

**Report to the Public Service Board**  
**2006-2008 Evaluation Activities Related to Vermont's**  
**Statewide Energy Efficiency Utility**

**December 11, 2009**



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## **Introduction**

Vermont legislation (30 V.S.A. §209) requires that the Public Service Board (“PSB” or “Board”) “[p]rovide for the independent evaluation of programs delivered” by an Energy Efficiency Utility (“EEU”) funded through an Energy Efficiency Charge (“EEC”). In its Order of 9/30/99 in Docket 5980, the Board approved a Memorandum of Understanding between parties that identified the Department of Public Service (“DPS” or “Department”) as the entity to “provide for formal evaluation of the Core Programs and any other System-wide programs approved by the Board for EEU implementation.” The Board approved MOU further specified that the evaluation would include, but not be limited to, an assessment of market transformation accomplishments.

In 2003, the Department provided a report on the conclusion of the Department’s EEU evaluation activities for the years 2000 through 2002. In 2006, the Department provided a similar report regarding activities for the second contract and performance cycle, 2003-2005. This report summarizes the DPS EEU Evaluation activities and results for 2006 through 2008, the third cycle of EEU performance and DPS evaluation.

### **I. DPS 2006 – 2008 EEU Evaluation Activities Plan**

On March 5, 2007, the Department provided the Public Service Board with its “Energy Efficiency Utility Evaluation Plan for Three-year Contract Period 2006-2008.” The plan contained the following objectives:

1. Verify the annual energy and coincident peak capacity savings and total resource benefit claims made by the EEU, as provided for in the contract with Efficiency Vermont (“EVT”) and the Public Service Board (“PSB”), and at Board direction for Burlington Electric Department (“BED”);
2. Conduct market studies to characterize and assess current conditions in discreet energy efficiency markets identified by stakeholders and in prior evaluation studies and reports;
3. Provide evaluation activities necessary to inform the implementation and success of the Public Service Board’s geographic targeting objectives and directives to the EEU. The Vermont legislature directed the Public Service Board to consider targeting the EEU services to maximize the value of the savings; and
4. Assess the impact of specific measures or initiatives where significant uncertainty exists and/or where the savings contribution is large. This work will be informed, at least in part, by impact evaluation needs as a result of EVT and BED’s participation in ISO-NE forward capacity market (“FCM”).

Three of the four objectives of the plan have been effectively addressed (i.e., items 1, 2 and 4 above), and a brief description of the activities and results is provided as section IV of this document. The fourth objective (item 3, evaluation of the geotargeted programs) will be carried over into the 2009-2011 time period. As a result of initial geotargeting program efforts being implemented from mid 2007-2008, it was not possible to provide a comprehensive “proof of concept” evaluation within the timeframe considered by the previous evaluation plan. That third objective is being addressed now and will be

completed midway through the 2009-2011 cycle. The 2006-2008 Evaluation Plan is provided as Appendix A to this document.

## II. Budget and Expenditures

When the three year budget for 2006-2008 was set in the fall of 2005, the budget total was legislatively capped at \$17.5 million annually, or \$52.5 million over the three years. The 2005-2006 General Assembly removed the cap and made other legislative changes to provide guidance to the Board in determining the EEU budget. In August of 2006, the Board set the budgets for each of the years 2006 through 2008 at \$19.5 million, \$24 million, and \$30.75 million respectively, for a total of \$74.25 million. The DPS EEU evaluation budget was increased proportionally, to a total of \$2.0 million for the three years. In a separate document, the Board approved the DPS use of carry-over funds from the previous budget cycle for future evaluation activities.<sup>1</sup> This resulted in a total 3-year potential budget of about \$2.3 million.<sup>2</sup>

Table 1 displays the preliminary budget allocations estimated in the 2006-2008 plan, along with actual expenditures over that time period. Each expenditure is discussed in more detail below.

<b>Table 1 – 2006 - 2008 Estimated Budgets and Actual Expenditures</b>		
<b>Evaluation activity</b>	<b>Budget Allocation</b>	<b>Actual Expenditure</b>
<b>Market characterization &amp; Assessments</b>	<b>\$1,080,000</b>	<b>\$1,141,278</b>
Residential Existing Homes On-Site Assessment	\$ 300,000	\$551,278
Residential New Construction Baseline Study(SF & MF)	\$ 200,000	
Business New Construction & Remodel On-Site Study	\$ 280,000	\$550,000 <sup>3</sup>
Business Sector Existing Buildings On-Site Study	\$ 300,000	
Analysis of CFL purchases in VT	---	\$40,000
<b>Impact Assessments</b>	<b>\$ 925,000</b>	<b>\$314,605.68</b>
Annual Verification Reports		\$314,605.68
<b>Planning &amp; Management</b>	<b>\$ 184,000</b>	<b>\$103,215.88</b>
Expert Assistance and professional development		\$103,215.88
<b>Other</b>	<b>\$ 124,395</b>	<b>\$226,370.77</b>
Potential Studies		\$163,980.42
Cost share with GMP EEF Evaluation		\$2,693.26
Regional Studies		\$59,697.09

<sup>1</sup>Board memo dated August 9, 2006

<sup>2</sup>Note that the Department did not spend funds that were carried over from the 2003-2005 evaluation period to 2006-2008. These funds were not part of the Department's approved request to carryover unspent funds from 2006-2008 to 2009-2011. The Department will file a separate memo regarding the future allocation of these funds.

