NEW YORK STATE

PUBLIC SERVICE COMMISSION

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Case 15-E-0302 – Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and Clean Energy Standard

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and

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Case 25-E-0072 - Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric Service.

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COMMENTS BY RICHARD ELLENBOGEN ON

A Response to the AGREE and EDF Document On Heat Pumps and the Actual Costs Of Operating Them in NY State

June 25, 2026

ABOUT THE AUTHOR

Richard Ellenbogen is an active party in the case, a resident of the State of New York, the CEO of Allied Converters, and welcomes the opportunity to provide comments as requested by the Commission in the above referenced proceeding, issued in the May 18, 2023 “Order Initiating Process Regarding Zero Target”.

He is a Former Bell Labs Engineer that worked in the Power Systems Laboratory there. He has done work on the Utility System with NYSERDA and Con Ed. He also decarbonized his factory starting in 1999 and those measurements resulted in the Public Service Commissions Case 08-E-0751 to reduce power line losses. He was an invited speaker to a PSC Utility Conference in 2008 for that case on Line Loss Reduction that was initiated by Steven Keller of DPS based upon the author’s work at the factory and a paper written at the request of Con Ed after a factory visit. He was the Keynote Speaker at the 2023 Business Council of New York State’s Renewable Energy Conference and an invited speaker at the Dutchess County Chamber of Commerce meeting on Energy. He was an early adopter of renewable technologies going back to the 1990's and decarbonized both his home and his business two decades ago. Between 2006 and mid-2023, the business recycled or repurposed 100% of its waste and sent nothing to a landfill. From 2023 until the end of 2025, that figure has been 99% recycling/repurposing.

Over the past 20 years, the factory has generated between 60% and 85% of its electrical energy onsite with a carbon footprint approximately 30% - 40% lower than the Con Ed System, even prior to the closing of Indian Point. The total energy costs at the facility were $1.19 per square foot in 2024 and 2025 whereas the average energy costs in the Northeast United States for a facility of that type are between $4.00 and $7.00 per square foot. Despite energy costs increases in NY State and the Con Ed area during that time, the costs there have been flat due to increased investment in energy recovery infrastructure.

Over the past three years, he has explored adding energy storage to the systems at the factory to offset the likelihood of energy failures in the Con Ed service area that have been documented by the NYISO.in the 2025-34 Reliability analysis. He has been expecting that this would be a necessity since the CLCPA was passed in 2019 and has written extensively on the subject so the energy storage project has been on the schedule for over six years. An analysis of the proposed project done by the US DOE has indicated that by storing energy generated overnight by the over 70% efficient generation located on-site at the factory, an additional 24% carbon reduction could be obtained.

INTRODUCTION

The following two sentences appear in the EDF/AGREE/Rewiring America document dated June 18, 2026 on pages 1 and 2.

Alliance for a Green Economy ("AGREE"), Environmental Defense Fund ("EDF"), and Rewiring America (jointly "Commenters") respectfully submit feedback and recommended improvements regarding the Draft Heat Pump Operating Economics Customer Engagement Plan ("Draft Plan") filed by Consolidated Edison Company of New York.

The overarching goal of the outreach efforts outlined herein is to help customers use all of the tools at their disposal to save on energy bills.

In the Con Edison service area, using the term "Heat Pumps" and "Help Customers Save on their Energy Bills" is a contradiction in terms. The math does not work anywhere in NY State to do that and the fact that the utilities and the PSC, with the help of AGREE, Rewiring America, and EDF, are encouraging ratepayers to switch to these technologies without putting a warning about the negative impacts on their bills constitutes malfeasance. That is especially true regarding gas conversions, less so with oil conversions as any environmental benefits from switching gas heat to heat pumps is minimal on the downstate utility system. These policies are bad for the ratepayers that install the heat pumps, they are bad for the ratepayers that don't install the heat pumps, and they are bad holistically for the environment.

DISCUSSION

The statements made in the introduction are not conjecture. They can be substantiated with the math shown below. Figure 1 shows a Con Ed bill from this month for a condo in Manhattan during cooling season. The cost per KWh shown in the electric bill is $.4089 per Kilowatt-hour (KWh).

The gas bill shown in Figure 2 is for a service during January 2026 when gas costs would be higher to provide a fair comparison. The cost was $2.30 per therm.

For anyone reading this that doesn't understand how heat pumps work, they move heat from outdoors to indoors during heating and from indoors to outdoors during cooling. The efficiency is measured as COP (Coefficient of Performance) and is the energy or heat used over time, measured in watts, that can be moved with one watt of input electricity. The higher the COP, the more efficient the heat pump.

The difference between a 75 degree indoor temperature and the ambient outdoor temperature (delta-T) during the May-June period on the electric bill was never more than 16 deg-F. In the winter, when temperatures average 32 degrees outdoors over a five- month period, that would result in a 43 degree delta-T between indoor and outdoor and the bill would rise far more if using heat pumps. Figure 3 shows the daily temperature ranges during the period covered by the electric bill in Figure 1. The larger the delta-T between indoor and outdoor, the larger the efficiency drop so when it is very cold outside, it is more difficult to extract heat from the outside air. Appendix 1 shows five months of temperature data for Central Park from November 2025 through March 2026.

FIGURE 1 – ELECTRIC BILL CON ED SERVICE AREA – JUNE 2026 DURING COOLING SEASON

Your electricity breakdown *Rate: EL1 Residential or Religious*

Electric Meter Detail - billing period from May 20, 2026 to June 19, 2026 (30 days)

Meter #	New Read	Read Type	Date	Prior Read	Read Type	Date	Read Diff	Total Usage kWh
	24791	Actual	Jun 19	23403	Actual	May 20	1388	1,388

Your Supply Charges

Supply 1388.00 kWh @15.683¢/kWh	$217.68
Merchant Function Charge	$7.09
GRT & other tax surcharges	$5.41
Sales tax @4.5%	$10.36
Total electricity supply charges	**$240.54**

Your total electricity supply cost for this bill is 16.58¢ per kWh. You can compare this price with those offered by energy services companies (ESCOs). For a list of ESCOs, visit PowerYourWay.com or call 1-800-780-2884.

