100% Renewable Energy by 2030
“We have our eye on the wrong target!”

By Stephen Thurston, Ferrisburgh VT, retired general contractor

“The cleanest and cheapest form of energy is energy that you don’t use.”

Reducing Carbon Emissions in Vermont - Conservation and Efficiency are Cost Effective Nothing Else Comes Close

CUSTOM HOME IN DORSET, VERMONT
DESIGNED AND BUILT BY
STEPHEN W THURSTON, BUILDER INC

EFFICIENCY VERMONT HOME WEATHERIZATION AND ENERGY EFFICIENCY TRAVELING EXHIBIT, FEATURING THE HOME ON THE LEFT ON THE SIDE OF THE TRAILER

BERNIE SANDERS
U.S. SENATOR for VERMONT

On 8-20-2009 Bernie Sanders held a hearing on Green Jobs and the New Economy at the Statehouse. Bernie asked the panel, "What about conservation and efficiency, are we missing the low hanging fruit?

Efficiency Vermont staffers responded, "2/1 benefit/cost ratios would apply to 160,000 Vermont homes with efficiency improvements of 80% achievable."

David Blittersdorf responded, "We have our eye on the wrong target with renewables. Without massive improvements in conservation and efficiency we will never meet our emissions goals."

Mary Powell, CEO Green Mountain Power told me, "Vermont mandates and federal subsidies are for renewables, not for conservation and efficiency. That's why we're building a wind project in Lowell". (The project was designed to offset electricity from Hydro Quebec, which is not considered renewable because it is larger than 80MW. No reductions in fossil fuel consumption or greenhouse gases were contemplated, but GMP would have cheap Canadian RECs ($5) to sell at a profit ($40) to meet its renewable obligations under state law.)

Vermont's Investments in Conservation and Efficiency vs Subsidies for Solar - the Priorities are Upside Down

According to Vermont's Climate Action Plan, published in December 2021, about 30,000 buildings have been weatherized in Vermont, but about 90,000 additional homes need to be weatherized by 2030. (That's 40,000 homes less than Efficiency Vermont said would save $2 for every $1 spent on 80% reduction in energy consumption via energy conservation and efficiency measures.)

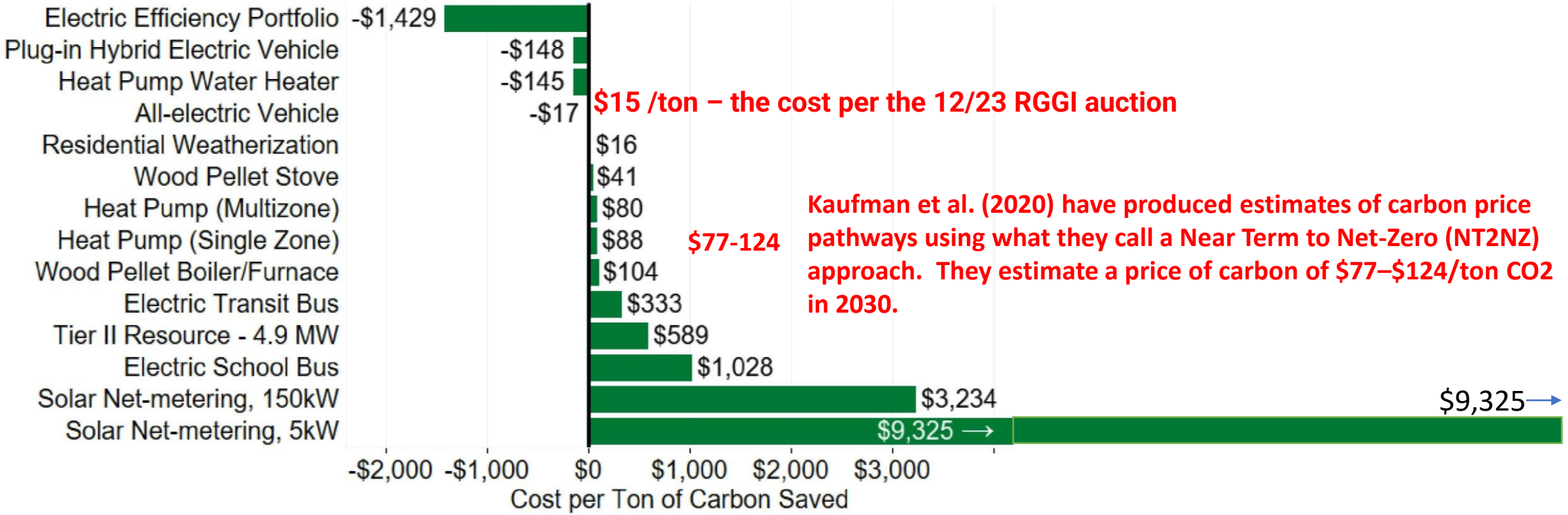
Hope For Homes, a federally funded weatherization program requires only 20% reductions in energy modeling, or 15% measured performance to qualify.

Rebecca Foster, CEO of Vermont Energy Investment Corp. — the nonprofit that operates Efficiency Vermont, the state's energy efficiency utility — estimates that weatherization saves $2 for every $1 invested. "The Weatherization Assistance Program budget, run through the Office of Economic Opportunity and then the weatherization agencies — those budgets have not been anywhere near the level that they would need to be to meet the needs that exist in the state to weatherize our housing stock," she said. "And so I think a lot of it comes back to funding."

Source: VTDigger 10/16/22.

