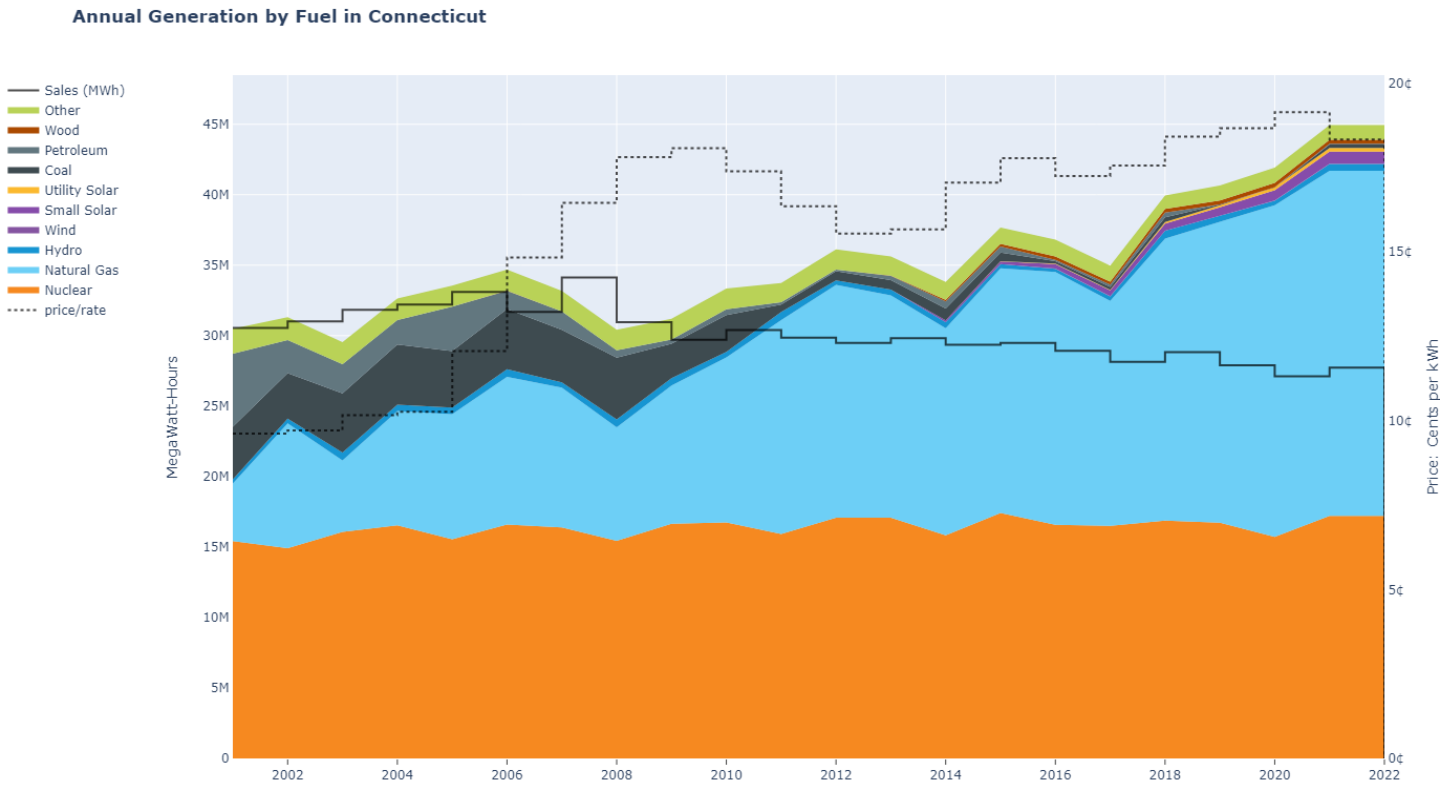
Testimony of Warren Van Wyck, Ferrisburgh, Vermont on SB123 to Connecticut General Assembly Energy and Technology Committee on February 21, 2023