<sup>3</sup>Approximately \$90,000 of the expenditures included in the Business Sector Market Assessments here was part of the aforementioned DPS carryover request, and spent in 2009. The funds are included here to show the full cost of the Assessment.

### **III. 2006-2008 Evaluation Activities and Results**

To implement the aforementioned objectives of the 2006-2008 plan, the Department issued formal Requests for Proposals (RFPs) for:

- An expert in energy efficiency evaluation to provide on-call evaluation planning, design, and management assistance. Dr. Martin Kushler, a nationally recognized energy efficiency evaluation expert, was retained to provide evaluation planning, design, and management services on call. Niko Dietsch, of the Environmental Protection Agency, and Carole Welch, an independent consultant, also provided expert assistance in 2008.
- Technical and management assistance in verifying Efficiency Vermont's annual savings and total resource benefit claims, and related activities, such as providing expert assistance reviewing technical reference manual (TRM) measure characterizations, verification of Burlington Electric Department's savings claims, and verification of Customer Credit Program savings claims. West Hill Energy & Computing was selected to provide these services.
- Residential Sector Market Characterization and Assessment studies. Nexus Market Research was selected to complete both the New Construction and Existing Homes segments of these studies.
- Business Sector Market Characterization and Assessment studies. KEMA, Inc. was selected to complete the Industrial Market, Business Existing Facility, and Business New Construction segments of these studies.

The DPS also directly contracted with Nexus Market Research to conduct a small follow up study to the Residential Existing Homes study regarding the sales of compact fluorescent light bulbs (CFLs).

Green Mountain Power Corporation (GMP), has established an Energy Efficiency Fund (EEF) to invest in energy efficiency projects that deliver significant and incremental benefits to GMP ratepayers. The Board approved a plan to use evaluation budgets to share in the cost of evaluation of the energy efficiency fund, understanding that results have significant relevance to statewide energy efficiency efforts. The Department hired RLW Analytics, (subsequently purchased by KEMA Inc) to perform evaluation activities related to GMP EEF measure implementation.

The Department has participated in the following regional studies<sup>4</sup>:

- NMR Lighting Persistence
- Nexus Market Research estimated measure life for various lighting products distributed through energy efficiency programs in New England. NMR recommended three different program-specific estimates of measure life for CFLs (coupon, direct install, and markdown) and two for exterior fixtures.

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<sup>4</sup>All regional and Vermont-specific studies referred to in this document are available electronically upon request. These documents should also be available online after the DPS completes a significant overhaul to its website.

- Nexus Market Research provided updated information to New England states that sponsor markdown and buydown programs to assist in calculations of demand and energy savings for compact fluorescent lamps obtained through these programs. The DPS and EVT have used this information to develop inputs to related Technical Reference Manual measure characterizations.
- RLW Analytics calculated on-peak and seasonal peak coincidence factors for residential room air conditioner measures to be consistently applied to energy efficiency programs in New England. The DPS and EVT have used this information to develop inputs to related Technical Reference Manual measure characterizations.
- *RLW Analytics* conducted research on behalf of the region to interpret and assess the feasibility of compliance with the ISO-NE's *Manual for Measurement and Verification of Demand Reduction from Demand Resources*. This information has been critical as the DPS furthers its Forward Capacity Market verification efforts.

The Department utilized Energy Efficiency Division staff to plan for and manage the implementation of the contracted evaluation activities described in the balance of this report. Staff also participated in significant regional activities, including NEEP's State Program Working Group that was instrumental in providing the framework for the participation of energy efficiency in the regional Forward Capacity Market (which set the stage for the current Measurement and Verification Forum).

Separately funded from the Evaluation budget outlined in Section III above, the Department in 2008 also issued an RFP for the planning and implementation of M&V for claims made by Efficiency Vermont and Burlington Electric Department into the Forward Capacity Market. This work is underway, and includes activities with which the Department has had little to no previous involvement, such as direct metering. The first certification for savings claimed in the FCM is due in May of 2010.