Your Delivery Charges

Basic service charge	$22.80
Delivery 1388.00 kWh @19.004¢/kWh	$263.78
System Benefit Charge @0.800¢/kWh	$11.11
GRT & other tax surcharges	$15.25
Sales tax @4.5%	$14.08
Total electricity delivery charges	**$327.02**
Your electricity total	**$567.56**

$567.56 / 1388 KWh = $0.4089 / KWh

FIGURE 2 – GAS BILL CON ED SERVICE AREA JANUARY 2026 DURING HEATING SEASON

Your gas breakdown *Rate: GS3 Residential or Religious Heating <4 Units*

Gas Meter Detail - billing period from December 24, 2025 to January 27, 2026 (34 days)

Meter #	New Read	Read Type	Date	Prior Read	Read Type	Date	Read Diff	Usage in ccf
	37321	Actual	Jan 27	36078	Actual	Dec 24	1243	1243 ccf
Therm conversion factor								**1.025**
Total Gas Use								**1274.00 therms**

Your Supply Charges

Supply 1274.00 therms @71.663¢/therm	$912.98
Merchant function charge	$30.42
GRT & other tax surcharges	$9.53
Sales tax @4%	$38.12
Total gas supply charges	**$991.05**

Your total gas supply cost for this bill is 77.79¢ per therm. You can compare this price with those offered by energy services companies (ESCOs). For a list of ESCOs, visit PowerYourWay.com or call 1-800-780-2884.

Your Delivery Charges

Basic service charge(includes first 3.40 therms)	$36.91
Remaining 1270.60 therms @131.631¢/therm	$1,672.50
Monthly rate adjustment @8.804¢/therm	$112.16
System Benefit Charge @0.393¢/therm	$5.00
GRT & other tax surcharges	$40.01
Sales tax @4%	$74.66
Total gas delivery charges	**$1,941.24**
Your gas total	**$2,932.29**

$2932.79 / 1274 THERMS = $2.30/THERM

FIGURE 3 – CENTRAL PARK TEMPERATURES DURING THE PERIOD COVERED BY THE CON ED BILL IN FIGURE 2

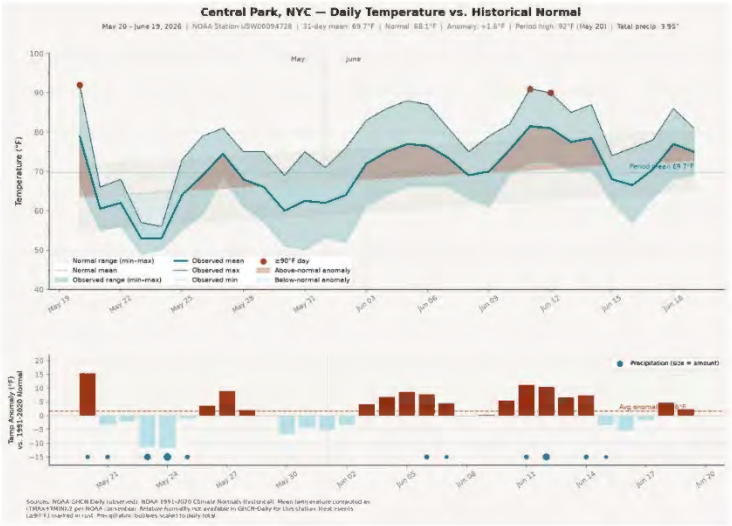
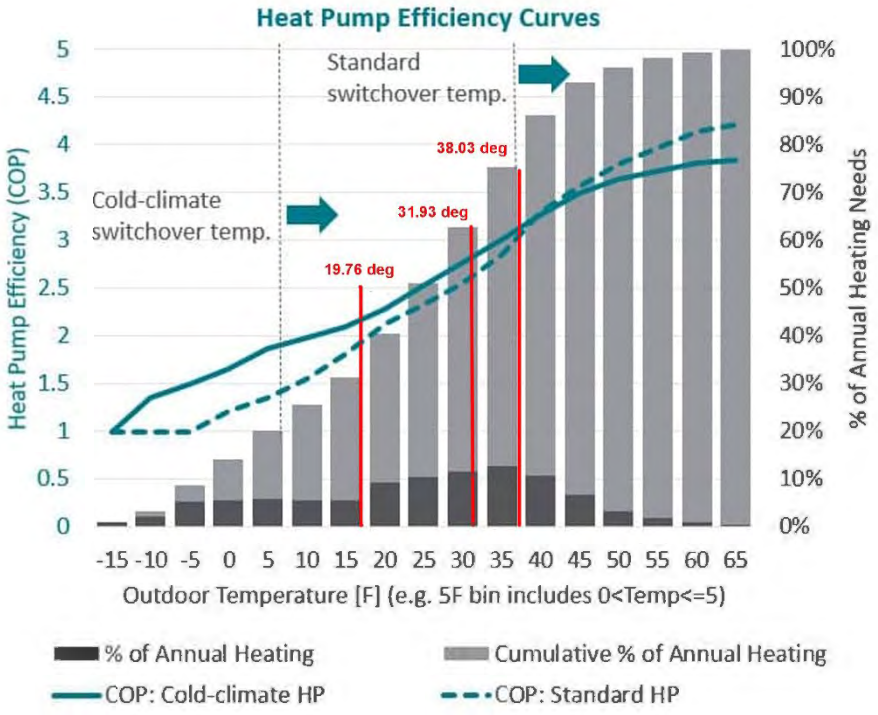


Figure 4 shows the efficiency of heat pumps at various temperatures. It was taken from a document promoting heat pumps in Fort Collins Colorado, so it is not anti-heat pump. The red lines that have been added to the graph show the average 2025-2026 temperatures in Central Park for the winter months (November-March), 38 deg-F, the average temperature during the colder months (December- February), 31.9 deg-F, and the average temperatures during the coldest 17 day period, January 24 – February 9, 19.8 degrees.