Brief bio: Warren Van Wyck, Ferrisburgh, Vermont Email: wvanwyck@outlook.com I served in the Vermont Legislature as a House member from 2013 – 2018 with the last four years on the House Energy and Technology Committee. Since 2019 I have been writing computer programs to display statistics and graphs about electricity generation and consumption for the USA in general and for ISO New England in particular. **My concern is keeping the lights on in New England – as opposed to the Texas (ERCOT) February 2021 blackouts – at affordable electric rates.** Vermont is part of the same grid as Connecticut. In 2021 Connecticut produced 160% grid electric energy of its usage, so, thank you, Connecticut, for helping to keep the lights on in Vermont (produced only 43% of what it used from the grid).



Connecticut is one of the six New England states in the ISO New England grid.

I watched the Tuesday, February 1, 2022 Energy and Technology Committee Panel with Meredith Angwin, Gordon van Welie of ISO New England, DEEP Commissioner Katie Dykes, et al.

1 INTRODUCTION

When buying real estate the saying is "Location, location, location." When operating the electric grid the (my?) saying is "Peak, peak, peak." Grid generation must meet grid Peak load/demand. Therefore, this testimony is in support of SB123 bill's goal of promoting reliable generation by including "hydropower" and "nuclear power" as a "Class I renewable energy source". Though New England electricity load peaks on summer days overall, it is in the winter that New England is more vulnerable to power shortages during cold spells due to 1) the simultaneous demand for Natural Gas for electric generation and heating, 2) the reduction of imported power from Canada. (It's cold in Montreal also.)

To meet grid peaks the system operator (ISO New England) must have generation for the base load (load existing 24 hours a day) and generation needed as demand rises – this is dispatchable power in grid-speak. Typically neither Wind nor Solar is dispatchable.

1.1 TECHNICAL NOTES:

1.1.1 Solar Generation

Solar generation accounting is divided two ways. 1) Grid-connected Solar (aka Utility Solar) and 2) Behind The Meter (BTM) Solar – House Roof-Top, etc. The Grid graphs have reduced System Loads mid-day due to BTM Solar generation. ISO New England provides estimates of BTM Solar generation.

1.1.2 Web Links

This PDF file when viewed with Acrobat Reader has links to web pages with an Interactive version of the graphs.

2 THREE 'PEAK' EVENTS IN NEW ENGLAND

This section describes three recent periods of cold weather when the grid required extra-ordinary generation beyond the typical fuels.

