



128 Lakeside Avenue, Suite 401
Burlington, VT 05401 USA

Tel: (802) 658-6060
Toll-free: (800) 639-6069

veic.org

March 10, 2014

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

Re: **EEU 2013-01** VEIC Additional Information for DPS Request to Re-run Scenario Modeling

Dear Ms. Hudson:

On March 3, 2014 Vermont Public Service Board ("Board") issued a Memorandum in this proceeding requesting additional information and comment to help inform the Board's decision as to whether to adopt a recommendation posed by the Department of Public Service ("Department") on February 10, 2014. In its comments, the Department requested three things:

1. That the Board order VEIC to re-run the modeling scenarios with no savings or costs attributed to non-hard-wired initiatives in the resource acquisition estimated budgets and savings for three and twenty years.
2. That savings and costs of behavioral measures be re-attributed to installed hard-wired measures.
3. That VEIC provide additional information regarding its heat pump penetration assumptions and information about the potential impact of changes in penetration rates on VEIC's modeling results

On February 21, 2014, VEIC replied to the Department's comments with estimates of schedule and budget impacts of re-running the scenarios. VEIC also provided a response to the Department's questions about heat pump penetration assumptions.

The Board issued four additional questions for VEIC to answer in its March 3, 2014 memo. VEIC provides the following information in response to this request from the Board.

- 1. Is there a way to analyze the DPS's proposed re-attribution of costs and savings from behavioral measures to installed hardware measures without the need to re-run the scenario modeling entirely, presumably in a manner that would cost less than VEIC's estimate of \$72,500?**

Response:

VEIC's time and budget estimates was based upon producing three additional scenarios with a similar level of detail, documentation, and internal and external review than VEIC's three scenarios filed on December 6, 2013. If the Board desired Scenarios #1 (Level Budget) and #2 (Sustained Growth) produced with less supporting detail and greater uncertainty surrounding the savings estimates, VEIC believes that it could be accomplished by mathematically manipulating the outcomes from the December 6th Scenario #3 (Aggressive Growth). However, VEIC is not aware of any method to significantly decrease the time or expense of preparing Scenario #3 with the proposed new assumption excluding behavior based initiative cost and savings.

If the Board were to accept the above #1 and #2 scenario modeling limitations, VEIC estimates that the proposed re-run could be accomplished in 3 weeks at an estimated cost of \$58,000 (80% of VEIC original estimate of \$72,500 proposed in the VEIC response dated February 21, 2014). However, if the Board was to eventually adopt either remodeled Scenario #1 or #2, VEIC would need to invest the time and resources to fully develop the selected model in order to produce measure level detail and documentation of the expected savings.

- 2. Would stakeholders be able to make informed budget and savings recommendations absent a re-run of the scenario models, as recommended by the DPS? Participants are reminded that savings estimates will need to be updated anyway once the Board has made a budget determination.**

Response:

In the event that the Board does not adopt the Department's proposed assumptions concerning behavior-based initiative costs and savings, VEIC would be able to make an informed budget and saving recommendation absent a rerun of the scenario models. In the event that the Board does adopt the Department's proposed assumptions concerning behavior based initiative costs and savings, VEIC would not be able to make informed budget and savings recommendations without a rerun of the scenario models.

- 3. Has the VEIC Response adequately addressed the DPS's questions regarding heat pump measure assumptions? How does not having heat pumps in the VELCO forecast affect the modeling results? On page 19 of the VEIC Response, VEIC states that it assumes "40% of homes will be heated by air source heat pumps." However, on page 20 of the VEIC Response, there is a table showing "[t]he total number of ASHPs modeled in each scenario and the portion of residential accounts that each represents," ranging from 5.5% to 13.3%. Please clarify what percentage of Vermont households were assumed to have adopted heat pumps in the modeled scenarios. Does the table on page 20 of the VEIC Response reflect the number of residential air source heat pump incentives that VEIC has modeled in each of the three scenarios?**

Response:

Not having heat pumps in the VELCO forecast results in a load forecast that is lower than otherwise would be if heat pumps were included. Consequently, because the annual savings



targets for Scenario 3 are based on a percentage of sales, the savings targets are lower than targets would otherwise be if heat pumps were factored into the load forecast. If the VELCO forecast were revised to include heat pumps and VEIC were to model the same 3% scenario, budgets would be significantly higher than those in the current Scenario 3. The inclusion of heat pumps in the VELCO load forecast does not impact Scenario 1 and 2. Those scenarios are budget based rather than based upon achieving a fixed reduction in load, and thus not dependent upon the VELCO load forecast.