#### **DPS Verification of EVT Annual Savings and Total Resource Benefit claims**

EVT's contract with the Public Service Board provides for the DPS to annually review and verify EVT's claimed annualized energy and demand savings, and total resource benefits (TRB). This review is conducted from April-June of the year following the period in which the savings are claimed. With EEC funds budgeted for the three year contract cycle for this report, the DPS completed verification reviews for claims made for the 2005, 2006, and 2007 calendar years. The 2008 verification process was completed in June of 2009, funded through the EEC collected for the 2009-11 budget cycle. West Hill Energy & Computing (West Hill) provided these verification services to the DPS for calendar year 2005 savings under a previous contract. The Department issued an RFP for verification services in 2006. West Hill was again the successful bidder, and provided these services for savings and TRB claimed in 2006 and 2007.

Beginning in 2004 and continued through the review period considered in this document, the Department based its recommendations on the review of a stratified, random sample of commercial and industrial projects. The process is designed to ensure that the sample is weighted toward larger projects that embody greater variability and more complex

methods for calculating savings. The projects under review are reasonably representative of EVT’s activity, thus the DPS proportionally adjusts the remainder of commercial and industrial savings claims. This sampling and adjustment method reflects what would otherwise result from a comprehensive savings review of all custom projects, if resources and time permitted such and approach.

Residential savings are primarily prescriptive in nature, so the Department’s verification review consists largely of the verification that the agreed-upon savings methodologies as compiled in EVT’s Technical Reference Manual were correctly applied. Random sampling was not necessary. The remaining initiatives are generally relatively small in magnitude and the Department primarily reviewed the larger projects with higher savings.

The review generally lasts two to three months, and results in a DPS report and recommendation to the EEU Contract Administrator. The Contract Administrator subsequently makes a recommendation to the Board regarding the appropriate savings EVT may claim for the reporting year. Table 2 displays the recommended DPS reduction in claimed MWh savings for years 2005-2007.

Year	MWh Reduction <sup>6</sup>	
2005	5,176	10.0%
2006	2,902	6.3%
2007	2,183	2.8%

The results show substantial improvement over the three years of verification. The DPS in its report regarding the 2007 claim noted the “improvement in EVT’s documentation and the positive impacts of EVT’s quality control (QC) process. Many of the types of issues previously identified by the Department were flagged and addressed through internal QC.”

In addition to the production of verification reports, the DPS reviewed numerous additions and revisions to the Technical Reference Manual, and participated in regular Technical Advisory Group meetings with EVT, BED, and the EEU Contract Administrator.

**DPS Verification of BED Annual Savings and Total Resource Benefit claims**

During the 2006-2008 performance cycle, the DPS undertook a review of Burlington Electric Department’s 2006 energy efficiency activities, verifying the energy savings and

<sup>5</sup>The results of the DPS review are quantified as reductions to annualized kWh or MWh gross savings at the customer meter. The EVT contract savings goals are expressed in MWh savings at generation, net free ridership and spillover effects. For this reason, these amounts are approximate and are finalized by EVT when the changes are entered into the tracking system.

<sup>6</sup>The Verification adjustments do not include savings and TRB for the Customer Credit Program, since they are not included in EVT’s contractual goals.

coincident peak savings amounts claimed by BED.<sup>7</sup> The Department recommended a reduction in savings claims of 652MWh, or 10.7%. This was only the second verification review of BED's savings claims since the year 2002. Verification processes themselves often improve the quality of savings claims. This verification uncovered a number of issues regarding documentation, project classification, and quality control. The Department is aware that BED has responded to the recommendations in this report and put many procedures in place to address the issues uncovered in this verification.

The methodology used to verify BED's savings claim was similar to that used to verify EVT's claim. To measure savings for the Business Existing Facilities initiative, a stratified random sample of projects was taken, with results proportionally applied to the remainder of the population. For Business New Construction, a census of projects was reviewed. In the residential sector, all space heat fuel switches were reviewed, as well as prescriptive assumptions and average savings for other custom measures.

Due to time and resource limitation, the Department determined it to be more efficient to verify BED's year 2007 and 2008 savings claims together. This coordinates processes with verification of Forward Capacity Market claims for BED, and has been agreed to by BED. Accordingly, 2006 is the only year for which the Department produced a savings verification report in the period considered by this document.

### **DPS Verification of Customer Credit Program Savings and Total Resource Benefit claims**

On February 13, 2009, the DPS issued a report on the verification of annual MWh savings and TRB claims for the 2007 Customer Credit Program. The Customer Credit Program (CCP) allows eligible customers to set efficiency priorities and utilize in-house expertise to meet a company's internal goals for efficiency improvements while drawing on a portion of its payments to the EEC. There was one CCP participant in 2007.