2.1 DECEMBER 24, 2017 – JANUARY 8, 2018 COLD SPELL

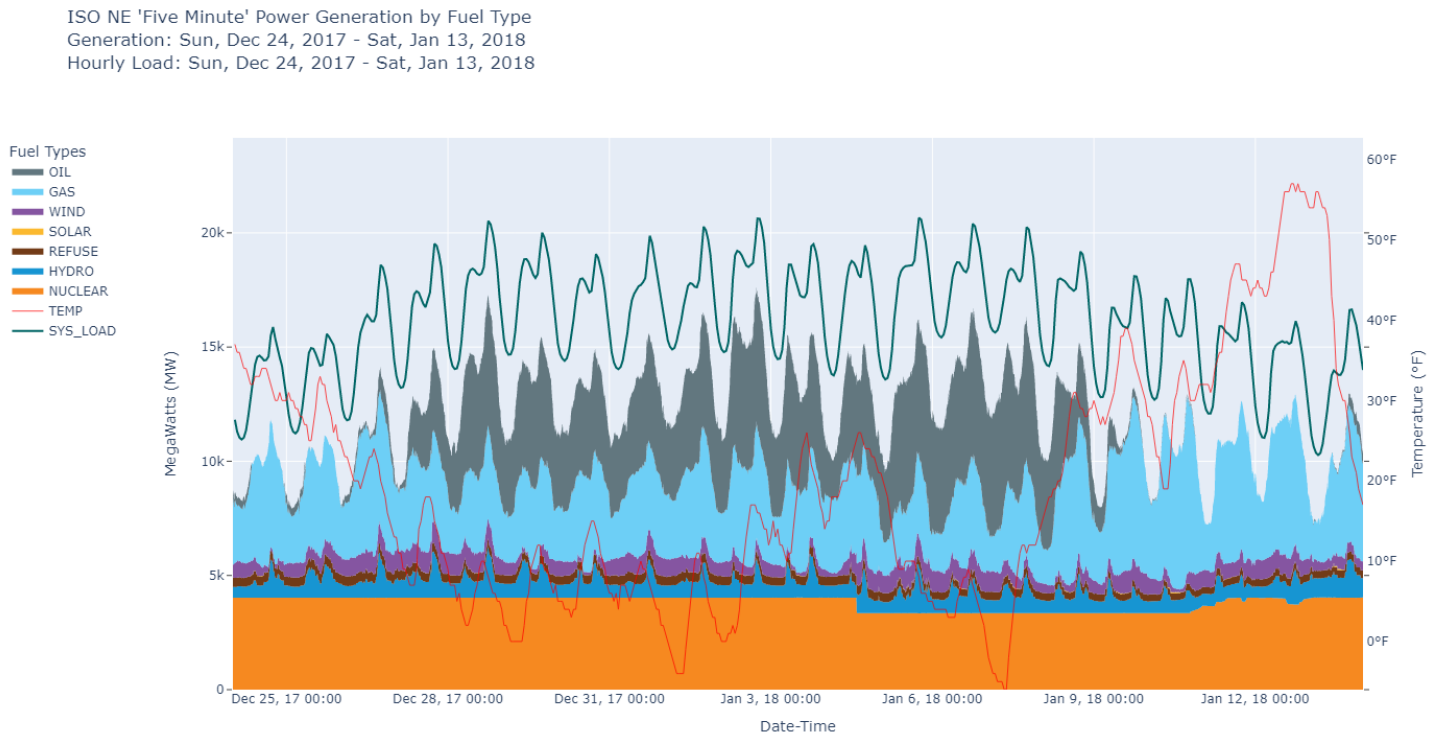
During this cold spell ISO New England grid was close to rolling blackout conditions.

From ISO New England Newswire April 25, 2018:

> ## Keeping the lights on
>
> Beginning on Dec. 26 and stretching until Jan. 8, the region endured a brutal stretch of cold weather. All major cities in New England had average temperatures below normal for at least 13 consecutive days, of which 10 days averaged more than 10°F below normal. Boston, for example, saw its most extreme cold wave in 100 years.