FIGURE 4 – HEAT PUMP COP vs. TEMPERATURE (Red Lines Indicate Temperatures during Particular Periods)



Source: Analytica.com
https://analytica.com/blog/heat-pumps-and-hybrid-systems-in-cold-climates/

The impact on heat pump efficiency is very apparent. The average COP is 3.2 for the 5-month period, 2.8 for the 3-month period, and 2.3 for the 17-day period. Those differences greatly affect costs and holistic emissions. Heat pump proponents love to say that they are carbon free, however the downstate New York System is 90% supplied by fossil fuel generation. Further, during the coldest periods the generating plants must switch from burning gas to burning oil because the same groups advocating for heat pumps have blocked increased gas pipeline capacity. That increases the emissions of the fossil fuel plants by 50% plus adds a far larger amount of particulate matter into the atmosphere. The more heat pumps that are added, the more oil will be burned because NY State cannot cost effectively add

renewables to the energy mix. As much as people might wish for a different outcome, the reality is that NY State is not the best location for **cost effective** renewable generation. This was clearly documented in a filing for 15-E-0302.

There are 29.3 KWh in a therm. That is a physical constant. To calculate the cost of operating a heat pump to deliver one therm of heat (100,000 BTU's), divide 29.3 by the COP and multiply by the cost per KWh. For the entire winter when the average temperature was 38 degrees, that would result in a cost of $3.75 per therm. During the December to February period with 32 degree temperatures, that would yield $4.45 per therm, and for the 17-day period, the cost would be $5.46 per therm.

To calculate the cost for gas heating, divide the cost per therm by the heating unit efficiency. If someone is using a 95% efficient gas heating system, divide $2.30 by 0.95 and it yields a delivered cost per therm of $2.42. That is $1.35 per therm less than the heat pump for the entire five-month period (35 % less), 46% less for the December to February period, and 56% less for the 17-day cold snap.

During that 17-day period, the heat pumps would also have holistically higher local emissions than the gas units. Figure 5 shows the operating costs for the heat pumps versus both gas and oil combustion.

There is no scenario where heat pumps will be nearly as cost effective as a gas heating unit. Offering rebates to induce people to switch at a time when a significant portion of NY State rate payers are in arrears does a disservice to everyone. It does a disservice to the people that switch because they will have 35% - 56% higher heating bills. It does a disservice to the ratepayers that don't switch because the rebate money must come from somewhere and that somewhere is the other ratepayers, and it does a disservice to the environment under the current generation parameters of the downstate NY System.

FIGURE 5 – HEATING COSTS PER THERM FOR VARIOUS METHODS

HEATING COSTS	Cost/Kwh	TEMP Deg-F	COP	Gallon	Therm	Efficiency	Net Cost per Therm
OIL		N/A		$4.25	$3.08	0.88	$3.50
Gas		N/A			$2.30	0.95	$2.42
Heat Pump	$0.41	19.76	2.2				$5.46
		31.93	2.7				$4.45
		38.03	3.2				$3.75

NY City is not Berkeley, California where the winter lows are 45 deg-F and a warm climate heat pump will operate with a COP of 3.7 on a cold day and over 4.2 for much of the winter. That would bring heat pump operating costs more in line with gas costs. Location matters and a Mediterranean Climate or the warm Southern States are far more suited to heat pump operation at reasonable costs. NY State is not similarly suited and trying to put a square peg into a round hole is an effort in futility.

Where heat pumps might make sense is for replacing oil combustion but no rebates would be needed for that transition. The average cost per therm for oil heat based upon the $4.25 per gallon (1.38 therms) cost

during this past winter would be $3.50 per therm using an 88% efficient oil system. As oil systems need a lot of maintenance, chimney cleaning, etc., the $.25 per therm cost difference between oil combustion and a heat pump would be offset by reduced maintenance costs. There would be a large environmental benefit to that transition, but rebates will not be necessary. Figure 5 shows the operating costs for heat pumps, gas heat, and oil heat at the three temperature ranges. Gas and oil system efficiency is not impacted by temperature, but poor insulation will make all three types of systems run with a higher duty cycle.

That being said, even in newer retrofits in colder climates, the heat pumps might not work in areas of NY State. As a personal example, I found that a newly renovated Air-B&B with new heat pumps in Lake Placid needs radiant baseboard heat operating during cold weather to supplement the heat pumps and the rooms were still in the mid 60's. Radiant Baseboard operates with a COP=1.0 and the cold weather at that time (0 deg-F to 10 deg-F) lasted for at least two weeks. That would greatly reduce the climate benefits of a heat pump transition and the temperatures upstate, far lower than those in the Con Ed service area, would skew the numbers more in favor of fossil fuel combustion. That is especially true because in less densely populated areas upstate, a common practice is to use wood to augment heating so if the system is too expensive or can't support the thermal load, wood is burned which has a carbon footprint 66% higher than oil and 250% that of natural gas combustion. It also has extremely high particulate emissions which are a source of asthma.

There is an argument that an 8% rate of gas leakage is a large source of CO2e emissions and that is a reason that the heat pump transition is needed. That is based upon statements made by Robert Howarth, a biology professor at Cornell. Those claims were challenged by other Cornell Professors at the time he made them and experimental data generated since has called all those claims into question. The leakage rate could be as low as 2% - 3% across the system which radically changes the math. Additionally, if there truly is leakage, why increase loads on the fossil fuel plants and force them to burn more natural gas. If leakage is an issue, then it will be there for the gas plants as well as for the on-site combustion.

