RECURVE
SHAPE THE FUTURE OF ENERGY

Comments on
Efficiency Maine Trust
Beneficial Electrification Study
January 17, 2020

Dear Efficiency Maine Trust,

Recurve respectfully submits comments on the Beneficial Electrification Study released in December 2019. We support thoughtful analysis of uncovering the barriers and opportunities for beneficial electrification in the transportation and heating sectors in Maine. Recurve applauds Efficiency Maine Trust (the Trust) for consideration of the potential foreseen and unforeseen shifts to load shapes as part of this transition to a clean energy future.

Recurve is an industry leader in meter-based demand-side energy management. We provide an advanced M&V platform, based on the open source OpenEEmeter, to track and normalize metered consumption data from individual buildings and understand their aggregated performance to provide flexible, demand-side load balancing.

We help load serving entities forecast the effects of a range of electrification strategies and track their performance over time. Recurve has analyzed the load shape impacts of heat pump retrofits, both in homes with pre-existing electric heat as well as those undergoing fuel switching. This analysis has provided our clients with bottom-up visibility into the hourly grid impact of heat pump retrofits, essential information for forecasting the additional load demands of aggressive building electrification and the carbon impacts resulting from these interventions.

The Recurve platform supports a meaningful feedback loop for continuous program improvement. The Recurve platform empowers program managers by providing real-time visibility into the performance of their entire suite of demand side resources. As annual program savings goals are replaced by time and locational savings requirements, and energy efficiency is becoming embedded within larger DER and electrification strategies, the timeliness and granularity of insight enabled by the Recurve platform provides the necessary actionable intelligence for flexible demand management.

We welcome the opportunity to discuss these ideas and resources in more detail.

Respectfully,

Carmen Best
Director of Policy & Emerging Markets
RECURVE

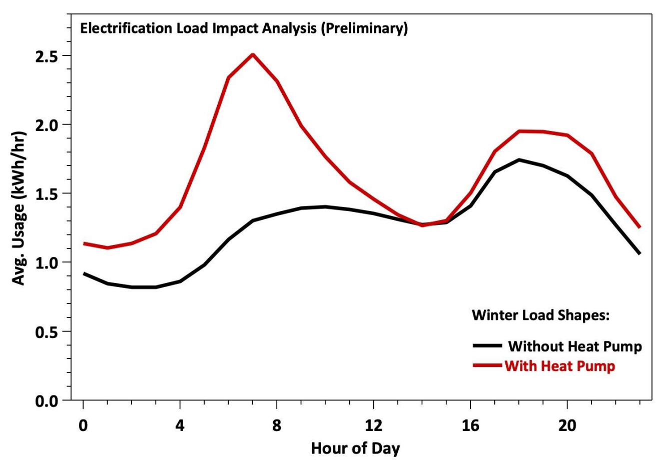
Response:
Section 5 of the Beneficial Electrification Study details the barriers to electrification and how to overcome them. Subsection 5.1.1, which begins on page 20, aims to examine barriers and solutions as they relate to the Energy Grid in both a supply and demand context. Recurve wishes to specifically comment on Load Flexibility and how flexible demand is essential to electrification and eventual decarbonization.

Absent from the Beneficial Electrification Study, specifically, as it pertains to load and demand flexibility, are details on how the various options to measure load shape impacts can affect how the success of electrification strategies. We present the following evidence as to why an integrated, meter-based approach should be applied to electrification and all demand flexibility programs broadly:

Metered Load Flexibility for Electrification and Decarbonization
Implementing building electrification is a critical component of all decarbonization strategies. At least 75% of gas space and water heating must be converted to (green) electric power to achieve current emissions targets.[1] However, the only way to achieve these desired carbon reductions is to pair electrification with effective load and demand flexibility to manage new system peaks.