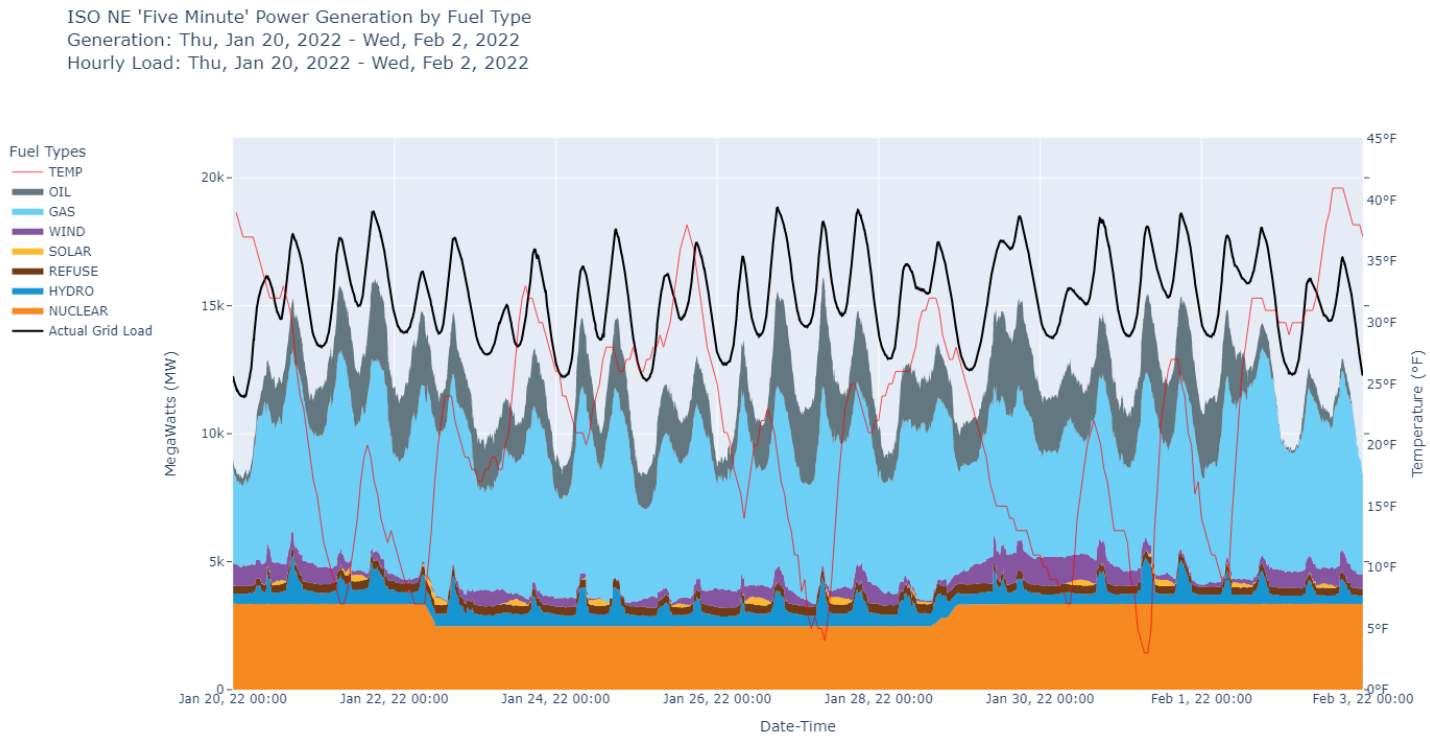
High demand for natural gas for heating caused natural gas pipeline constraints that resulted in high natural gas prices. As a consequence, the price of generators burning natural gas rose higher than the price of generators burning oil or coal, and so a significant portion of the region's electricity was **generated by power plants that use oil.**

Next is a graph of selected generation in the region from Sunday Dec 24, 2017 to Saturday Jan 13, 2018. Note the exceptional usage of OIL generation as the Temperature (TEMP) goes down. If you do a 'Click' on the graph, an Interactive version of the graph is displayed in your web browser.



In the interest of not displaying too many lines/colors, there is significant gap between Generation and Load (SYS_LOAD). This gap was met primarily with Coal, Wood, and Imports from Canada and New York State – see this daily generation graph or five-minute graph.