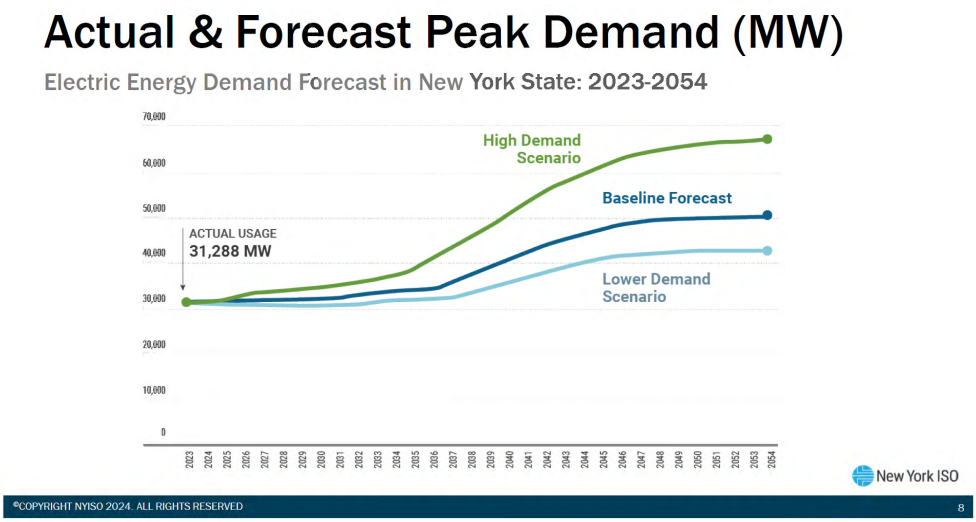
REQUIRED INCREASE IN SYSTEM CAPACITY TO SUPPORT HEAT PUMPS

Beyond the 45.6% increase in heat pump operating costs between the 38 degree temperature and the 19.7 degree temperature is the fact that there will also be a 45.6% increase in peak power draw in the cold weather and the system must be rebuilt to handle that higher load. That is going to require resizing of conductors, transformers, and building circuits. Con Ed has $200 million in the current rate case applied to expanding the system for this electrification. It's great for Con Ed because they will make a profit on the 63% higher electric revenue compared to the current gas revenue and they will also make an extra $20 million in profit on the additional electrification required to support that electrification. Then, NY City puts a tax on all that additional revenue and all those additional costs are coming from the wallets of the ratepayers. If people think that their rates are too high now, wait until this policy is in place for a couple of years.

That doesn't include the costs of the additional generation that will be needed for this policy. The NYISO has stated that peak electric loads in NY State could reach 40 Gigawatts (GW) by 2036 and 68 GW by 2054. The current peak load is 31.3 GW. See Figure 6 below. No one has yet determined where all this generation is going to come from because the renewables, storage, and grid inertia for an inverter based system needed to run electric heat are prohibitively expensive. NY State still has not come to grips with the fact that they are going to have to retool their gas plants if they are going to keep the lights on in the near term and the 5 GW of nuclear will not be ready until well after 2036. They have been searching for the Magic DEFR (Dispatchable Emission Free Resource) which doesn't currently exist except for Nuclear

and if one was discovered today, it couldn't be installed in sufficient quantities anywhere near the required time frame. The Champlain Hudson Power Express won't help to power the heat pumps when needed most because Quebec has no obligation to provide any energy during the Winter Months when they need the power. This past winter, Quebec was importing from the United States during the Cold Snap. Appendix 2 is a copy of a Substack post from the Electric Grandma, a very respected utility analyst, showing Quebec importing electricity from New England on that power cable that was supposed to supply power to those states from Quebec.

FIGURE 6 – NYISO PEAK DEMAND PROJECTIONS 2023 - 2054



Beyond the system issues, numerous studies have concluded that all of the building retrofits to convert to electric heat will cost between $50,000 and $150,000 per living unit. At present interest rates, that will add an additional $300 to $900 per month to every unit's carrying cost for the next 30 years.

Where is all that additional money going to come from? One third of NY City residents already pay 50% of their monthly income for housing. The number of customers in arrears on their utility bills in NY State has risen rapidly despite large rate relief programs implemented in 2023. The ratepayers cannot handle this type of system with continuous cost increases across the spectrum. When all of this comes to a head and finally breaks, it is going to break violently with very negative ramifications for the state.

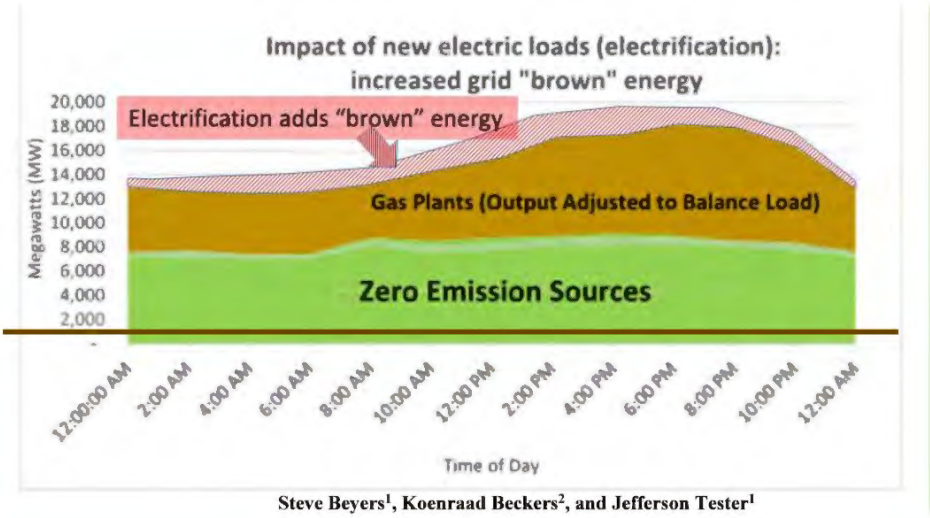
CLAIMS OF REDUCED EMISSIONS - THE KEYNESIAN MULTIPLIER AND THE CARBON COST OF MONEY

