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October 7, 2013

Susan M. Hudson, Clerk  
Vermont Public Service Board  
112 State Street  
Montpelier, VT 05620-2701

Re: EEU 2013-01 Department of Public Service Table of Electric Modeling Assumptions and Additional Information

Dear Mrs. Hudson:

The September 10, 2013 comments of the Department of Public Service ("Department") in the above-referenced proceeding indicated that additional information related to the documentation of modeling assumptions (including a table of assumptions and associated values for use in modeling of electric scenarios) would be filed with the Board by September 30, 2013. On September 26, 2013 the Department requested until October 7, 2013 to make this filing, which is also made on behalf of Vermont Energy Investment Corporation ("VEIC") and City of Burlington Electric Department ("BED").

The Department notes that on September 30, 2013 the Public Service Board ("Board") issued an Order directing certain electric resource acquisition scenarios to be analyzed and approved specific electric and thermal energy and process fuel quantitative performance indicator frameworks for VEIC and BED. The Board's Order also approves the electric modeling assumptions filed jointly by the Department, VEIC and BED on August 15, 2013 and September 10, 2013.

This filing is comprised of two parts. First, we provide additional information related to the specific assumption categories listed below which was not available at the time of Department's August 15th and September 10th filings. This information is provided to give additional background and context for the assumptions and we do not request Board approval of the information in this filing at this time. However, we welcome further process and suggest that written comments from interested stakeholders may be appropriate.

Second, this memo summarizes the Board approved and additional electric modeling assumptions in tabular format. The Department notes that the documentation of available assumptions and model inputs may be a useful communication tool in the current and future



Demand Resource Plan (“DRP”) modeling efforts and serve as a reference for DRP project managers, contractors, and interested stakeholders.

## **Part One: Additional Information Related to Assumption Categories**

### **Base Appliance and Equipment Efficiency Levels, Free rider and Spill Over Rates, and Measure Life**

As noted in the Department’s August 15, 2013 memo the basis for assumptions and model inputs related to base appliance and equipment efficiency levels, free rider and spill over rates, and measure lives are largely sourced from the Technical Reference Manual (“TRM”) and specific characterizations where TRM values are not available. The data represented in this category is a combination of public (TRM values) and proprietary (specific characterizations where TRM values are not available) information. The Department will make TRM values available to interested stakeholders upon request.

A list of measures that have the potential to have an impact on savings estimates in the DRP proceeding is included in Attachment A. Measures receiving TRM updates are under consideration on an ongoing basis in the Technical Advisory Group (“TAG”) process and some measures in Attachment A have been updated since the inaugural DRP. Measures in Attachment A are intended to serve as a sample and the list is not considered to be comprehensive.

### **Behavioral Measures, Advanced Metering Infrastructure (“AMI”) Enabled Measures, and Other New Measures**

Behavior, AMI-enabled, and other new measures that are not currently part of the TRM and savings portfolios of VEIC and BED are included in Attachment A. Per VEIC and BED’s current order of appointments behavior savings cannot be claimed in years 2012-2014 without renegotiating savings goals with the Department and receiving approval from the Board. The Department’s concerns largely relate to the persistence of behavioral savings over time as well as appropriate methods for cost-effectively verifying the realized energy savings from such initiatives. Behavior measures can generically be classified by market sector – residential, commercial, and industrial. VEIC and BED are currently investigating approaches for capturing behavior savings. It is anticipated that specific behavioral measures will be a part of the VEIC and BED savings portfolios starting in year 2015, and general market sector behavior categories have been included in Attachment A.

For context, VEIC has two behavior engagement pilot projects scheduled for 2014. The Department, VEIC, and BED agree that persistence and verification issues become more manageable when isolated to specific behavioral engagement strategies. As a consequence we are considering the challenges associated with quantifying persistence and verification of savings primarily within the context of the pilot programs below. In general, the outcome of these behavior pilots will help determine specific behavioral focused initiatives, savings estimates, and verification methodologies going forward.

### Commercial and Industrial Sector

#### *Strategy: Continuous Energy Improvement*

Continuous Energy Improvement (“CEI”) is a long-term, comprehensive strategy for maximizing energy productivity. CEI integrates capital upgrades, process improvements, maintenance, and employee engagement to yield deeper, more sustainable savings. CEI is based on the philosophy that on-going, incremental change that benefits an organization is the responsibility of everyone. This strategy has recently been tested in the Energy Leadership Challenge program.

### Residential Sector

#### *Strategy: Home Energy Reports*

This approach utilizes home energy usage data, individualized reports, customer specific messaging and other tools to encourage behavioral customer engagement.