Although this report was issued in 2009, most of the work associated with its production occurred in 2008, thus it is discussed in this report. The review was the first of the CCP since 2002. As such, it is not surprising that it highlighted areas where clarification of expectations for documentation of metered data and analysis is necessary. The report resulted in agreement of all parties to continue collaboration

Due to the small number of measures completed through the CCP, the DPS reviewed a census of all measures with savings claimed. Total annual electricity savings resulting from Customer Credit Program efforts were verified to be approximately 8.3MWh.

### **Residential Market Sector Evaluation**

In 2007, the Department commissioned Nexus Market Research (NMR) to conduct residential market assessment and baseline studies. Specifically, the Department sought assessments and two areas: an on-site assessment of residential existing homes and a residential new construction energy efficiency baseline study. Because of significant

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<sup>7</sup>The "DPS Verification of BED's 2006 Claimed Annual MWh Savings, Coincident Summer and Winter Peak Savings Final Report" was issued on March 31, 2008, and is available on the DPS website or on request.

differences in building characteristics, multi-family buildings were addressed separately in the new construction studies. Primarily the studies intentions were to identify and provide information about opportunities for achieving increased levels of cost-effective energy efficiency useful for program planning and design, and to develop current baseline data on market conditions that will be useful in future evaluations of EEU program effects.

#### *Existing Homes*

To assess the single-family existing homes market in Vermont, NMR conducted over 150 on-site audits that gathered detailed information on insulation, window, doors, HVAC systems, water heating, appliances, electronics, and lighting. Measurements of air leakage were taken at over 100 homes using a blower door test, and duct air leakage was measured at a handful of homes. The study identified cost as continuing to be the primary obstacle preventing homeowners from improving efficiency in the home. Among other suggestions, NMR recommended consideration of a homeowner education campaign, higher rebate levels for efficient products, low-interest loans for efficiency improvements, and targeting of homeowners already planning to remodel. Interestingly, the age of a home was found not to be correlated with key characteristics of energy efficiency.

#### *Single-Family New Construction*

The specific objective of this report was to conduct a market assessment, identify market baselines, and to help identify opportunities for increased energy efficiency in Vermont. To achieve these objectives, NMR conducted phone surveys, over one hundred on-site audits, and in depth interviews with builders and HVAC and insulation contractors. The results of this study show that the energy efficiency of new homes has improved since the last baseline study was conducted in 2002. However, the study also recommended a number of opportunities for improvement. For example, almost one-half of the homes with slabs do not meet Residential Building Energy Standard (RBES) insulation requirements, and almost one-third of tested homes have significant envelope leakage.

#### *Multi-Family New Construction*

The Residential Market Sector Evaluation separately summarizes the findings of on-site audits of new multi-family buildings in Vermont. The study found that overall, multi-family complexes in Vermont are very efficient. EVT worked with nearly all of the audited complexes. 17 out of 20 audited multi-family buildings are ENERGY STAR certified. The study indicates that EVT programs have been successful in reaching out to a significant portion of the new multi-family construction market in Vermont. However, there remain many opportunities to further increase the efficiency of multi-family construction. For example, the study finds opportunities for efficient heating, HVAC equipment, and appliances.

#### **Analysis of Compact Fluorescent Light bulb purchases in Vermont**

In 2008, the Department, in coordination with EVT, contracted directly with NMR to conduct a small follow up study to the residential market sector evaluation activities. The objective of this follow up study was to provide information to more accurately



characterize the level of compact fluorescent light bulb purchases in Vermont. The analysis provided the Department with estimates of the baseline, program effects, market-level net-to-gross ratio (NTG), CFL purchases per household and overall in-service rates.<sup>8</sup> The study concluded that because Vermont's ongoing support for CFLs has created a mature market and CFL sales surge nationwide (among other reasons) that declining NTG ratios would be seen in Vermont in the coming years, and recommended using 1.09 as a conservative NTG estimate. The final report date for this study reads June 9, 2009, however the bulk of the analysis was conducted in 2008 and the study was funded fully from the Department's 2006-2008 evaluation budget.

### **Commercial Market Sector Evaluation**

The Department commissioned KEMA, Inc. to develop a set of three reports to characterize the energy-related features and opportunities for cost-effective energy efficiency improvements in Vermont's business facilities. The goals of the project were to provide baseline data on current market conditions identify and provide information for use in program planning and design. Specifically, the reports seek to estimate the saturation of key end-uses, end-use technology shares, and efficient technology shares. To further support planning efforts, the reports developed primary information on the current market share of efficient equipment in the following end-use categories: lighting, packaged HVAC units, motors, and variable speed drives.

#### *Business Existing Facilities*

The study of existing facilities (those built prior to 2006) consisted of an on-site survey of a random sample of 117 commercial facilities. The study produced a significant amount of data characterizing the existing building stock, weighting results by both square footage and the number of premises in a particular building type (office, retail, rest). Both formats are useful for varying efficiency applications. KEMA found that in existing commercial facilities, there is still significant opportunity to upgrade fluorescent tube lighting and for lighting controls to all lighting type, efficient motors used for cooling and setback thermostats. The report recommends continuing to address small and large businesses differently, recognizing differing barriers for implementing efficiency measures.