THE COST OF REMOVING CARBON IN VERMONT

Figure 1 - Relative Cost of Carbon Reduction Policies



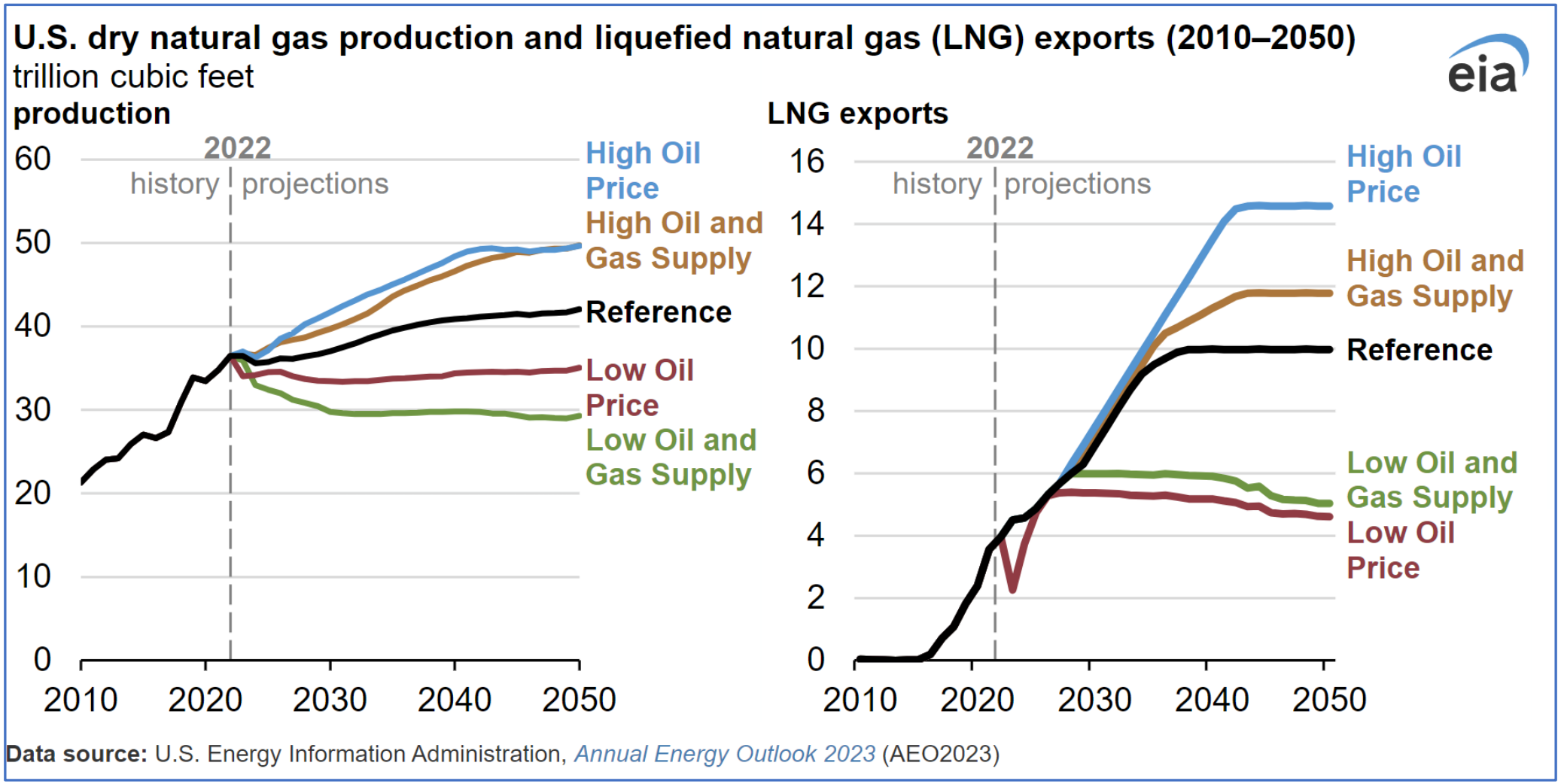
$15 /ton – the cost per the 12/23 RGGI auction