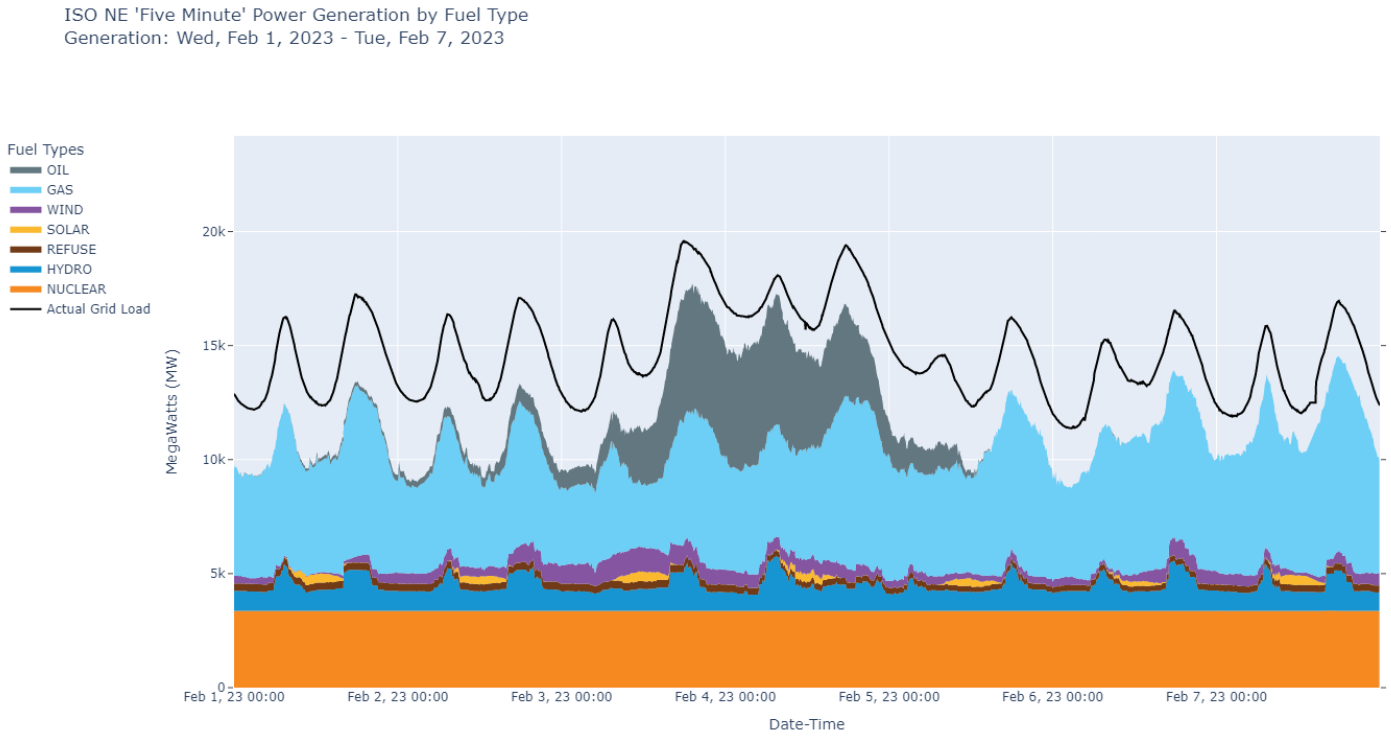
2.2 JANUARY 20 – FEBRUARY 2, 2022 COLD SPELL



2.3 FEBRUARY 3, 4, 2023 COLD SPELL

On Saturday Feb 4. 2023 at 6 am the temperatures: Hartford and Boston: -9 F°, Montreal -20 F°.

A graph for seven days including February 3 and 4. Note increase in OIL usage and the steady performance of the Nuclear plants, Seabrook in New Hampshire and Millstone in Connecticut. As New York State found out recently with closure of Indian Point nuclear plants, less Nuclear requires more Natural Gas generation.