The supposed benefit of electrification is that it will reduce carbon emissions. However, that is based upon the extremely rosy assumption that the energy to supply them is carbon free. In NY State that is not the case and research done at Cornell University has shown that additional marginal electric load in NY State during times of peak load is supported by fossil fuel generation. Figure 7 is a graph copied from the Cornell research and clearly shows that all additional electric loads are supported by additional fossil fuel combustion. As the least efficient fossil fuel plants are used last, as the loads approach those predicted by the NYISO in Figure 6, NY State's CO2 emissions profile is going to skyrocket. Data released by the

Public Service Commission has already projected the state's emissions to rise by 2% by 2030, although that wasn't stated in the documents. A reader had to parse the numbers and do the calculations to figure that out. As with everything else in NY State, anything that doesn't support the CLCPA Lie is obscured behind curtains.

Appendix 3 shows the EPA data for NY State electric generation emissions. NYCW (NY City/Westchester), highlighted on the page, shows emissions of 865 pounds of CO2e per Megawatt-hour (MWh). Local Law 97, NY City's building electrification Law, declares that the emissions are 630 pounds per MWh, with no basis in fact. Again, the numbers they use are 37% lower than reality and the facts are hidden behind a math calculation that only an engineer can understand. With that emissions profile, the heat pumps will be more polluting in the downstate region during cold weather and that will get worse as they proliferate. All of these ideas are based upon the false assumption that NY State will be able to cost effectively install renewable generation and as was clearly shown in the 15-E-0302 document about Australia that was referenced previously and again here, it can't be done cost effectively under the most favorable renewable conditions on the planet. New research was just released showing that Australia is dumping millions of MWh because their solar arrays are overproducing at certain times of the year. If batteries are added to use that energy, the extremely high costs of those will eliminate any potential rate reductions that still have not accrued after 20 years of their trying to implement the policies. If Australia can't make renewables work cost effectively, no one can. NY State's renewable profile is far worse and the thermal load is four times higher than in Australia. As a result, any potential climate benefit espoused by the heat pump proponents that might be present with cleaner generation will vanish under the currently available options in NY State, and those for the foreseeable future.

FIGURE 7 – IMPACT ON GENERATION OF ADDITIONAL LOADS IN NY STATE



Steve Beyers[1], Koenraad Beckers[2], and Jefferson Tester[1]

[1] Cornell University, Ithaca NY
[2] National Renewable Energy Laboratory, Golden CO

Another lie being put forward is about all the economic benefits of installing these technologies and all of the jobs that will be created. Those statements conveniently overlook where all of the equipment is manufactured and it isn't in NY State. The heat pumps are primarily manufactured in Europe and

Southeast Asia and many of the transformers are sourced from Korea. Furthermore, all the additional electrification that will be occurring with no local carbon benefit will actually raise global CO2e emissions as all production globally is 83% supported by fossil fuel combustion. That is both based upon direct emissions building the equipment and secondary emissions resulting from the effects of the Keynesian multiplier. The energy and the equipment being proposed are global commodities, as are Co2e emissions, this is a global issue and not isolated to NY State.

Every extra dollar spent unnecessarily will generate five dollars of economic activity globally. The extra $200 million in Con Ed's EIOP budget for this electrification will generate $1 billion in economic activity globally. $830 million of that will be supported by fossil fuels and very little of that economic activity will be in NY State. It will be occurring in China, Europe, and Southeast Asia. While NY State won't see the monetary benefits, NY State will get the emissions that will inevitably drift from Asia to North America. NY State is not in a bubble.

The economic decisions being made in NY State will be that of ratepayers choosing between feeding their families or paying their utility bills. This is already occurring throughout NY State as utility arrears have now passed $1.7 billion. More than 1 million households now have unpaid utility debt. That is despite hundreds of millions of dollars of rate relief offered by NY State in 2023. In the Con Ed service area, the amount of the average utility arrears can be higher than the average monthly rent.

So, what do Agree and the EDF propose? Adding technology that will increase those arrears even more by installing technology that will increase heating bills by 40% and then trying to offset those increases with rebates that will be paid for by the other utility customers, many of whom are also in arrears. They are doing this while implying that the technologies are both cleaner and less expensive, which as has been made clear by the prior discussion, neither is true in the Con Ed service area. Tik Tok has even caught onto the scam as can be seen in Appendix 4. Fantasies cannot overcome reality and the truth will eventually come to light.

There are numerous projects that could be executed in NY State that would simultaneously provide jobs, reduce emissions, and reduce utility bills as opposed to increasing them the way that this policy will do. Those include improving building envelopes which will reduce thermal losses and reduce combustion, replacing old combustion equipment with newer, more efficient combustion equipment that would reduce costs, and insulating pipes that will greatly reduce heat loss. Those aren't sexy but they are cost effective and will help utility customers. They will also reduce utility revenues through the use of less energy, so for those of you that hate your utility, these policies will hit them in the wallet. They are far less expensive to implement than $50,000 per dwelling and when they are completed, utility bills will go down to pay for the improvements instead of higher as they do with the heat pumps.

CONCLUSION

I brought these issues up in a pointed email during the Con Ed rate hearings. I told the proposers that they should go back and retake High School Math and Physics because they missed something along the way. I was called "unprofessional", "inflammatory", and "anti-electrification", but interestingly enough they didn't say that I was wrong.

The anti-electrification comment is comical because I was one of the first adopters of these technologies in NY State with a ground source heat pump system dating to 2003 and two solar arrays dating to 2007. The heat pumps are open loop and can achieve COP's nearly twice that of any heat pump system that can

be built today because the regulations have changed. We have five ton heat pumps transferring eight tons of energy, 60% higher than their rating. Additionally, they are not affected by air temperatures. The solar arrays have been there for so long that they are nearing their end of life. I have driven a Tesla for nine years, since 2017. I also have installed meters and collected data on all of the technologies for over twenty years, so I know how they operate as well as anyone in NY State. I am not anti-electrification. It has its place under certain circumstances.