#### *Business New Construction*

Specific objectives for the Business New Construction market included developing a quantitative profile of Vermont's population of new commercial facilities, developing end use saturation, and fuel and equipment shares, assessments of remaining energy efficiency opportunities based on on-site assessments. Unexpected limitations with available building permit data made a reliable estimate of the population of newly constructed facilities infeasible in this report. The study visited 27 newly constructed facilities in Vermont, reports on equipment saturations, and provides a qualitative indication of energy efficiency opportunities in the new construction market. The report finds opportunities in end uses and equipment such as lighting (occupancy sensors,

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<sup>8</sup> EVT contracted with NMR separately to gain further information regarding the level and location of CFL purchases in two geotargeted regions: St. Albans and Newport/Derby.

upgrading fluorescent tube lighting, LED installations), cooling controls, and setback thermostats.

### *Industrial Facilities*

To assess the industrial market, KEMA developed and deployed an on-site survey of a stratified random sample of 43 industrial facilities. The survey identified a large volume of potential energy efficiency improvements in generic lighting, motor, and compressed air systems among both smaller and larger industrial customers. The report suggests that engineering and financial support for system oriented measures is a significant area of opportunity. Measures that require a significant amount of diagnostic engineering to characterize and specify efficiency opportunities have the potential to produce large decreases in energy use. Other opportunities were found in interior lighting applications, motor systems, compressed air systems, and space heating and cooling applications.

## **Appendix A**

### DPS EEU Evaluation Plan for Three-year EEU funding cycle 2006 – 2008

March 5, 2007

#### *Introduction*

Vermont legislation (30. V.S.A § 209) authorizing the creation of an Energy Efficiency Utility (“EEU”) and funded through an Energy Efficiency Charge (“EEC,” or “wires charge”) requires that the Vermont Public Service Board (“PSB”) “[p]rovide for the independent evaluation of programs delivered” under this section. In its Order of 9/30/99 in Docket No. 5980, the Board approved a Memorandum of Understanding between the Vermont Department of Public Service (“DPS” or “The Department”), Vermont’s electric utilities, and a number of other parties. In the MOU, the parties agreed (in ¶ 11) that the Department was to “provide for formal evaluation of the Core Programs and any other System-wide programs approved by the Board for EEU implementation. This evaluation will include but not necessarily be limited to assessment of market transformation accomplishments, with accompanying proposals for program change.”

The Department provided these EEU evaluation services over the first 6 years of the EEU implementation, from 2000 through 2005.<sup>9</sup> This document outlines the Department’s plans for continuing to evaluate the Energy Efficiency Utility (EEU) programs for the three-year, 2006-2008 contract cycle.<sup>10</sup>

Vermont’s statewide EEU is known as Efficiency Vermont (“EVT”). Efficiency Vermont services and initiatives are provided for most of Vermont under a Public Service Board contract with the Vermont Energy Investment Corporation (“VEIC”), a non-profit organization located in Burlington, Vermont. The City of Burlington Electric Department (“BED”) provides the energy efficiency utility services in their service territory. This evaluation plan is applicable to both EVT and BED programs.

The development of this Plan incorporates input from the EEU implementers, EVT and BED, the EEU Contract Administrator, and other stakeholders. This input was obtained in a September 2006 meeting and in subsequent communications.

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9 See DPS website at <http://publicservice.vermont.gov/pub/2003-2005summaryreport.htm>

10 Additional funds may be needed to conduct measurement and verification (“M&V”) evaluations that may be required to support the reliability of EVT and/or BED capacity savings submitted to ISO-NE in the Forward Capacity Market (“FCM”) auction and for subsequent payment submittals in any successful market participation. This plan is intended to be sufficient for the M&V described in the November 17, 2006 Vermont’s EEU M&V Plan for the ISO-NE FCM transition period.

## Budgets

When the three-year EEU budget was set in the fall of 2005, the budget total amount was legislatively capped at \$17.5 million annually. At that time, the DPS EEU evaluation budget was set at 3.3% of this total or about \$1.7 million for the three-year period. The 2005-2006 Vermont Legislature removed the \$17.5 million cap and made other changes to provide guidance to the Public Service Board in determining the EEU budget. In an August 2, 2006 Board order, the EEU budgets for each of the years 2006 through 2008 were set at \$19.5 million, \$24 million, and \$30.75 million respectively. The DPS EEU evaluation budget was increased to a total of \$2.0 million for the three years. In a separate document, the Board approved the DPS use of carry-over funds from the previous budget cycle for future evaluation activities.<sup>11</sup> This results in a total 3-year budget of about \$2.4 million or approximately 3.2% of the total EEU budget. Table 1 shows the amount of available funds for each of the years upon which this plan is proposed.