In addition, as noted in the Board’s Order of October 4, 2013 in EEU 2013-05, the Revision of the EEU Process and Administration Document, in reference to Section II.1.B of the document: *“The DRP proceeding may include consideration of the potential for cost-effective technologies that increase the use of electricity while decreasing overall energy consumption.”* Therefore, some measures in Attachment A may fall into this category.

## **Part Two: Table of Electric Modeling Assumptions**

A table of policy assumptions and model inputs are documented below. All listed assumptions and inputs are intended to reflect the values in the Board’s order in EEU-2013-01 dated September 30, 2013. Items with asterisks (“\*”) are new and are offered on an informational basis to provide additional context and background.

### **Policy Assumptions**

|                                     |                                                                                      |
|-------------------------------------|--------------------------------------------------------------------------------------|
| <i>Low-Income Sector Equity</i>     |                                                                                      |
| VEIC                                | 8.9% of resource acquisition budget annually for forecast period                     |
| BED                                 | 2.6% of resource acquisition budget annually for forecast period                     |
| <i>Small Business Sector Equity</i> |                                                                                      |
| VEIC                                | 1,950 customers w/ less than 40,000kWh annually                                      |
| BED                                 | 158 customers w/ less than 40,000kWh annually                                        |
| <i>Residential Sector Equity</i>    |                                                                                      |
| VEIC                                | 34%, 36%, 37% of resource acquisition budget for years 2015, 2016, 2017 respectively |
|                                     | Average 40% of resource acquisition budget for years 2018-2022                       |
|                                     | Average 43% of resource acquisition budget for years 2023-2027                       |
|                                     | Average 46% of resource acquisition budget for years 2028-2032                       |
|                                     | Average 48% of resource acquisition budget for years 2033 and 2034                   |
| BED                                 | 25% of resource acquisition budget annually for forecast period                      |
| <i>Commercial Sector Equity</i>     |                                                                                      |

|      |                      |
|------|----------------------|
| VEIC | Inverse of the above |
| BED  | Inverse of the above |

### Modeling Inputs

|                                                                                                                |                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Impacts of Changes in Codes and Standards</i>                                                               |                                                                                                                                                |
| VEIC/<br>BED                                                                                                   | Savings potential reduction due to residential and commercial code updates as well as stretch code.                                            |
| <i>Avoided Costs</i>                                                                                           |                                                                                                                                                |
| VEIC/<br>BED                                                                                                   | Most recent Board approved avoided costs (new avoided cost pending Board approval as of 9/27/2013 in EEU-2013-07)                              |
| <i>SMEEP and CCP Participant Load</i>                                                                          |                                                                                                                                                |
| VEIC                                                                                                           | SMEEP load - determined in DRP load forecast and removed                                                                                       |
| VEIC                                                                                                           | CCP load - determined in DRP load forecast and removed                                                                                         |
|                                                                                                                | CCP \$ set aside - remove \$970,000 annually from EVT resource acquisition                                                                     |
| <i>Measure Decay</i>                                                                                           |                                                                                                                                                |
| VEIC/<br>BED                                                                                                   | Treated in load forecast used in DRP analysis - available upon request from DPS                                                                |
| <i>Base Appliance and Equipment Energy Efficiency Levels, Free Rider and Spill Over Rates and Measure Life</i> |                                                                                                                                                |
| VEIC/<br>BED                                                                                                   | Technical Reference Manual (TRM) measures - available upon request from DPS                                                                    |
| VEIC/<br>BED                                                                                                   | *Measures updated in the TRM estimated to have an impact on savings estimates relative to inaugural DRP - samples in Attachment A of this memo |
| VEIC/<br>BED                                                                                                   | *Custom measures - available upon request from DPS (modeler specific and may be proprietary)                                                   |
| <i>Behavioral Measures, Advanced Metering Infrastructure (AMI) Enabled Measures, and Other New Measures</i>    |                                                                                                                                                |
| VEIC/<br>BED                                                                                                   | *AMI - no standalone AMI Enabled measures (considered only as a data collection tool)                                                          |
| VEIC/<br>BED                                                                                                   | *Behavioral Measures - some savings generally included in model (no specific measures at this time)                                            |
| VEIC/<br>BED                                                                                                   | *Other new measures - sample in Attachment A of this memo                                                                                      |

Thank you for your consideration,

For the Department of Public Service



Brian Cotterill  
Energy Program Specialist



Jeanne Elias  
Special Counsel

cc: EEU 2013-01 Service List (electronic service only)