$77-124

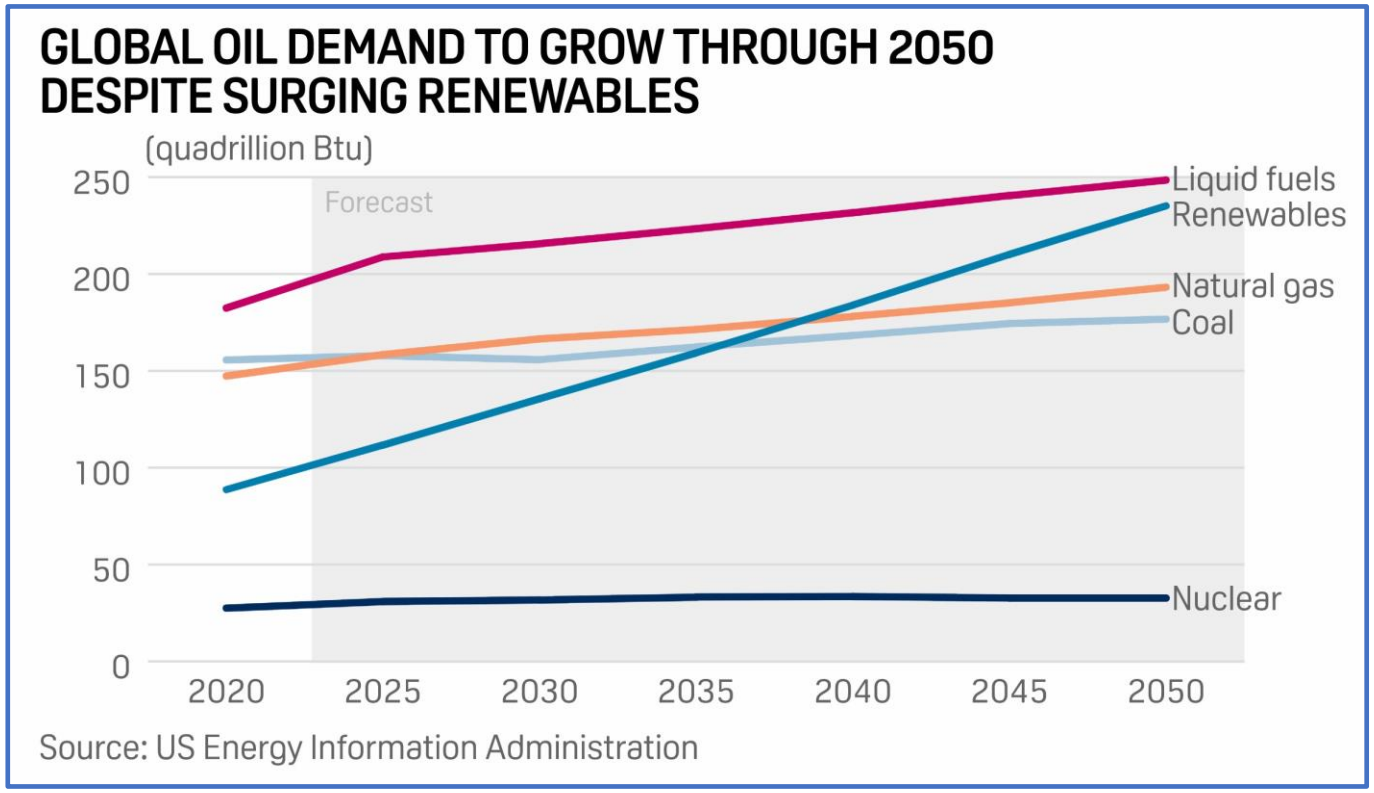
Kaufman et al. (2020) have produced estimates of carbon price pathways using what they call a Near Term to Net-Zero (NT2NZ) approach. They estimate a price of carbon of $77–$124/ton CO2 in 2030.

Source – PUC Report to the Legislature on Comprehensive Energy Plan 2021 by Ed McNamara, Current PUC Chairman

Future World Hydrocarbon Production per US EIA



Net Zero Emissions by 2050 is Democrat/Progressive Happy Talk

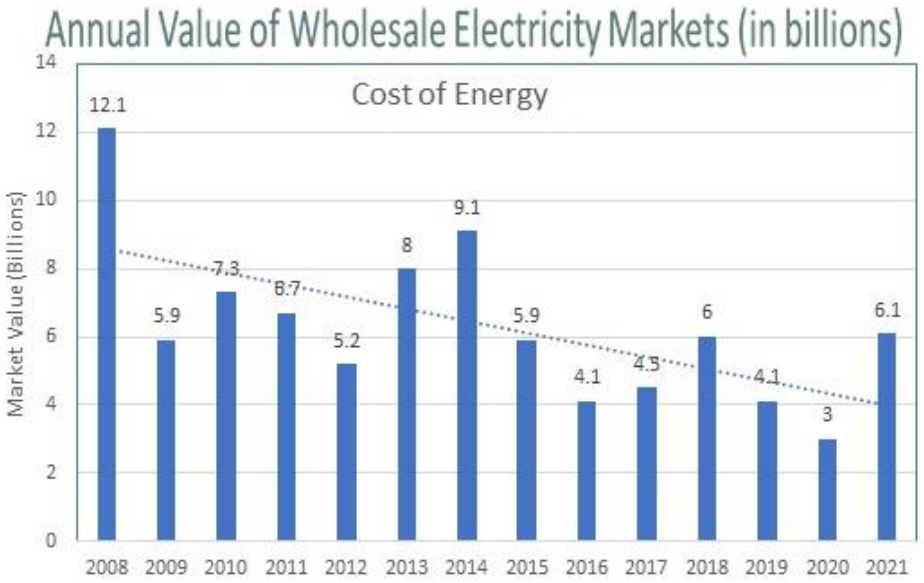


"Bangladesh's short-term economic and political costs resulting from <u>not</u> using its coal for the generation of electricity are far higher than the longer term costs resulting from climate change."

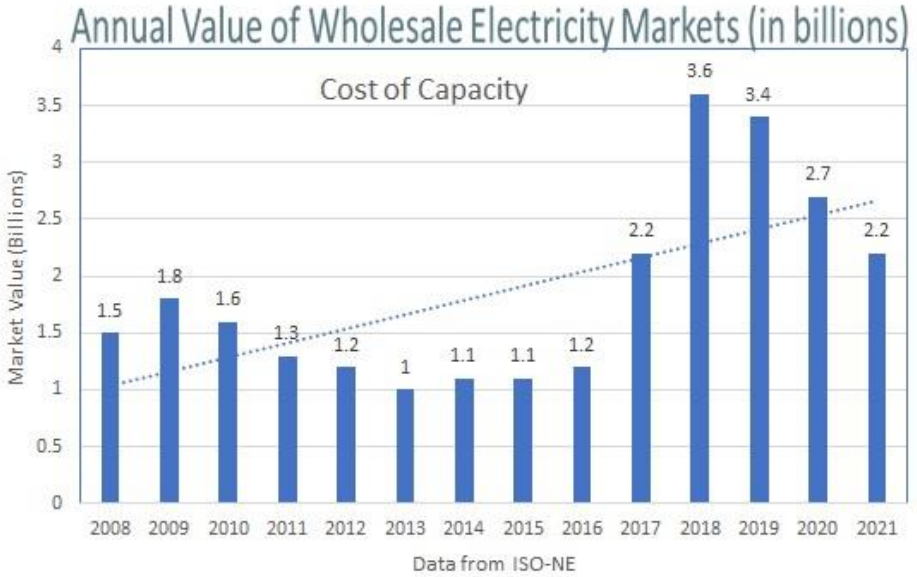
More Renewables Means More Reliable, Dispatchable Generation – Not Less

Some legislators contend that VT electrical rates are now the 2nd lowest in New England when before the 2015 RES they were the highest.