What I am is anti-stupidity. When math, physics, history, and economics tell you with **100% certainty** that a project is going to fail, only an insane person or a scammer trying to make a buck from the project proceeds. That is especially true if you're doing it with other people's money. So yes, I can be inflammatory but I back that up with numbers. If people are going to try to influence public policy, it is incumbent upon them to ensure that their policy prescriptions adhere to physical reality and not some desires floating around in their heads or a desire to enrich themselves at the public's expense. The numbers presented previously in this document and to NY State over the past 7 years are real, as are the customers in arrears as a result of seven years of these policies that try to defy physics, climate, and geography.

Politicians and others like to blame the utilities and the fossil fuel companies but utility bills in other states, primarily supported by fossil fuels, are not increasing anywhere near the rate that they are in NY State. NY State has the seventh highest average cost per KWh, despite having the largest Hydropower resource East of the Mississippi River. There is no valid excuse for NY State to find itself in the current situation. The breakdown is in Public Policy with politicians and climate activists thinking that they know more than the engineers.

Physics is unrelenting and those people should take a long look in the mirror and ask themselves who is really unprofessional. Is it the ideologues trying to implement policies that will force ratepayers to choose between feeding their children or paying their utility bills, or the engineer trying to prevent a situation where ratepayers have to make that choice?

APPENDIX 1 – 5 MONTHS OF CENTRAL PARK TEMPERATURE DATA (NOVEMBER 2025 - MARCH 2026)

TEMPERATURE DATA - CENTRAL PARK 11/1/2025 - 3/31/2026

SOURCE - NOAA.GOV

STATION	DATE	TMAX	TMIN	TAVG
USW00094728	11/1/2025	58	48	53
USW00094728	11/2/2025	59	43	51
USW00094728	11/3/2025	59	50	54.5
USW00094728	11/4/2025	59	47	53
USW00094728	11/5/2025	66	48	57
USW00094728	11/6/2025	57	42	49.5
USW00094728	11/7/2025	61	41	51
USW00094728	11/8/2025	65	54	59.5
USW00094728	11/9/2025	63	54	58.5
USW00094728	11/10/2025	59	35	47
USW00094728	11/11/2025	41	33	37
USW00094728	11/12/2025	50	38	44
USW00094728	11/13/2025	51	42	46.5
USW00094728	11/14/2025	51	40	45.5
USW00094728	11/15/2025	50	40	45
USW00094728	11/16/2025	56	41	48.5
USW00094728	11/17/2025	44	37	40.5
USW00094728	11/18/2025	45	37	41
USW00094728	11/19/2025	47	39	43
USW00094728	11/20/2025	47	38	42.5
USW00094728	11/21/2025	52	44	48
USW00094728	11/22/2025	52	40	46
USW00094728	11/23/2025	49	36	42.5
USW00094728	11/24/2025	52	43	47.5
USW00094728	11/25/2025	58	46	52
USW00094728	11/26/2025	59	49	54
USW00094728	11/27/2025	49	36	42.5
USW00094728	11/28/2025	43	33	38
USW00094728	11/29/2025	42	32	37
USW00094728	11/30/2025	47	37	42

STATION	DATE	TMAX	TMIN	TAVG
USW00094728	12/1/2025	43	34	38.5
USW00094728	12/2/2025	40	34	37
USW00094728	12/3/2025	41	31	36
USW00094728	12/4/2025	41	24	32.5
USW00094728	12/5/2025	32	20	26
USW00094728	12/6/2025	42	30	36
USW00094728	12/7/2025	43	34	38.5
USW00094728	12/8/2025	38	22	30
USW00094728	12/9/2025	35	19	27
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USW00094728	12/14/2025	33	19	26
USW00094728	12/15/2025	29	19	24
USW00094728	12/16/2025	32	24	28
USW00094728	12/17/2025	47	30	38.5
USW00094728	12/18/2025	50	36	43
USW00094728	12/19/2025	58	32	45
USW00094728	12/20/2025	38	30	34
USW00094728	12/21/2025	46	29	37.5
USW00094728	12/22/2025	39	28	33.5
USW00094728	12/23/2025	40	35	37.5
USW00094728	12/24/2025	46	35	40.5
USW00094728	12/25/2025	49	29	39
USW00094728	12/26/2025	29	20	24.5
USW00094728	12/27/2025	31	25	28
USW00094728	12/28/2025	39	22	30.5
USW00094728	12/29/2025	49	31	40
USW00094728	12/30/2025	33	27	30
USW00094728	12/31/2025	33	27	30

STATION	DATE	TMAX	TMIN	TAVG
USW00094728	1/1/2026	36	22	29
USW00094728	1/2/2026	30	20	25
USW00094728	1/3/2026	30	23	26.5
USW00094728	1/4/2026	35	26	30.5
USW00094728	1/5/2026	39	29	34
USW00094728	1/6/2026	42	35	38.5
USW00094728	1/7/2026	49	37	43
USW00094728	1/8/2026	50	42	46
USW00094728	1/9/2026	54	39	46.5
USW00094728	1/10/2026	52	39	45.5
USW00094728	1/11/2026	47	34	40.5
USW00094728	1/12/2026	41	31	36
USW00094728	1/13/2026	48	35	41.5
USW00094728	1/14/2026	52	45	48.5
USW00094728	1/15/2026	47	24	35.5
USW00094728	1/16/2026	34	22	28
USW00094728	1/17/2026	39	31	35
USW00094728	1/18/2026	36	30	33
USW00094728	1/19/2026	32	22	27
USW00094728	1/20/2026	26	16	21
USW00094728	1/21/2026	40	17	28.5
USW00094728	1/22/2026	47	37	42
USW00094728	1/23/2026	38	14	26
USW00094728	1/24/2026	17	9	13
USW00094728	1/25/2026	22	10	16
USW00094728	1/26/2026	27	17	22
USW00094728	1/27/2026	22	15	18.5
USW00094728	1/28/2026	23	14	18.5
USW00094728	1/29/2026	23	11	17
USW00094728	1/30/2026	18	9	13.5
USW00094728	1/31/2026	24	10	17