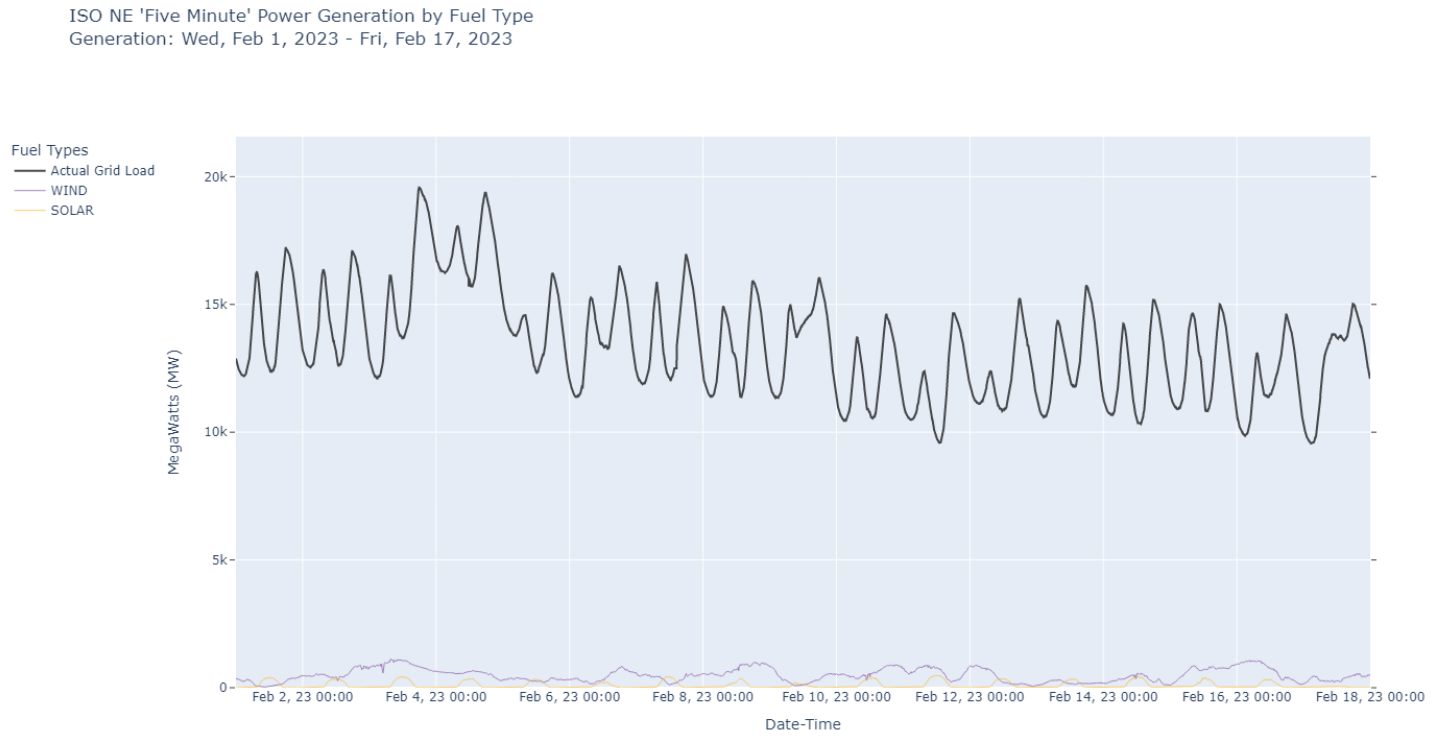
Further analysis of this cold spell including Net Imports to Canada – a very unusual condition.