In fact, the low cost of natural gas has been the reason for low electrical rates. However, the savings in energy costs have been offset by the increase in the cost of capacity. These capacity costs will continue to escalate as more wind and solar are added to the grid.



Shale boom,2008 recession, pandemic, = lower NG prices



Increasing wind and solar require ever more reserve generation to counter intermittency.

2024 Regional Electricity Outlook – ISO NEW ENGLAND

$26 Billion in Transmission Upgrades for Electrification/Renewables by 2050

The push to eliminate carbon emissions is driving electrification of the heating and transportation sectors, which will result in a sharp increase in the region's demand for electricity just as the grid is incorporating huge amounts of intermittent, weather-dependent resources. At the same time, technology at a scale needed to power the grid solely with carbon-free resources hasn't arrived yet. Therefore, our studies have shown, some amount of flexible, dispatchable resources—whether they are carbon-emitting or not—will continue to play a role in filling supply gaps and ensuring the reliable flow of electricity we've come to expect and rely on.

Cumulative costs to upgrade the transmission system could reach $17 billion to reliably serve a 51 gigawatt peak in 2050, or $26 billion to support a 57 gigawatt peak. To reach those levels, the region's annual investment in transmission reliability projects over the next 26 years would need to roughly keep pace with or exceed the average spent each year over the past two decades.

“OUT OF MARKET PAYMENTS” BY ISO-NE ARE BECOMING BUSINESS AS USUAL

DISPATCHABLE GENERATORS MUST BE ALLOWED TO COVER THEIR COSTS OR THEY WILL BE FORCED TO RETIRE. THE COMPETITIVE MARKET AND ACCOUNTABILITY ARE BEING REPLACED WITH BACK-ROOM DEALS:

“*When a generating resource located within New England submits a retirement request, ISO New England conducts a study to see how the retirement will affect the overall reliability of the region’s bulk power system. If the ISO New England study determines that power system reliability will be affected, ISO New England can ask the retiring resource to remain online.*

If the resource owners agree to do so, the generating resource would receive an ***out-of-market payment.*** *Regardless of the outcome of the study, the* ***ISO does not have the authority to prevent a resource from retiring.”*** Source – ISO-NE

Such an arrangement exits with the Mystic Gas Power Plant in Massachusetts. “In January and February 2023 alone, ISO-NE has passed on more than $220 million in charges under the agreement. **The $120 million supplemental capacity payment to Mystic for January 2023 was more than a quarter of the value of the entire New England wholesale energy market for that month**.”

These costs can be attributed to wind and solar getting preferential treatment in the bidding process, which factors in “fuel cost” (ie “0”) for wind and solar making it impossible for reliable generators to cover their costs of operation. Wind and solar often bid below zero (negative

FUEL INSECURITY in NEW ENGLAND

Natural Gas – plenty of gas reserves nearby but not enough pipeline to meet demand during peak periods. Will only get worse with increased electricity consumption due to EV and heat pump policies. LNG brought to NE by tankers from foreign countries is more expensive and less reliable.

Nuclear energy – unmatched reliability, hundreds of plants throughout the world. 2 operating plants down from 5 in ISO-NE. The region's remaining two zero-carbon-emitting nuclear facilities, Millstone and Seabrook, supply a quarter of the electricity New England consumes in a year.

Wind – uncontrollable, constantly variable, unavailable 70-75% of the time (25-30% average annual capacity factor.) Requires 100% backup. Offshore wind wreaks havoc on ocean biosphere – worse impacts on fauna than land based.

Solar – unavailable 85% of the time (15% average annual capacity factor in NE, vulnerable to weather patterns that decrease output for weeks or months at a time – such as this winter. Requires 100% backup.

Hydro – dependable and controllable, vulnerable to extended drought, HQ does not have additional capacity beyond current commitments unless more dams are constructed.

Batteries – many MWs in the ISO-NE queue, but energy stored in batteries is 10 times more costly than conventional generation. Grid scale battery storage sufficient to supplant wind and solar is still in the pipe dream realm.

Takeaway – as more intermittent renewable capacity is added to the grid, more nuclear, and gas fired generation will have to be built just to regulate the renewables, which can be absent for days/weeks at a time.

New England Weather November through January

"Cloud Cover Blocks Solar Generation"

Complete cloud cover 40% of the time
Mostly cloudy (more than ½ sky) 23%
Partly cloudy (less than ½ sky) 33%
Clear skies only 6% of the time*

Installed Solar Capacity in ISO-NE:

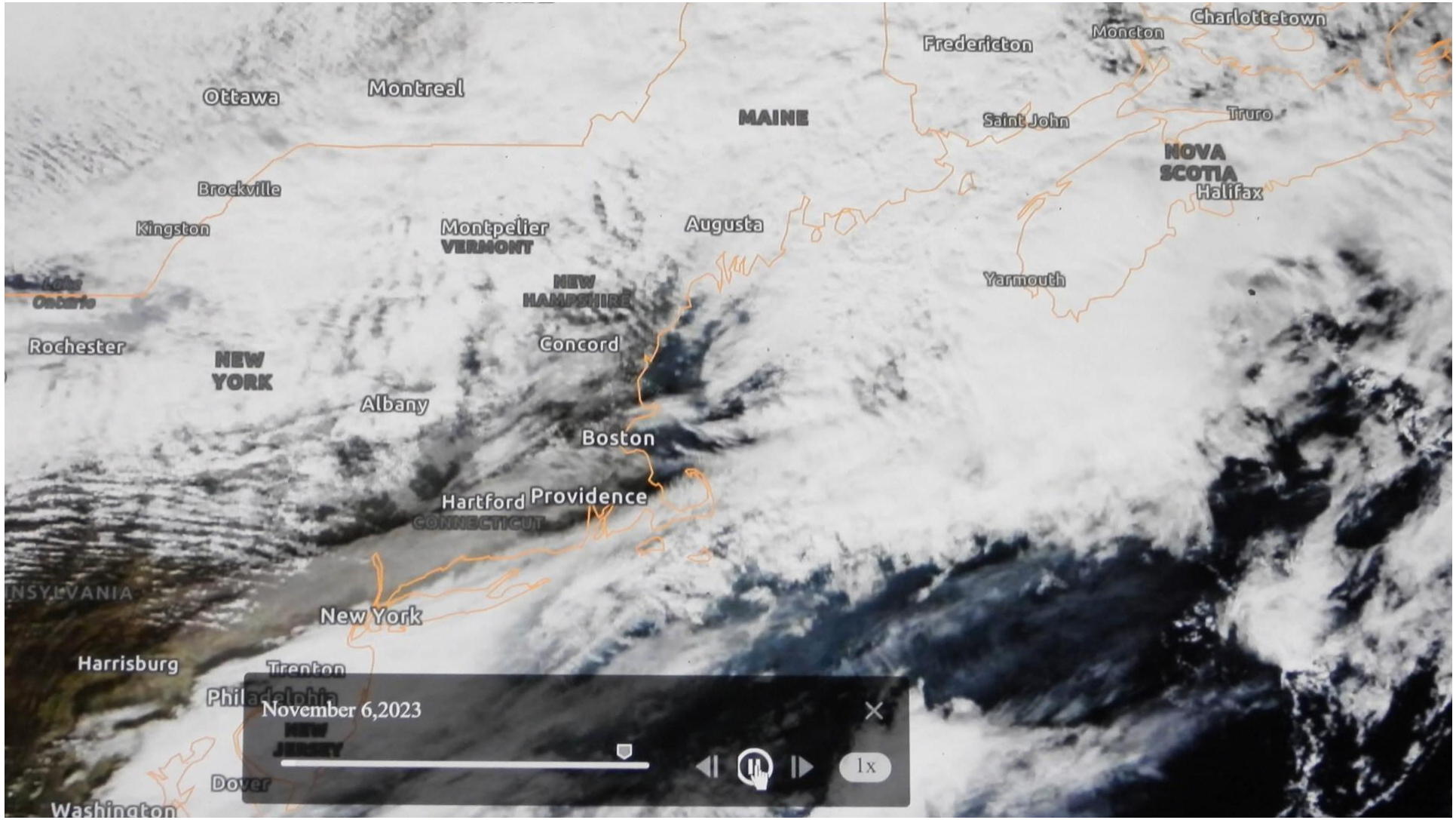
Utility/Merchant	2,718	MW
Behind The Meter (BTM)	3,657	MW

Utility is 74% of BTM

Utility Solar Generation for Nov - Jan is 521,502 MWh

Utility Capacity Factor 521,502 / (2,718 x 24 x 92) x 100 **= 8.7%** BTM capacity would be similar.

Solar panels were non-productive 91.3% of the time over three months. Where will the power come from when such conditions exist if Vermont's electricity is 100% renewable? Batteries work for hours, not days, let alone weeks or months. Reliable generation sufficient to power the grid will be paid its annual "cost of operation" regardless of actual generation, like Mystic Power is now being paid, potentially doubling the cost of wholesale electricity as both renewables and reliable power are required to be purchased.


Charlottetown
Moncton
Fredericton
Ottawa
Montreal
MAINE
Saint John
Truro
NOVA SCOTIA
Halifax
Brockville
Kingston
Montpelier
VERMONT
Augusta
NEW HAMPSHIRE
Yarmouth
Rochester
Concord
NEW YORK
Albany
Boston
Hartford
Providence
CONNECTICUT
New York
Harrisburg
Trenton
Philadelphia
NEW JERSEY
Dover
Washington
November 6,2023
1x

ISO New England - Wind and Utility Solar Generation for January 2024

Overall Wind served 2.99% of the Load for the month and Utility Solar 1.08%
"Behind The Meter"/"Roof Top" Solar reduces the Grid Load, but would account for