## Attachment A

### Sample of New and Updated Measures with Savings Impact Relative to Inaugural Demand Resource Plan Proceeding

| Measure Name and Brief Description                                                                | Market/Initiative |
|---------------------------------------------------------------------------------------------------|-------------------|
| Next generation Efficient Snow Guns                                                               | C&I               |
| Next generation Efficient Variable Frequency Drives                                               | C&I               |
| Roof Top Unit - Advanced Controls                                                                 | C&I               |
| Whole Building Controls and Energy Dashboard Measure                                              | C&I               |
| Advanced Compressor Controls                                                                      | C&I               |
| ENERGY STAR-based Commercial Reach-in Refrigerators and Freezers                                  | C&I               |
| Permanent Magnet Motors                                                                           | C&I               |
| Next Generation Refrigeration Compressors                                                         | C&I               |
| DOE Challenge Rooftop Units                                                                       | C&I               |
| C&I Behavior                                                                                      | C&I               |
| Air-source Heat Pump Heating and Cooling Measure                                                  | C&I and Res       |
| Heat Pump Water Heater                                                                            | C&I and Res       |
| HVAC Pumps and Circulators                                                                        | C&I and Res Rx    |
| Heat Recovery Chillers                                                                            | C&I Custom        |
| Unitary HVAC Equipment (RTU, split systems)                                                       | C&I Custom and Rx |
| Hybrid Packaged HVAC Equipment                                                                    | C&I Custom or Rx  |
| Linear LED Replacement Lamps. No existing measure codes or characterizations.                     | C&I Lighting      |
| Fluorescent (includes all C&I HPT8, T5, and CFL)                                                  | C&I Lighting      |
| Exterior LED Fixtures (includes parking area, street lighting, wall packs, etc.)                  | C&I Lighting      |
| Interior LED Fixtures (includes downlights, cooler/freezer case lights, 2x4 / 2x2 troffers, etc.) | C&I Lighting      |
| Lighting Controls (includes occupancy, daylight, and exterior controls)                           | C&I Lighting      |
| Screw Base LED Measures                                                                           | C&I Lighting      |
| Chillers (comfort cooling)                                                                        | C&I Rx            |
| Direct Drive Fan - retrofit measure for HVAC                                                      | C&I Rx            |
| Synchronous Belt - Retrofit measure for HVAC                                                      | C&I Rx            |
| ENERGY STAR-based Commercial ice Machines                                                         | C&I Rx            |
| Air-source Heat Pump                                                                              | Existing Homes    |
| Early replacement Refrigerator/Clothes Washer                                                     | Existing Homes    |
| Heat pump Water Heater                                                                            | Existing Homes    |
| Plug-in Vehicle/Charging                                                                          | Existing Homes    |
| Replace Electric Heat with Air-source Heat pump                                                   | Existing Homes    |
| Residential Behavior Change                                                                       | Existing Homes    |
| Smart Thermostat                                                                                  | Existing Homes    |
| Solar Hot Water                                                                                   | Existing Homes    |

*Attachment A-(continued)*

**Sample of New and Updated Measures with Savings Impact Relative to Inaugural Demand Resource Plan Proceeding**

| <b>Measure Name and Brief Description</b>                                                       | <b>Market/Initiative</b>                 |
|-------------------------------------------------------------------------------------------------|------------------------------------------|
| Whole House Fans                                                                                | Existing Homes                           |
| Whole House Controls                                                                            | Existing Homes                           |
| Direct-installation Lighting and Water Conservation                                             | Existing Homes                           |
| Efficiency Kits                                                                                 | Existing Homes                           |
| Electric Heat Fuel Switch to Natural Gas                                                        | Existing Homes                           |
| Ventilation Fans                                                                                | Existing Homes                           |
| Replace Electric Water Heater with Heat Pump Water Heater                                       | Low Income Single Family and Multifamily |
| Capture Electrical Savings of Installing a High Efficiency HRV Instead of a Less Efficient HRV. | Multifamily                              |
| Screw-base LEDs                                                                                 | Multifamily                              |
| Combined HVAC and Hot Water Appliances                                                          | RNC                                      |
| Hybrid Water Heaters                                                                            | RNC                                      |
| Electric Vehicle Charging Stations                                                              | RNC                                      |
| Residential Behavior Change                                                                     | RNC                                      |
| Smart Thermostat                                                                                | RNC                                      |
| Solar Hot Water                                                                                 | RNC                                      |
| Whole House Fans                                                                                | RNC                                      |
| Air-source Heat Pump                                                                            | RNC                                      |
| Pumps and Circulators                                                                           | RNC                                      |