Table 1: DPS EEU Evaluation Available Funds

	2006	2007	2008	3-Year Total
Budget	\$677,000	\$692,000	\$708,000	\$2,077,000
Carryover		\$236,676		
Total	\$677,000	\$928,676	\$708,000	\$2,313,676

These funds are used to pay the costs of independent evaluation contractors whose services are procured through a competitive process. The cost of DPS staff time devoted to EEU evaluation activity is currently funded through the Department budget and is in addition to this amount.

## Evaluation Goals and Objectives

The goal of this plan is to provide the Board with an independent evaluation of EEU programs, pursuant to its statutory obligations under §209(e)(10). As a result of the implementation of this plan, the Department, Board, and various stakeholders will have a better understanding of Vermont's energy efficiency markets and the impacts of the EEU's activities. Toward that end, this plan has the following overall objectives:

5. Verify the annual energy and coincident peak capacity savings and total resource benefit claims made by the EEU, as provided for in the contract with Efficiency Vermont ("EVT") and the Public Service Board ("PSB"), and at Board direction for Burlington Electric Department ("BED");
6. Conduct market studies to characterize and assess current conditions in discreet energy efficiency markets identified by stakeholders and in prior evaluation studies and reports;

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11 Board memo dated August 9, 2006

7. Provide evaluation activities necessary to inform the implementation and success of the Public Service Board’s geographic targeting objectives and directives to the EEU. The Vermont legislature directed the Public Service Board to consider targeting the EEU services to maximize the value of the savings; and
8. Assess the impact of specific measures or initiatives where significant uncertainty exists and/or where the savings contribution is large. This work will be informed, at least in part, by impact evaluation needs as a result of EVT and BED’s participation in ISO-NE forward capacity market (“FCM”).

To meet these objectives, a number of evaluation activities will be conducted through the use of independent contractors. Competitive bids for specific identified objectives will be sought through the request for proposals (“RFP”) process starting in January 2007. A preliminary budget breakdown is presented in Table 2. More detailed budget information can be found in Appendix A.

Table 2: Preliminary Budget

<b>Market characterization &amp; Assessments</b>		<b>\$1,080,000</b>	<b>46.7%</b>
Residential Existing Homes On-Site Assessment	\$ 300,000		
Residential New Construction Baseline Study (SF & MF)	\$ 200,000		
Business New Construction & Remodeling On-Site Study	\$ 280,000		
Business Sector Existing Buildings On-Site Study	\$ 300,000		
<b>Impact Assessments</b>		<b>\$ 925,000</b>	<b>40.0%</b>
<b>Planning &amp; Management</b>		<b>\$ 184,000</b>	<b>8.0%</b>
<b>Other</b>		<b>\$ 124,395</b>	<b>5.4%</b>
<b>Total</b>		<b>\$2,313,395</b>	

## Market Characterizations and Assessments

With the increased EEU budgets, directive for geographic targeting, and the potential for the Board to reconsider the 2008 EEU budget set in the Board’s August 2, 2006 order, there is a need to conduct market studies to identify areas of promising efficiency potential and to inform program design decisions. The Department intends to conduct market assessment and baseline studies initially in pursuit of this goal and has allocated about 46% of the three-year budget amount for that purpose. The detailed budget in Appendix A lists the proposed areas for study. Issues for consideration are listed and briefly described below.

1. “Early retirement” programs. The July 2006 *Vermont Electric Energy Efficiency Potential Study* conducted for the DPS by GDS Associates found that so-called “early retirement” resources were likely to be somewhat more costly (though still cost-effective) than current program lost-opportunity acquisitions. This is not surprising, but efforts in this area may well be necessary to achieve the new, higher energy efficiency objectives. This is an area that requires more research and investigation into potential early retirement opportunities. Leading examples include refrigeration and air conditioning systems, but other areas should be investigated as well. Also, the DPS proposes to conduct market assessment research on industrial process opportunities and develop case studies that document the impact of energy efficiency improvements on particular industries.
2. Residential multi-family new construction baseline study. About half the activity in the residential new construction market is associated with multi-family and single family attached homes. A study that determines current practices in these market, as well as current lighting levels and HVAC equipment in all new homes, would be useful.
3. Residential New Construction lighting baseline study. The DPS annual verification process has identified a need to update the baseline levels and characteristics of lighting in new residential construction. The study might simultaneously update other selected characteristics of the residential new home market and explore possible program design modifications to acquire more efficiency.
4. Update key business sector market effect indicators. Two areas identified for emphasis are building commissioning and the effective use of day lighting.
5. Residential appliances. The evaluation work completed by KEMA in February 2006 estimates much less net impact in recent years, although the study leading to that conclusion seems to inadequately capture the effect on the market of Vermont’s multi-year, ongoing efficiency programs. In response to this situation, this Plan proposes two additional evaluation activities for this cycle. One is to commission a project to review and assess the best current methodologies for estimating net program effects on the market. The other is a new market assessment for residential appliances which would be useful to assist residential program design efforts.
6. Direct some research toward the challenge of increasing first-time participants. One example is some research/evaluation toward EVT’s stated objective of increasing the participation of large grocery stores in stocking and displaying CFLs in the Retail Products initiative.
7. Conduct an evaluation of the Manchester community based project. In its September 25, 2006 order, the PSB directed EVT to use the additional budget amounts to maximize peak capacity reductions statewide and to seek energy and capacity reductions in targeted geographic areas. A study that looked at the Manchester experience would be useful for future geographic targeting initiative designs.