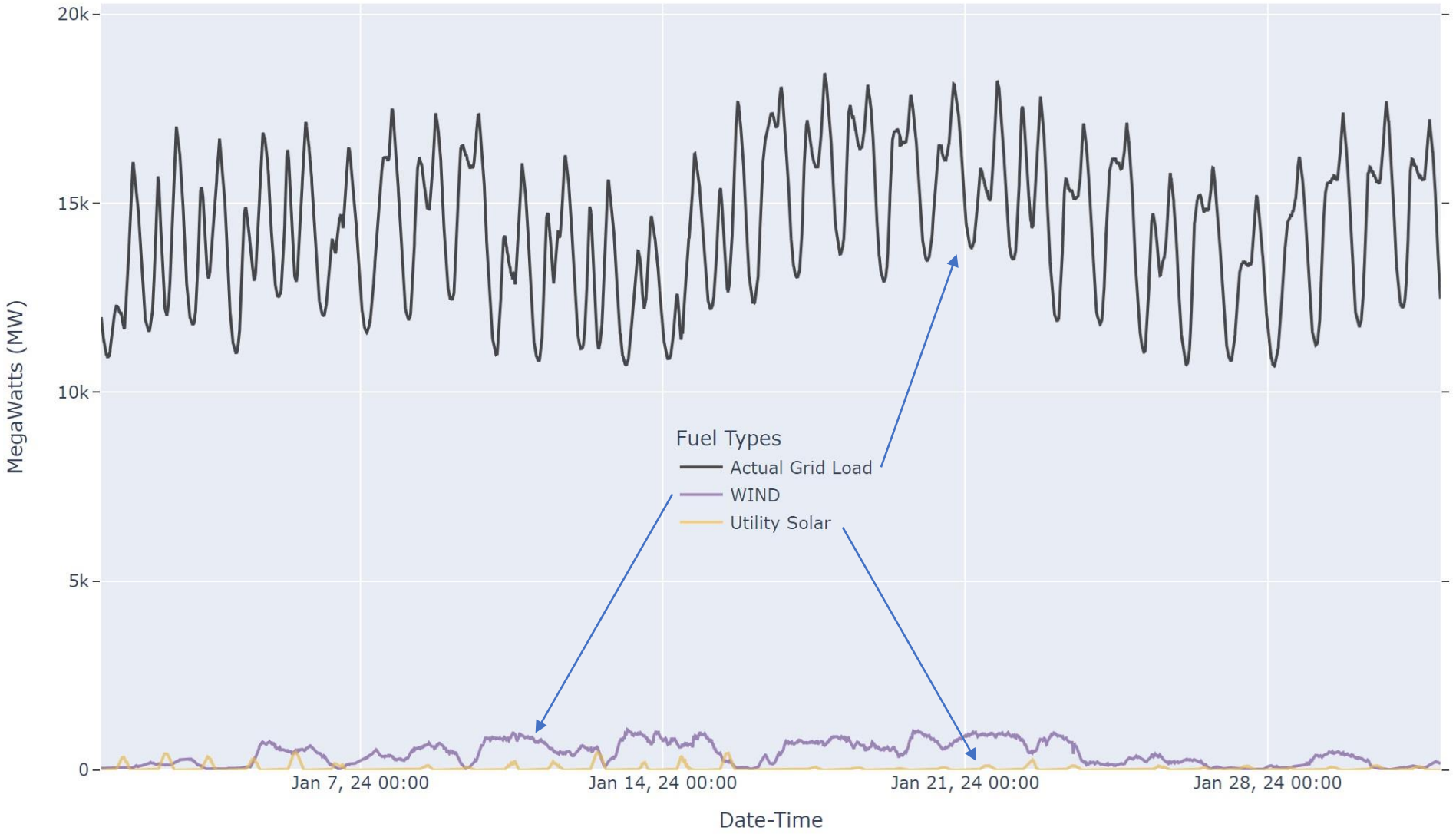
The SOLAR is 'Adjusted' Utility Scale Solar generation.
For 2023, Utility Solar Nameplate is 2,718 MW
"Behind The Meter"/"Roof Top" Solar Nameplate is 3,657 MW
The graph was produced Feb. 15, 2024 by Warren Van Wyck Updated: 02/16/2024 Solar Adjusted B
A previous page with an explanation of Utility Solar under-reporting. Disclaimer: This page is neither approved, sanctioned, nor endorsed by ISO New England Inc.

Fuel generation percentages for the month

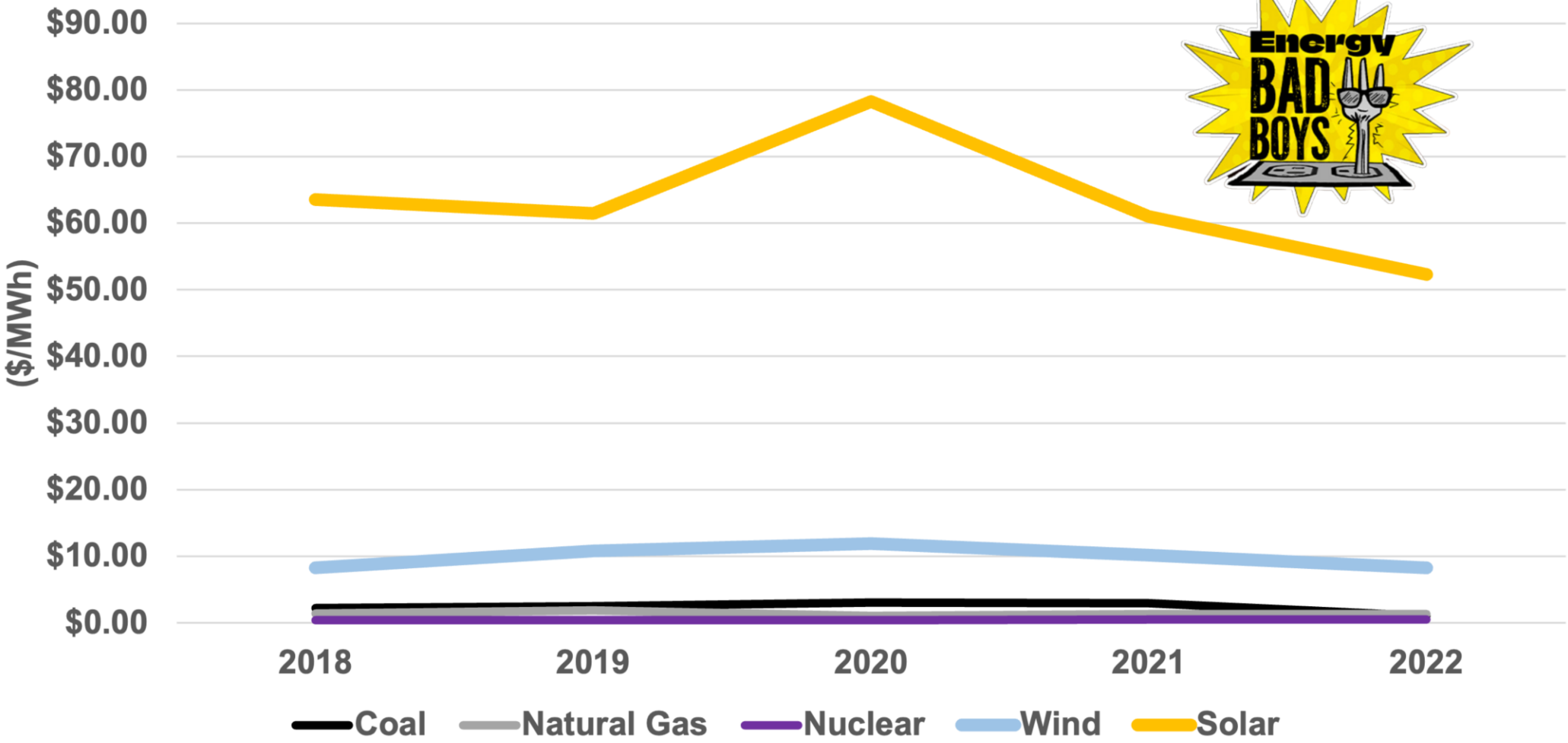
GAS	45.97%
NUCLEAR	20.27%
HYDRO	7.65%
WIND	2.99%
REFUSE	2.12%
WOOD	1.84%
OIL	0.50%
COAL	0.28%
SOLAR	1.08%
LANDFILL_GAS	0.23%
OTHER	0.05%
Imports	17.02%