3 VARIABILITY AND INTERMITTENCY OF SOLAR AND WIND

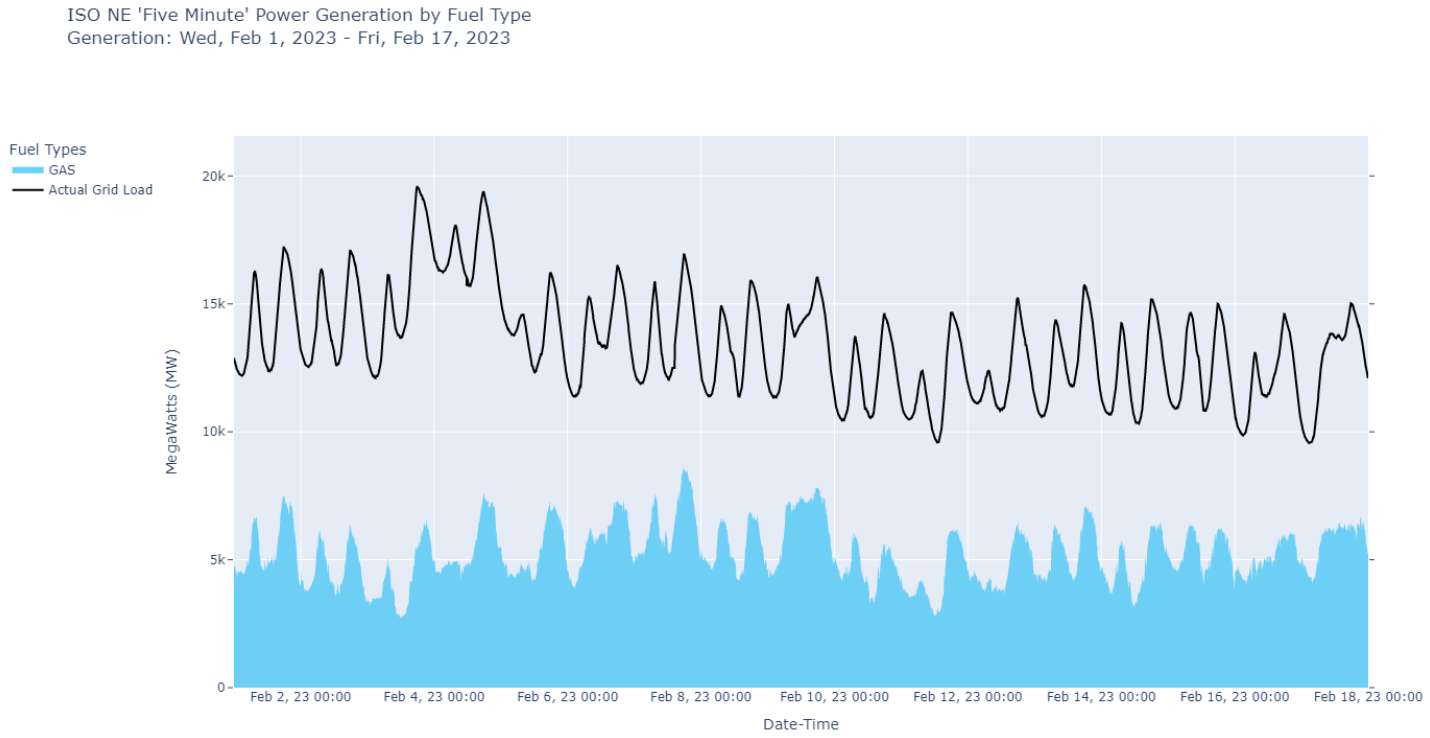
In Meredith Angwin's book *Shorting the Grid: The Hidden Fragility of Our Electric Grid* she writes about three conditions that make a grid less reliable: 1) an overreliance on renewables [Wind and Solar], 2) backing up renewables with just-in-time Natural Gas, 3) overdependence on neighboring power grids. These three have become known as the "Fatal Trifecta."

Note that Solar Generation diminishes as the daily peak load occurs.

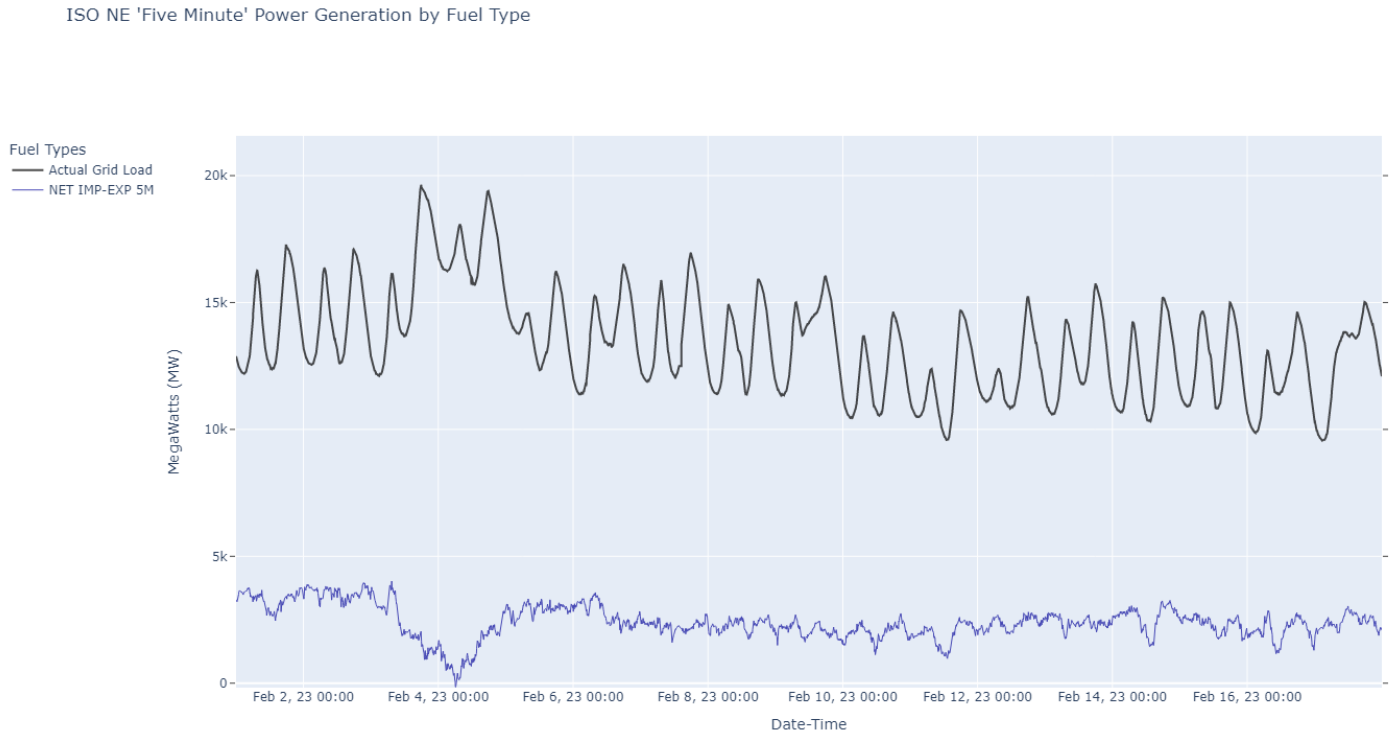
A graph of System Load with Wind and Grid Solar generation for Feb 1 to Feb 17, 2023.