## Impact Assessments

### Annual Savings Verification Process

Accurate and credible savings estimates are a vital component of the statewide energy efficiency programs operated by EVT and BED. The 2006-2008 Board's contract with VEIC for EEU services specifies that the DPS is responsible for the annual verification of EVT's energy and capacity savings and total resource benefits ("TRB") claims. The contract contains performance indicators for MWh savings, coincident summer KW peak, coincident winter KW peak, and total resource benefits.<sup>12</sup> EVT's Annual Savings Claim is provided on April 1 following each year of implementation. The DPS conducts a two-month intensive review of the savings and TRB claim and provides its report and recommendation to the EEU Contract Administrator on or about June 7. The process includes the design and implementation of a stratified random sample of business custom projects for review, reviews of measure-level savings in EVT's central database, electronic and paper files for custom projects, savings analysis tools, and pre-installation and post-installation billing history for selected projects. There also is an ongoing technical advisory group process that reviews EVT's technical reference manual additions and revisions, follows up on Department findings in its verification process, and provides a forum for other issues related to EVT's savings estimate procedures.

For this contract period, the Department plans to take steps to further increase the scope of its verification process. The past two years saw a great improvement with the adoption of a stratified random sampling methodology to review savings claimed for EVT's business sector services.<sup>13</sup> However, the constrained verification process time period has limited the ability to conduct site-specific verification activities that could provide greater savings certainty for large projects or unusual measures. An RFP for these services for this contract cycle will seek proposals that include additional measurement and verification of large or unusual projects, or measures that result in a large savings amounts.

In addition, the DPS will conduct an annual review to verify Burlington Electric Department ("BED") annual savings and TRB claims.

### Other Impact Assessments

The verification process is the backbone of the Department's assessment of the impacts of the EEU's savings and activities. The process and its results often point to items and issues where additional evaluation studies are needed. The increasing emphasis on energy efficiency impacts in electric infrastructure planning for both

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<sup>12</sup> Contract negotiations are presently underway to establish indicators for geographic targeting.

<sup>13</sup> See 2004 and 2005 verification reports on DPS website at:  
<http://publicservice.vermont.gov/pub/2003-2005summaryreport.htm>

Vermont and New England helps enhance the importance of rigorous impact evaluation.<sup>14</sup>

Vermont's relatively small evaluation budget is a key consideration, however, as impact evaluation can be a very expensive activity.<sup>15</sup> The goal is to accomplish good, defensible impact evaluation estimates at a reasonable cost. This requires careful strategic targeting of evaluation efforts.

This plan proposes to allocate about 40% of the total three-year budget for impact evaluation studies and activities; \$400,000 of which is estimated for the verification process as described above. The remaining \$525,000 will be allocated for discreet studies in the areas of priority interest. Wherever it is possible and appropriate, the Department will seek to partner with other New England jurisdictions for these studies, to maximize the available funds.

The following list provides several examples of current areas of high priority interest. However, the significantly increased EEU budgets ordered by the PSB in August 2006 and the evolving role of efficiency resources in the ISO-NE forward capacity market requires some flexibility with respect to specific objectives for this Plan. This list, therefore, may be supplemented following future discussions with interested parties in Vermont.

1. Measure persistence and longer-term spillover for residential and business sector lighting. The interest is in both residential and business sector lighting products, especially compact fluorescents bulbs, associated with the EVT Retail Products initiative.
2. Assumptions used to estimate savings from lighting products reported in the Retail Products initiative that are attributed to business customers. In 2005, business customers made twenty-four percent of the CFL bulbs purchased through the Retail Products initiative. These purchases represented 53% of the lighting savings attributed to Retail Products. The in-service rates and hours-of-use documented in EVT's technical reference manual generally reflect standard commercial business characteristics. However, an initial investigation of EVT's tracking system data suggests 70% of these bulbs are linked to hospitality, property management, and religious building accounts. A study that investigates the disposition of these bulbs and reviews the assumptions used to estimate the savings is needed.