STATION	DATE	TMAX	TMIN	TAVG
USW00094728	2/1/2026	24	10	17
USW00094728	2/2/2026	35	14	24.5
USW00094728	2/3/2026	33	23	28
USW00094728	2/4/2026	33	26	29.5
USW00094728	2/5/2026	32	20	26
USW00094728	2/6/2026	33	23	28
USW00094728	2/7/2026	27	6	16.5
USW00094728	2/8/2026	18	3	10.5
USW00094728	2/9/2026	31	10	20.5
USW00094728	2/10/2026	37	24	30.5
USW00094728	2/11/2026	41	33	37
USW00094728	2/12/2026	36	27	31.5
USW00094728	2/13/2026	38	22	30
USW00094728	2/14/2026	46	29	37.5
USW00094728	2/15/2026	40	32	36
USW00094728	2/16/2026	39	29	34
USW00094728	2/17/2026	47	35	41
USW00094728	2/18/2026	41	37	39
USW00094728	2/19/2026	42	36	39
USW00094728	2/20/2026	37	34	35.5
USW00094728	2/21/2026	46	36	41
USW00094728	2/22/2026	39	30	34.5
USW00094728	2/23/2026	35	28	31.5
USW00094728	2/24/2026	31	23	27
USW00094728	2/25/2026	44	26	35
USW00094728	2/26/2026	49	35	42
USW00094728	2/27/2026	44	29	36.5
USW00094728	2/28/2026	54	33	43.5

STATION	DATE	TMAX	TMIN	TAVG
USW00094728	3/1/2026	43	30	36.5
USW00094728	3/2/2026	33	21	27
USW00094728	3/3/2026	36	29	32.5
USW00094728	3/4/2026	49	35	42
USW00094728	3/5/2026	46	37	41.5
USW00094728	3/6/2026	41	37	39
USW00094728	3/7/2026	52	36	44
USW00094728	3/8/2026	69	50	59.5
USW00094728	3/9/2026	73	51	62
USW00094728	3/10/2026	80	51	65.5
USW00094728	3/11/2026	72	53	62.5
USW00094728	3/12/2026	63	34	48.5
USW00094728	3/13/2026	42	32	37
USW00094728	3/14/2026	51	38	44.5
USW00094728	3/15/2026	48	35	41.5
USW00094728	3/16/2026	57	48	52.5
USW00094728	3/17/2026	48	29	38.5
USW00094728	3/18/2026	37	25	31
USW00094728	3/19/2026	44	32	38
USW00094728	3/20/2026	57	39	48
USW00094728	3/21/2026	59	46	52.5
USW00094728	3/22/2026	63	44	53.5
USW00094728	3/23/2026	50	34	42
USW00094728	3/24/2026	48	32	40
USW00094728	3/25/2026	54	38	46
USW00094728	3/26/2026	76	45	60.5
USW00094728	3/27/2026	65	41	53
USW00094728	3/28/2026	44	31	37.5
USW00094728	3/29/2026	54	34	44
USW00094728	3/30/2026	73	47	60
USW00094728	3/31/2026	81	60	70.5

	AVERAGE TEMP	COP
AVERAGE November - March	**38.03**	**3.2**
AVERAGE December-February	**31.93**	**2.8**
AVERAGE January 24 - February 9	**19.76**	**2.3**

APPENDIX 2 – THE ELECTRIC GRANDMA SUBSTACK POST – JANUARY 27, 2026

The Electric Grandma

Don't Look North

Québec takes care of its own people first

Meredith Angwin

Jan 27

A Surprising Graphic

Cold. It has been cold. Below zero in some parts of New England, and down in the single digits in other parts.

And yet, when I took this screenshot from our grid operator, ISO-NE, around 5 p.m. on January 24, one thing completely surprised me. I was amazed at that arrow on the New England Clean Energy Connect (NECEC) transmission line. The arrow was pointing towards Canada. In other words, New England was exporting to Quebec on that line. Here's a tweet I wrote. I have added some emphasis.

It's five pm, my former home town of Wilder VT is 3 degrees. Windchill makes it feel like minus 3.
ISO-NE is burning more oil than natural gas. 37% oil, 25% gas.
The new NECEC transmission line **?from? Quebec** is exporting **to Quebec** right now.

Looking carefully at the graphic, I see that it is full of surprises .

- First, while the wholesale price usually runs between $0 and $100 per MWh, here the price is over $600 dollars.
- Second, we usually have NO oil burned on the New England grid. In this snapshot, oil is the dominant fuel (37% oil, 25% natural gas, 17% nuclear, 12% hydro, 8% renewables.)
- Third, ISO New England usually imports from Québec and New Brunswick. Net imports are shown on the resource mix circle. Despite the incoming arrows from New Brunswick and New York, we have no net imports on this circle. So, New England was neutral or a net exporter.

Same-Old versus Wow

Surprise versus great surprise.

Same-old: the prices on the grid soar during a cold snap. For example, during Winter Storm Uri, ERCOT wholesale prices reached $9000/MWh, compared to pre-storm prices of less than $50/MWh.

Same-old: When natural gas-fired power plants cannot get natural gas (mostly because homes are using it for heating), many of them can burn oil. Oil-fired power at 37% on our grid is unusual, for sure, but not totally unheard of. For example, on January 6, 2018, oil provided 36% of ISO-NE electricity.