However, New England is very reliant on Natural Gas. Note in the graph below how Natural Gas (GAS) generation is unable to meet the large increase in Load/Demand on Feb 4, 2023.



New England also Imports on an annual basis almost 20% (2020) of its power. And the Imports are not reliable during a cold spell. Note in the graph below how the **Imports go to zero** on the morning of Feb 4, 2023 when it was nine below in Hartford even as Load/Demand soars (it's cold in neighboring Quebec also!).



4 CONCLUSION

New England needs a multiple Fuels approach to keep the lights on. Nuclear and Hydropower should be considered "Class 1" energy sources as partners in this effort. New England should not rely on Imports from Canada on the coldest days.

Disclaimer: 1) Graphs of ISO NE data are neither approved, sanctioned, nor endorsed by ISO New England Inc.

Written by Warren Van Wyck 02/20/2023 and submitted.

Submitted Version on the web.

Corrected version (if any) revised 02/22/2023 B and 09/21/2023

Add Addendums

5 ADDENDUMS

5.1 CLARIFICATION

20% Imports for 2020. 15.8% in 2021. Note Indian Point 2 (1,020 MW) was decommissioned April 30, 2020.

5.2 2021 OVERALL ELECTRICITY RATES

Note that Connecticut is 6th nation wide:

	State	Rate All sectors	
	(with Link)	Cents per kWh	All sectors: Average Price: Cents per kWh
1	Hawaii	30.31¢	
2	Alaska	20.02¢	
3	California	19.65¢	
4	Massachusetts	19.06¢	
5	Rhode Island	18.44¢	
6	Connecticut	18.32¢	
7	New Hampshire	17.37¢	
8	Vermont	16.34¢	
9	New York	16.11¢	
10	New Jersey	14.01¢	
11	Maine	13.96¢	

red to the 10 lowest:

42	West Virginia	8.87¢	
43	Nebraska	8.84¢	
44	Louisiana	8.82¢	
45	Washington	8.75¢	
46	North Dakota	8.65¢	
47	Nevada	8.58¢	
48	Oklahoma	8.52¢	
49	Utah	8.34¢	
50	Wyoming	8.25¢	
51	Idaho	8.17¢	

5.3 BLOCK ISLAND WIND FARM PRODUCTION

Note the dip in Generation mid-summer, when New England demand is the highest.