The table on page 20 of the VEIC Response (shown below as Table 1) reflects the number of residential air source heat pump incentives that are modeled in each of the three scenarios. This includes homes replacing electric resistance heat with a new heat pump and supporting the purchase of a new high efficiency heat pump over a new baseline heat pump at time of replacement or in new construction. As with any efficiency measure, we expect there to be purchases and installations of baseline efficient heat pumps which would not be eligible for an incentive. We also expect purchases of efficient heat pumps that do not receive an Efficiency Vermont electric efficiency incentive. Therefore the total number of homes with heat pumps would exceed the values in the table on page 20. The 40% represents VEIC's estimate of the total number of homes by 2034 that are electrically heated – not just those that were incentivized in the electric or thermal initiatives. The only place that this assumption is used is in the calculation of the thermal electric savings derived from behavior measures. If the penetration rate is less than 40%, we would still expect to achieve energy savings, but fossil-fuel based savings rather than electric.

Table 1 Total ASHP penetrations as a percent of residential accounts

	Total ASHPs	% of Residential Accounts
Scenario 1	18,010	5.5%
Scenario 2	20,554	6.3%
Scenario 3	43,447	13.3%

Total Residential Accounts, 2012: 326,965

4. If the Board were to direct VEIC to re-run the scenario models, would any participant recommend a different set of assumptions regarding heat pump measures?

Response:

VEIC does not recommend a different set of assumptions regarding heat pump measures for the following three reasons.

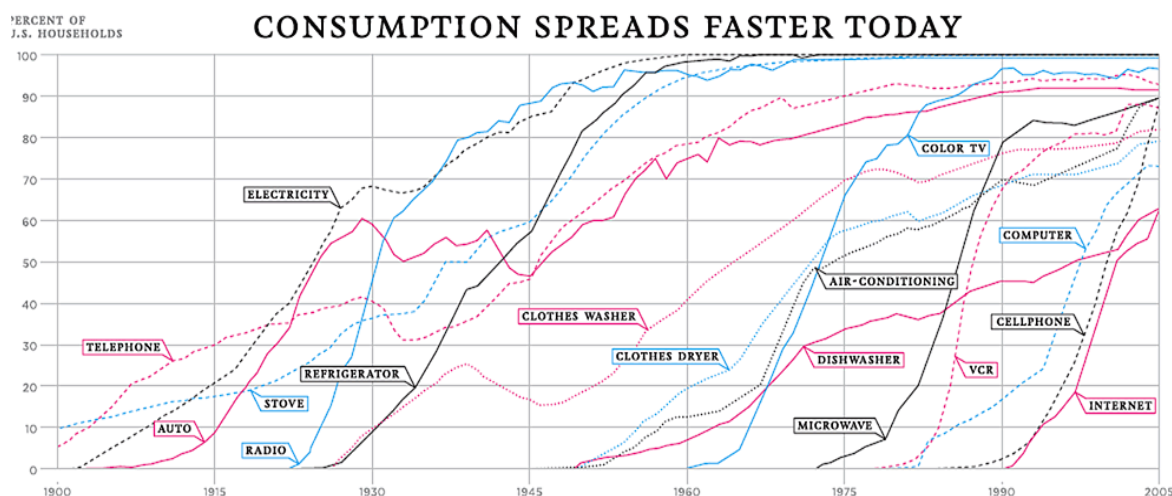
1. Adopting differing penetration rates will have little effect on proposed EEC budgets and savings. Lower penetration rates would imply that a relatively small quantity of financial heat pump incentives would be diverted to other technologies. In that case, neither total



expenditures nor savings may differ from the original model as those alternative investments might produce similar savings yields. Electrical savings from behavior based initiatives would shift to fossil based savings, as temperature set-backs will still save energy.

2. Twenty year forecasts of the adoption rates of new technologies are fraught with uncertainty. As Nils Bohr, Nobel laureate in Physics, once said, “Prediction is very difficult, especially if it’s about the future.” VEIC’s estimate was based upon its best professional judgment informed by customer and industry research.
3. Research suggests that the adoption rates of new technologies are not linear but follow an “s” shaped curve and that adoption rates are accelerating as shown in Table 2¹. As illustrated in the graph below, many recent technological innovations have reached greater than 40% household penetrations rates in significantly shorter times than 20 years. Whether heat pumps will follow that pattern is debatable. Fortunately, Vermont will have the opportunity to revisit and revise its 20 year forecast in three years and every three years thereafter².

Table 2:



In addition to the questions posed above, the Board requested in its March 3, 2014 Memo, that participants file proposals on how to best amend the schedule in this proceeding. VEIC presents three alternative amended schedules in **Attachment A**, based upon the three possible scenario construction outcomes.

VEIC has no further comments regarding either the Department’s February 10, 2014 recommendation or VEIC’s response. VEIC appreciates the opportunity to provide this

¹ <http://visualizingeconomics.com/blog/2008/02/18/adoption-of-new-technology-since-1900>

² “If you have to forecast, forecast often.” –Edgar R. Fiedler in *The Three Rs of Economic Forecasting-Irrational, Irrelevant and Irreverent*, June 1977

additional information to the Board and parties in this proceeding. Please feel free to contact me if you have any questions regarding this filing.

Sincerely yours,

A handwritten signature in blue ink that reads "Michael J. Wickenden". The signature is fluid and cursive, with the first name "Michael" and last name "Wickenden" clearly legible.

Michael Wickenden
Director of Regulatory Affairs

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

