# Response to Questions on the Baseline Energy Forecast

**State of New Hampshire**
**State Energy Advisory Council**

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# 1. General Questions

## *1.1 What is the source of the population estimates?*

*The population estimates were taken from the NH Office of Energy and Planning,* Population Projections.

## *1.2 What is the source of the economic forecast and how was this used?*

*The economic forecast was developed using the US Department of Commerce Bureau of Economic Analysis (BEA)* Gross Domestic Product by State *data set. This data was analyzed in concert with the recent population data from OEP and vehicle miles traveled (VMT) data from the Federal Highway Administration (FHWA) to establish a trend of economic activity per capita and a relationship between VMT and GDP.*

## 2. Questions about the Electric Sector Forecast

### *2.1 How does the model account for PPA and REC Prices?*

*The model considers the total financing of renewable projects but is agnostic on the mechanism of the financing (either through a long-term PPA or through selling RECs). As such, it is not possible to separate out the specific price for RECs for each project. The ISO-NE states are modelled as being able to trade RECs in order for all of them to meet their internal RPS mandates.*

### *2.2 How does the model account for the transmission costs of renewable integration?*

*A transmission interconnection cost is included with wind resources, and transmission upgrades are assumed for the grid as a whole.*

### *2.3 How does the model account for transmission constraints?*

*The model assumes that new resources are constructed with sufficient transmission capacity such that their operation is not curtailed by transmission constraints.*

### *2.4 How does the model account for capacity factors?*

*The capacity factors of plants are estimated using historical data and estimates from NREL.*

### *2.5 How does the model account for the cost and emissions of spinning reserves?*

*Given that most renewable energy is non-dispatchable, the model takes this into account and increases the amount of dispatchable resources necessary to balance the grid. Beyond this, the model was not built to address any further ancillary services.*

### *2.6 How does the model account for negative pricing protection costs?*

*At the level of renewable penetration which the model is forecasting, there will be minimal issues with system integration. Although the model is not capable of predicting hourly price fluctuations, it is expected that there will be minimal negative price fluctuations.*

### *2.7 How does the model account for the electric energy efficiency portions of the New Hampshire Core Energy Efficiency Programs?*

*The model uses data from the 2013 New England* Capacity Energy Loads and Transmissions Report*, and includes Energy Efficiency as a reduction in demand, not a competing resource.*

### *2.8 Does the model account for non-airborne emission power generation rules including the Mercury and Air Toxics Standards (MATS)?*

*The model takes non airborne pollution into account, including MATS which primarily affects coal retirements and retrofits.*

### *2.9 What factors determine utilization of hydroelectric capacity?*

*The model uses historic weather normalized data in order to predict hydro capacity.*

### *2.10 How does the electric sector forecast account for plant closures?*

*The model considers the economics of operating each resource in order to determine the capacity factor. However, the decision to continue operating or close down a plant requires much more information and has not been built into the model. Instead, it relies on the assumptions made by the operators of those facilities and accounts for all planned and announced plant closures.*

### *2.11 How does the electric sector model differentiate between ISO-NE and NH with respect to energy pricing and pollution?*

*Pricing is specific to NH including transmission and distribution costs, whereas pollution is calculated based on an ISO-NE wide demand share based average.*

### *2.12 What is driving the jump in the price of electricity in 2018?*

*Although there is a slight increase in natural gas prices in 2018, there is a jump in wholesale electricity prices from $38.62/MWh in 2017 up to $47.55/MWh in 2018. The price of natural gas and the price for electricity follow each other closely since natural gas fired power plants are generally the marginal units, which set the price of electricity. In the model the two are matched until 2018 at which point an assumed carbon price of $10/ton is implemented. This national policy supersedes the Regional Greenhouse Gas Initiative (RGGI) and effectively replaces any cost of carbon associated with that program. Although the exact nature and price of the carbon policy is unknown, Navigant believes that this is a*

*reasonable assumption and uses it in order to model changes in generation in the face of some form of carbon policy.*

### *2.13 How close will NH be to making the 25% Renewable Portfolio Standard by 2025? What is and what is not included in this goal?*

*The model indicates that 20% of the generation will come from renewables by 2025. The model assumes some cost-containment of the RPS but is agnostic towards the mechanism – either through ACPs or through changes in what resources are included in meeting the target.*

## 3. Questions about the Thermal Sector Forecast

### *3.1 How does the forecast account for electricity used for heating, including both direct electric heating and indirect electricity use through heat pumps?*

*At the Energy Advisory Council's request, Navigant has included an estimate of the amount of electricity used in place of other thermal fuels including applications in space heating, water heating and cooking. These estimates have been made using the* US DOE Buildings Energy Data Book.

### *3.2 What is making up for the significant drop in oil use in residential heating?*

*The drop in oil for heating is a consistent trend across New England and the US. The decrease is driven by high oil prices, and has been accomplished through energy conservation measures and fuel switching. In New Hampshire this includes the* Core Energy Efficiency Programs*, the* Residential Bulk-Fed Wood Pellet Rebate Program*, adoption of natural gas heating, and the increased efficiency of the overall building stock.*

### *3.3 How does the forecast account for additional fuel switching given the significant cost advantage of natural gas over fuel oil over the forecast period?*

*The forecast was based in part by the US Energy Information Administration Annual Energy Outlook projections for New England, and then adjusted based on factors specific to NH. Specifically, the resource plans and rate case proposals from* Liberty Utilities/Energy North *and* Unitil/Northern Utilities *were considered. The net result is that although adoption will continue along the existing natural gas corridors, there will be little expansion of natural gas lines outside of this due to the minimum payback period allowed by the PUC in order to avoid unfairly taxing existing customers.*

# 4. Questions about the Transportation Sector Forecast

## *4.1 What is driving the decrease in transportation sector fuel consumption?*

*The decrease in fuel consumption is primarily driven by increased light duty vehicle fuel efficiency due to the* Corporate Average Fuel Economy *(CAFE) Standard. The most recent version of CAFE sets different limits based on the size and type of vehicle, and will increase the average fuel economy of new vehicles sold to the equivalent of 54.5 mpg by 2025. Additionally, electric vehicle penetration reduces total energy consumption as measured in BTUs. This occurs on behalf of the energy efficiency gains of electric motors over conventional internal combustion engines, which has been estimated to be as much as 3:1. Essentially one vehicle mile traveled on electricity uses far less energy than one traveled on any existing liquid or gaseous fuel.*

## *4.2 How does the model account for Renewable Fuels Standards?*

*Renewable Fuel Standards are incorporated into the model through ethanol and biodiesel consumption forecasts. These forecasts are developed from an assessment of New Hampshire's publically available flex fuel and biodiesel refueling stations, as well as the national average percentage blend of ethanol within the gasoline fuel pool. The percentage blend of ethanol within the gasoline pool is driven by the Renewable Fuel Standard. Ethanol consumption, however, is limited to the 10% volumetric blend wall of the common gasoline refueling infrastructure in New Hampshire. Past the 10% blend wall, increases in ethanol consumption must come from mid-to-high level ethanol-gasoline blends, of which two are available in the United States, E15 and E85. These two blends are, however, not currently available in New Hampshire.*

## *4.3 What conversion rate are you using to calculate MPGe?*

*The model uses a conversion rate of 33.7 kWh per 1 gallon of gasoline equivalent. This is based on the US Environmental Protection Agency and US DOE standard conversion rate found on* www.fueleconomy.gov.