Wind and Solar for selected dates:

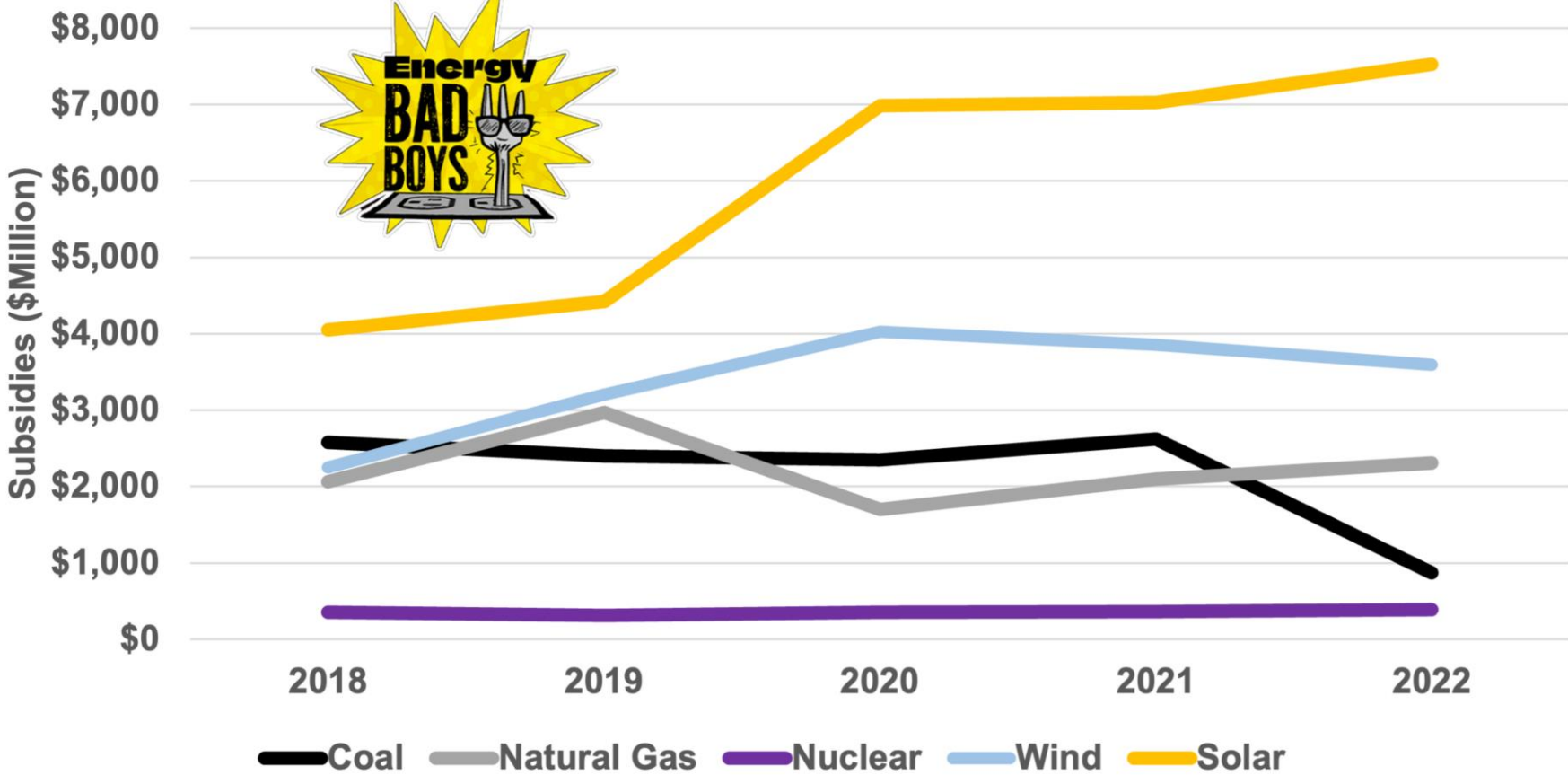
Wind:	
Jan 1 - 3	0.84%
25 - 28	1.07%
Solar:	
16 - 21	0.44%
24 - 27	0.62%