Quantifying actual changes in energy consumption allows accurate calculations of reductions in GHGs across all fuels. Along with quantification of grid avoided costs, these metrics serve as a common valuation principle that puts gas savings, electrification load impacts, and complementary demand flexibility all on the same footing.

Accounting for both decarbonization and grid avoided cost is essential, as the increased load from electrification will create new grid dynamics such as a winter morning peak and increased evening usage driven by heat pump space heating.



To fully decarbonize the grid, electrification must, therefore, be complemented by an increased supply of wintertime optimized renewables, and behind the meter demand flexibility (EE, DR, Storage).

Tracking and procurement of load and demand flexibility at the meter will accelerate decarbonization through beneficial electrification combined with the full range of generation, storage, and load-balancing tools required to decarbonize the grid.

[1] Sacramento Municipal Utilities Department, Resource Planning Report, p. 52, Filed April 2019

Procurement Planning
Increasingly, utilities and other program administrators are opting for metered pay-for-performance (P4P) in order to cultivate markets, leverage AMI data, and integrate demand-side resources--all foundational elements of an electrification strategy built for long-term success.[2] The stacked value of decarbonization and demand flexibility can be used as the basis of a price signal for pay-for-performance as well as integrated cost-effectiveness reporting.

In the case of decarbonization, the reduction of GHG emissions from natural gas and the increase in electrical demand on a marginal hourly basis must each be properly accounted for and then combined to determine the net impact on GHGs.

These reductions inform the utility avoided cost of decarbonization. New overnight loads from heat pumps must be minimized in order to offset additional costs from expensive wintertime renewable energy and additional energy storage needs. When a heat pump is running overnight, the benefit of reduction in heating energy needs during that time period is multiplied in the context of decarbonization.

GHG and grid impacts can be quantified and valued as follows:

1. Collect customer gas and delivered fuels data and calculate GHG reductions from observed savings.
2. Quantify hourly demand changes from electrification and other behind the meter flexibility such as EE, DR, or Storage.
3. Calculate the electric GHGs based on the marginal hourly GHG intensity of a kWh and the hourly metered impact on demand.
4. Calculate the utility avoided cost value of demand changes based on hourly change in demand and the marginal cost of alternatives (for example, winter solar+storage).
5. Establish a meaningful value for GHG reductions and calculate the net GHG value across all fuels.
6. Combine avoided cost and GHG value as the basis for cost effectiveness and payments.

To accelerate the decarbonization and electrification process, regulators or utilities can increase the value of GHG savings and include the full life-cycle of natural gas GHG emissions.

[2] See, for example, https://www.nyserda.ny.gov/All-Programs/Programs/Business-Energy-Pro

An integrated, meter-based approach should be applied to all demand flexibility programs including electrification, demand response, energy efficiency, and storage / EV programs. This approach can also serve as the foundation for meter-based pay-for-performance which enable marketplace innovation to develop new business models and technologies necessary to achieve full electrification of buildings and decarbonized grid.

Meter-based pay for performance and standard and transparent quantification of GHGs and avoided costs provide utilities with the inputs necessary to identify the most valuable virtual power plants. With transparent, real-time M&V, these portfolios can serve as procurable, reliable, and financeable decarbonization resources.

Appendices:

Decarbonization of electricity requires market-based demand flexibility, Electricity Journal M. Golden, A. Scheer, C. Best; August 2019 [In press version attached in pdf]
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Measure Carbon Like Our Planet Depends On It, Recurve, June 10, 2019
https://www.recurve.com/blog/measuring-carbon-like-our-planet-depends-on-it

Policy Pathways to Meter-Based Pay for Performance, C. Best, M. Fisher, M. Wyman August 2019
https://www.iepec.org/2019_proceedings/#/paper/event-data/044-pdf

The Economics of Clean Energy Portfolios, Rocky Mountain Institute, M. Dyson, A. Engle, J. Farbes, 2018.
https://rmi.org/insight/the-economics-of-clean-energy-portfolios/