Wow: Even in cold weather, New England tends to import from Canada. For example, right now it is 15 degrees in my old hometown of Wilder VT. Tonight, it will reach minus 6. (This afternoon, I took the screenshot below.) ISO-NE had 32% oil on the New England grid. Lots of oil. But it also had 14% net *imports*.

Earlier in the month, New England was *exporting*. That was a great surprise.

Looking North

What was going on? My first question was to Warren Van Wyck, who maintains a very helpful website for the American grids. https://www.wvwelectric.com/menu/ Many of the graphs on his website are interactive. Van Wyck has a math degree and has worked as a computer programmer. He also served as a representative in the Vermont legislature for several years.

I asked him about this exporting-power business. He was kind enough to make a special-purpose graph for me. Here it is. Positive numbers on this graph show electricity flows to New England. Negative numbers are exports. “Phase 1 and Phase 2” are lines connecting to Québec. NECEC is NECEC, also connecting to Québec.

NECEC (blue line) went into service January 16, and it quickly bought about 1100 MW into New England. Phase 1 and 2 were also sending MW to New England at that time. But….then…on January 25, the cold weather hit. NECEC imports went to zero. The phase 1 and phase 2 lines went negative, which meant New England was exporting to Québec. New England and New York sometimes export to Québec in cold weather. But this situation was particularly dramatic.

A Few Quotes to Contemplate

First, let's look at a press release from Governor Healey's office, on January 16 2026.

Governor Healey Celebrates Completion of NECEC Transmission Line

Transmission line will deliver 20% of Massachusetts' electricity, lower bills by $50 million each year….

During cold temperature periods, New England relies on higher-priced, more carbon-intensive fuels. This leads to expensive and volatile winter energy pricing and regional reliability concerns. The NECEC project will help address these challenges by providing consistent clean energy production during cold temperatures.

Second, we will look at a quote from Québec. Jon Larsen of RTO Insider wrote the article. Hydro-Québec Halted NECEC Deliveries amid Reliability Concerns

"The polar vortex has brought extreme and sustained cold air across Québec," Serge Abergel, chief operating officer for Hydro-Québec Energy Services, said in a statement." Later in the article, the author notes that "Hydro-Québec could face significant penalties for falling [sic] to meet the delivery requirements of the contracts."

Third, I will add my own comment. The NECEC transmission line can deliver 1200 MW. New England shut down two nuclear plants (Vermont Yankee and Pilgrim) in the last ten years. These two plants provided 1300 MW of baseload power to New England.

I miss those plants.

APPENDIX 3 – EPA DATA - GENERATION EMISSIONS NY STATE

EPA

Summary Data

eGRID with 2023 Data

Released: January 15, 2025
Revision 1 Released: January 17, 2025
Revision 2 Released: June 12, 2025

- eGRID 2023 Summary Tables (xlsx) <https://www.epa.gov/system/files/documents/2025-06/summary_tables_rev2.xlsx> (962.55 KB)
- eGRID 2023 Summary Tables (pdf) <https://www.epa.gov/system/files/documents/2025-06/summary_tables_rev2.pdf> (401.09 KB)

eGRID Subregion Total Output Emission Rates (lb/MWh)

Show 10 entries Search:

eGRID Subregion	CO_2	CH_4	N_2O	CO_2e	Annual NO_x	Ozone Season NO_x	SO_2
AKGD	899.633	0.086	0.012	905.109	5.554	6.167	0.310
AKMS	528.483	0.026	0.004	522.400	0.139	7.882	0.708
AZNM	703.703	0.039	0.005	706.189	0.360	0.384	0.103
CAMX	428.464	0.025	0.003	429.983	0.392	0.384	0.020
ERCT	733.857	0.043	0.006	736.679	0.443	0.488	0.319
FRCC	702.262	0.041	0.005	704.785	0.242	0.240	0.128
HIMS	1123.371	0.146	0.022	1133.294	7.565	7.288	4.489
HIOA	1489.548	0.134	0.021	1498.947	3.908	3.714	4.280
MROE	1397.313	0.116	0.017	1404.963	0.982	1.022	0.277
MROW	928.138	0.097	0.014	976.552	0.711	0.885	0.896
NEWE	539.275	0.063	0.008	543.179	0.291	0.283	0.116
NWPP	631.735	0.054	0.008	635.267	0.568	0.520	0.268
NYCW	864.469	0.022	0.002	865.744	0.232	0.256	0.024
NYLI	1180.672	0.148	0.018	1189.333	0.829	0.791	0.331
NYUP	242.089	0.011	0.001	242.776	0.083	0.086	0.027
PRMS	1543.073	0.077	0.012	1548.530	3.902	4.095	3.695
RFCE	596.984	0.036	0.005	599.170	0.202	0.289	0.212
RFCM	978.617	0.052	0.012	975 978	0.519	0.515	0.564
RFCW	911.424	0.071	0.010	916.054	0.422	0.359	0.412
RMPA	1036.681	0.098	0.013	1042.539	0.526	0.587	0.379
SPNO	861.999	0.087	0.012	867.740	0.462	0.566	0.137
SPSO	872.042	0.054	0.008	875.567	0.673	0.782	0.658
SRMV	739.720	0.032	0.004	741 74'	0.488	0.532	0.35'

eGRID Subregion	CO_2	CH_4	N_2O	CO_2e	Annual NO_X	Ozone Season NO_X	SO_2
SRMW	1239.839	0.132	0.019	1248.582	0.787	0.576	`.636
SRSO	842.329	0.056	0.008	846 007	0.347	0.336	0.162
SRTV	898.079	0.079	0.011	903.306	0.384	0.362	0.427
SRVC	593.419	0.045	0.006	596.326	0.282	0.316	0.152
U.S.	767.289	0.057	0.008	770.884	0.452	0.453	0.359

Showing 1 to 28 of 28 entries

Previous 1 Next

Last updated on June 16, 2025

APPENDIX 4 – TIK TOK's VIEW OF HEAT PUMPS IN THE CON ED SERVICE AREA