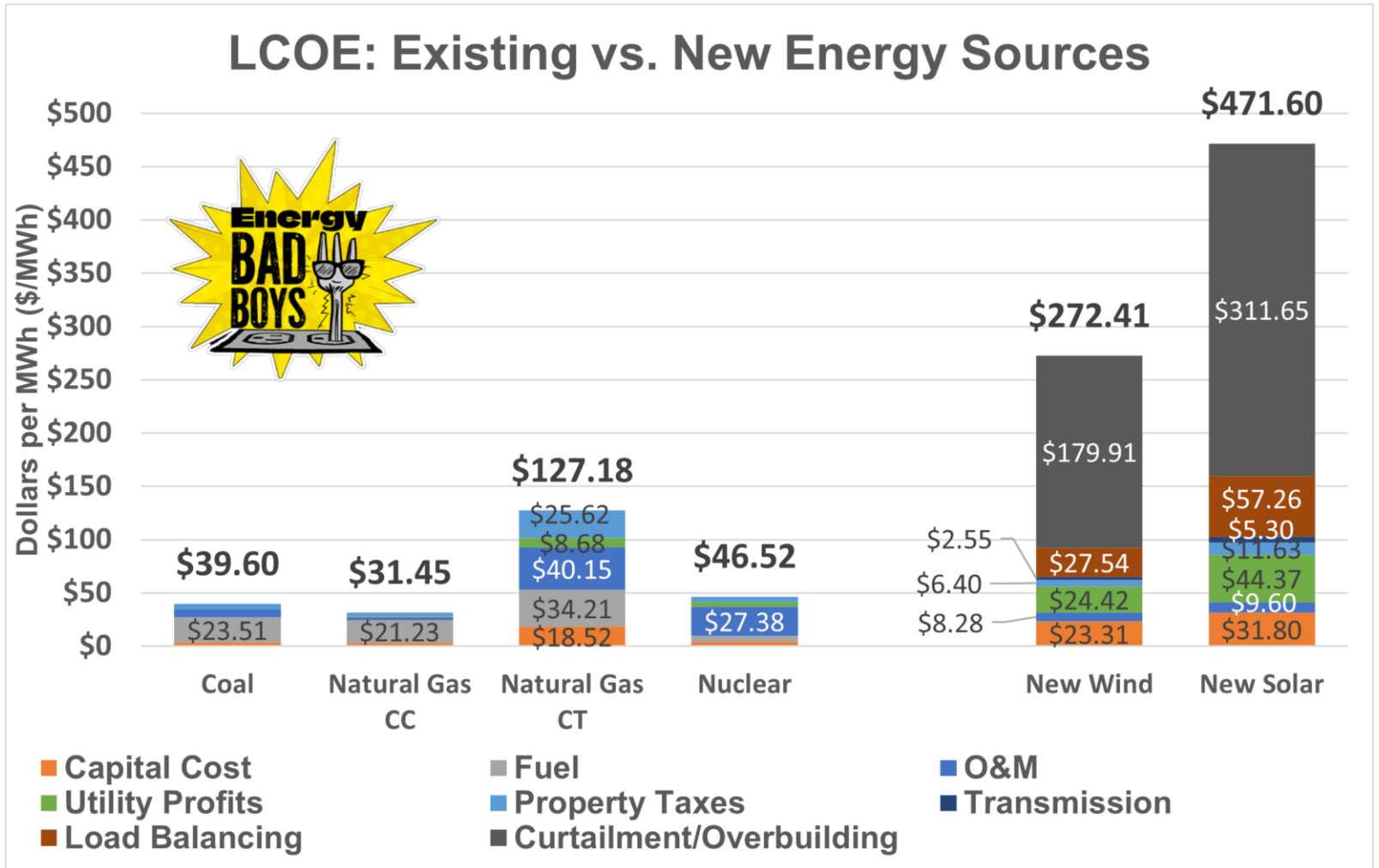
Subsidies per Megawatthour Produced ($/MWh) for Each Energy Source



Subsidies Paid to Each Energy Source ($Million)



Based on data provided by the Energy Information Administration (EIA)



The more an electric system relies on wind and solar, the more expensive it gets.

Vermont's Role in Solving Global Warming

At a Senate Natural Resources Committee meeting on 01/24/2023 Chris Bray explained the basis for S.5, the Clean Heat Standard, *"The "North Star" is reducing greenhouse gases, because the physics of the problem we're facing are that if we don't reduce greenhouse gases, we trifle. Now, we can talk about Vermont's role and all that kind of stuff, but on this point we're clear, both in law and I'd say we have a moral obligation, to address that problem."*

The law Bray is referring to is the Global Warming Solutions Act, which he championed and helped to force into law over Governor Scott's veto in 2020. Every Republican voted against this bill as well as last year's so called Affordable Heat Act. But to the Super Majority Democrat legislature, Republicans are non-persons whose views need not to be considered. Bray's moral obligation argument similarly presumes that those who disagree with his climate policies are immoral.

One could argue that Vermont's renewable energy mandates are "trifling" with the well being of the average Vermont resident. They receive no benefit but pay ever increasing costs in subsidies and high rates, while conservation and efficiency policies would actually reduce energy consumption and have a 2/1 benefit to cost ratio.

What happens to Solar Projects when the Tax Benefits are used up?
They are not worth the cost of maintenance.

Dysfunctional solar trackers installed in 2013 by All Earth Renewables in Bristol, VT in response to ACT 45's $30 per MW solar feed in tariff on top of RECs, ITC, etc, etc.