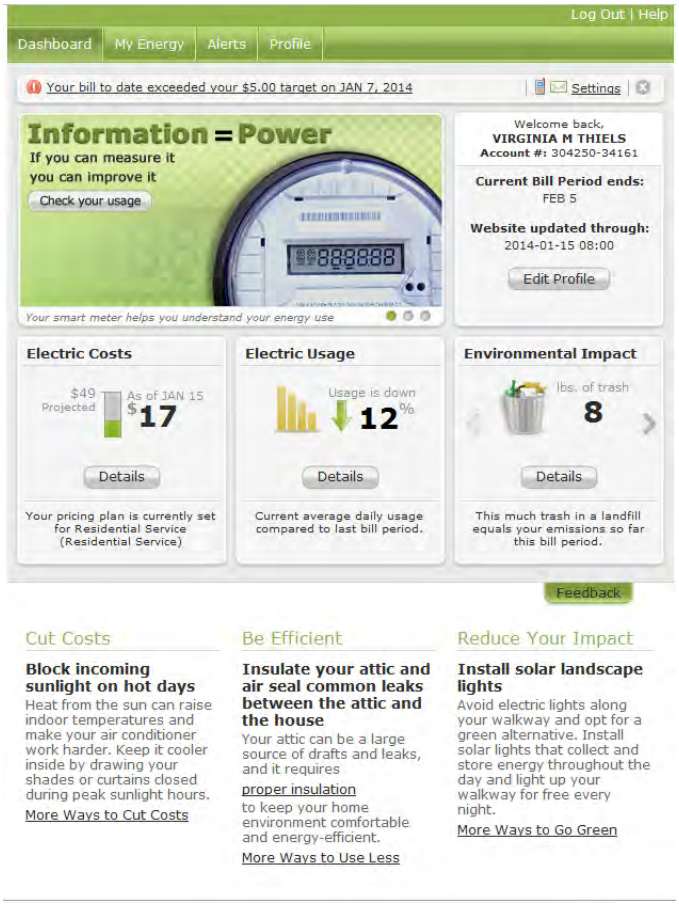
| Fiscal Year | Payment in Lieu of Taxes (PILOT) | City Franchise Fees | Totals |
|---|---|---|---|
| 2010 | $1,513,864 | $1,640,653 | $3,154,517 |
| 2011 | $1,570,954 | $1,678,281 | $3,249,235 |
| 2012 | $1,645,920 | $1,646,997 | $3,292,917 |
| 2013 | $1,770,701 | $1,637,827 | $3,408,528 |
| 2014 | $1,872,967 | $1,659,807 | $3,532,774 |
| **5 Yr. Totals** | **$8,374,406** | **$8,263,565** | **$16,637,971** |

# THE MANY BENEFITS OF SMART GRID

In 2010, BED was the recipient of a $7.15 million Department of Energy grant that funded 50 percent of the installation of a smart grid system that included the conversion to advanced meters. This project has fundamentally changed every aspect of how BED operates. This "Platform for the Future" has truly moved us into the 21st century, allowing us to keep up with the changes and innovation in the utility industry that continue to accelerate with each passing year. We are only beginning to experience their impacts through continued increases in the reliability of the electric grid, improved efficiencies, reduced environmental impact, and fundamental changes in how BED and its customers interact.

All along the way customers have been asking about the benefits of such a large investment. Now that the initial installation funded by the grant is complete and some of the benefits are becoming measurable, we can report on our experiences to date.

The benefits that we have seen so far include far fewer truck rolls around the city to read meters or to turn power on or off, which of course improves air quality and reduces costs of maintenance, gas and staff time. This new system allows small-scale local renewable energy to be more easily incorporated into BED's distribution system by allowing BED to simply re-program customer meters remotely if a generation source is added. It has also allowed BED to begin moving meter readers to new tasks, and to avoid some planned equipment purchases.



# THE MANY BENEFITS OF SMART GRID

| Benefit | Cumulative Benefit Estimate over Life of Investment | Actual Achieved Inception to Date |
|---|---|---|
| Power Cost Reduction - Energy | $ 4,046,796 | $ - |
| Power Cost Reduction - Capacity | $ 6,301,066 | $ - |
| Avoided Service Turn On/Off Cost | $ 3,554,823 | $ 57,195 |
| Meter Change-out Deferred | $ 1,585,173 | $ 38,105 |
| Avoided Off Cycle Read Costs | $ 968,506 | $ 18,132 |
| MV90 Software License Savings | $ 383,346 | $ - |
| Avoided Manual Meter Reading Costs | | $ 56,834 |
| Meter Reading Equipment Downsized (Salvage) | $ 7,388 | $ 7,449 |
| **TOTAL** | **$ 16,847,098** | **$ 177,715** |

BED will soon be offering new "time-of-use rate" structures to begin capturing the anticipated power cost reductions. Some remaining legacy software will also be retired in the upcoming year, capturing those savings, and BED will complete the connection between the AMI system and its Outage Management System to further enhance the reliability benefits of the system.

With the new advanced meters and the online Energy Engage program, customers will be able to assess which new rates work best for them. When more customers switch some of their electricity usage from high-cost on-peak power to lower cost off-peak we all benefit as a municipal utility. With the new time-of-use rates the customer will see this benefit right on their monthly bill.

As the transportation sector continues to move from gas to electricity the advanced meters will help enormously in making sure that e-vehicle owners fill up during the off-peak times. This will ensure improved air quality and lower carbon emissions.

The electric utility industry is at the beginning of a fundamental change in how people receive their energy. BED's smart grid investment has positioned Burlington to be at the forefront of that change, and we are already enjoying some of the benefits. But, there is much more to come, and we look forward to using smart grid technology to provide Burlington residents with even more efficient, transparent, and responsive service in the future.

*Bucket rides at the 2014 Kids Day in Battery Park*

All photos by Cathy Chamberlain, except control center on page 9. Cover design by Sue Storey.
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