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<sup>14</sup> Impact evaluation is "used to measure the change in energy and/or demand usage (such as kWh, kW and therms) attributed to energy efficiency and demand response programs." *The Need for and Approaches to Developing Common Protocols to Measure, Verify and Report Energy Efficiency Savings in the Northeast*, Final Report, January 2006, Northeast Energy Efficiency Partnerships, Inc. (NEEP).

<sup>15</sup> The EEU evaluation budget is about 3.2% of the overall EEU budget for the three years. This is at the low end of typical evaluation allocations in the industry, where a common rule of thumb is 5 to 10% of the total budget.



3. Market effects (spillover, free-riders) for the Business New Construction Initiative. Vermont recently passed Commercial Building Energy Standard (“CBES”) legislation, putting standards into effective January 1, 2007. Understanding the impact of EVT activities on standard practice and determining the degree of code compliance are issues central to understanding what savings can be attributed to EVT’s activities in the commercial new construction market.
4. Snow making efficiency measure impacts. Installation of efficient snow making equipment is by the far the largest technology savings in 2005 and EVT indicates additional projects are currently in progress. The DPS verification review identified a number of questions and issues about these measures and their actual impact on energy and demand use at the ski areas.

## **Planning & Management**

The DPS currently has a three-year contract with Dr. Martin Kushler for expert energy program evaluation services, including evaluation design and technical quality control, which extends for the 2006-2008 cycle. In addition, the Department anticipates it will require additional planning and management services in the fall of 2007 through at least mid-2008 to prepare a DPS report and recommendation to Board by March 1, 2008 for the 2009 – 2011 EEU budget. The total budget allocation for Dr. Kushler and the additional assistance is estimated at \$184,000.

## **Other**

The Department’s proposed budget includes \$124,000 for a process evaluation for the EVT Community based pilot in Manchester, and to cover the additional, unanticipated cost of the July 21, 2006 Vermont Electric Energy Efficiency Potential Study totaling \$74,394.<sup>16</sup> Miscellaneous general expenses are also included under this category.

## **Implementation Strategy and Scheduling**

Implementation of this plan will take place primarily in calendar year 2007 and early 2008. A general strategy is outlined as follows:

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<sup>16</sup> The Department received Board approval for this use of unspent EEU evaluation funds (carry over) from the previous contract cycle. This was a one time Department EEC expenditure, as the Docket 5980 MOU that resulted in the creation of the statewide EEU provided for the funding of periodic efficiency potential studies through a utility bill back mechanism.

1. Issue an RFP for a verification contractor for a two-year contract with option for additional 2-year renewal.
2. Develop and issue RFP's for market assessment and baseline studies in early 2007. This work will help identify opportunities for increased energy efficiency to meet the new EEU budget and savings goals. To the extent practical, studies will be grouped into a minimal number of RFP's.
3. Issue an RFP to develop improved methods to assess net savings impacts, including consideration of attribution, free riders, and spillover.
4. Use the results of the market assessments, baseline work and methodology studies to refine and frame impact evaluations that will be done in 2008.
5. Implement targeted process evaluations as needed for new initiatives and programs with significant uncertainty.

### *Proposed Market Assessment and Evaluation Activities*

The three markets where studies are most needed are residential existing homes, business new construction and remodeling, and business existing buildings. The Department's priority proposals are as follows:

1. Conduct a large scale (100 – 200) on-site assessment of existing single family homes to:
  - a. Document current building and equipment status and potential,
  - b. Assess barriers to higher efficiency on specific priority measures, such as residential customers with no CFLs, and
  - c. Assess potential receptiveness to specific energy efficiency upgrades, including early retirement of targeted appliance and HVAC equipment.

These on-site assessments would not include detailed energy audit type calculations, but rather would be used to gather categorical information on current conditions and physical potential for upgrades, plus customer perceptions and receptiveness with respect to energy efficiency upgrades.

2. Conduct an on-site study of business new construction and remodeling to:
  - a. Document building and equipment status and energy efficiency potential, including targeted baselines for lighting power density ("LPD") and HVAC EER's, and saturation of super T8s and CFL fixtures;
  - b. Determine packaged HVAC distribution of efficiencies by size, and assess the potential for efficiency improvement; and
  - c. Understand the characteristics of equipment change-out in the remodeling market and how energy efficiency might be better incorporated into the market.
3. Conduct a relatively large-scale (50 – 100) on-site assessment of existing business buildings to:
  - a. Document building and equipment status and energy efficiency potential, including targeted baselines for lighting power density ("LPD") and HVAC EER's, and saturation of super T8s and CFL fixtures;

- b. Determine packaged HVAC distribution of efficiencies by size and assess the potential for efficiency improvement; and
- c. Characterize the remodeling and equipment change-out markets and how energy efficiency might be better incorporated into those markets.

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