

August 12, 2023

Hon. Michelle L. Phillips
Secretary
New York State Public Service Commission
Three Empire State Plaza
Albany, New York 12223-1350
Submitted electronically

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

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”.

Mr. Ellenbogen is a Former Bell Labs Engineer that has done work on the Utility System with NYSERDA and Con Ed. He has decarbonized his own 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 in a PSC hosted Utility Conference in 2008 for Line Loss Reduction that was initiated by Steven Keller based upon his work at the factory and a paper written at the request of Con Ed after a factory visit¹. Mr. Ellenbogen was a Keynote Speaker at the Pace Pleasantville June 20, 21, 2023 New York Renewable Energy Conference² and an invited speaker at the Dutchess County Chamber of Commerce meeting on Energy. Mr. Ellenbogen was an early adopter of renewable technologies going back to the 1990's and decarbonized both his home and business two decades ago.^{4,5} Between 2006 and mid 2023, the business recycled or repurposed 100% of its waste and sent nothing to a landfill. Over the past 20 years, the factory has generated between 60% to 85% of its electrical energy onsite with a carbon footprint approximately 30% lower than the average of the state utility system, even prior to the closing of Indian Point.

Mr. Ellenbogen and Allied Converters were also involved in increasing access to renewables through a PSC Tariff petition during 2008-2009 that allowed for the utility system interconnection of multiple sources of on-site high efficiency generation at a single location³ and Allied Converters was the first facility in NY State that was so enabled.

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1. **Distributed Generation, Customer Premise Loads & the Utility Network A Case Study**
<http://www.powerfactorcorrectionllc.com/Distributed%20Generation.pdf>
 2. **2023 Business Council of NY State Renewable Energy Conference**
<https://savenyenergy.com/business-council-of-ny-states-renewable-energy-conference/>
 3. **NY State Public Service Commission Case 08-E-1426** Allied Converters, Inc. – Petition For a Declaratory Ruling on the Administration of Solar Net Metering Provisions at Locations Where Multiple (Hybrid) Energy Efficient Generation Technologies Are Installed.

Footnotes 4 & 5 are annotated on page 5

Mr. Ellenbogen has major concerns about the state's energy policy and how it is being implemented and has performed a mathematical analysis of the state's energy profile. The analysis was presented to both NYSERDA and Chairman Rhodes four years ago and no challenges were presented. It was recently presented to several Cornell Engineering Professors and members of their energy center. The only comment was that the analysis was understating the scope of problems identified in NY State's Energy Policy. The single comment was, "If the CLCPA is enacted as written and all of the goals are achieved, we can expect hundreds of hours of rolling blackouts annually."

INTRODUCTION

Prior to addressing the 14 questions in the Public Service Commission request, we first need to address the basis of the plan that is making the request necessary.

While Mr. Ellenbogen is in favor of the decarbonization identified in the CLCPA, the way that the policy is structured cannot possibly work and it is going to cost the state hundreds of billions of dollars, while not reducing atmospheric carbon, and worse yet, it precludes methods of reducing carbon emissions that actually will work much more rapidly based upon the physics of how utility systems actually operate. These issues supercede the 14 questions because without first ascertaining the feasibility of the plan, the answers to the 14 questions are irrelevant. Mr. Ellenbogen became involved with analyzing the state's energy policy after the gas bans were initiated in Westchester County where he lives. He was listening to the rationale of the arguments and became aware that the arguments against using natural gas were devoid of any mathematical analysis. He has no financial interests in the fossil fuel industry and understands that methane emissions are an issue, however the solutions being adopted by NY State are actually going to make matters worse. Issues that he presented to NYSERDA and the PSC four years ago have turned into newspaper headlines in the present day,⁶ It wasn't clairvoyance. It was arithmetic and analyzing what had been done elsewhere along with the end results.

ISSUES

The CLCPA, despite its name, is not leadership. It is following a plan that has failed in Germany over the course of 33 years. Just recently, on 8/7/23, it was announced that Germany is a net importer of electricity despite 33 years of installing renewable generation, while France that has chosen a mix of 70% nuclear energy and 10% hydro is a net exporter while having 10% to 15% of its nuclear output curtailed because of maintenance⁷. At the opposite end of the spectrum, Germany is a net electricity importer despite importing massive amounts of natural gas to generate electricity. Germany recently signed an agreement with Qatar to import 30 million metric tons of LNG over the next 15 years⁸.

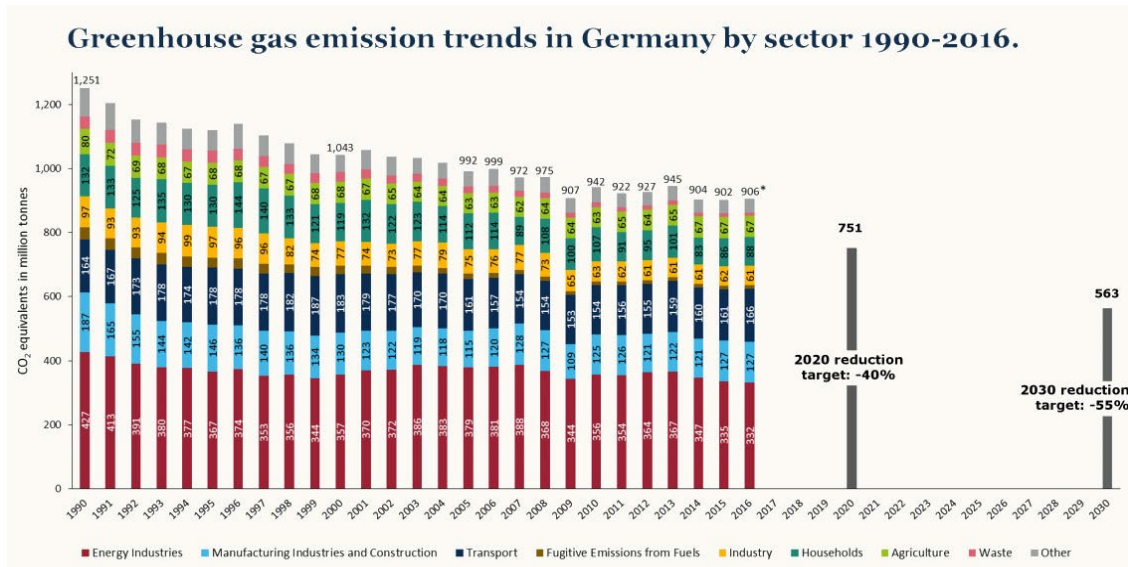
6 As New York Lags on Climate Goals, Some Dirty Plants May Stay Open Past Deadline NY Focus June 14, 2023
<https://nysfocus.com/2023/06/14/new-york-air-pollution-climate-peaker-plant>

7 France Is Europe's Top Power Exporter as Germany Turns Importer
<https://www.bloomberg.com/news/articles/2023-08-07/france-is-europe-s-top-power-exporter-as-germany-turns-importer#xj4y7vzkg>

8 German minister satisfied with 15-year Qatar LNG deal Reuters November 29,2022
<https://www.reuters.com/business/energy/german-econ-minister-satisfied-with-15-year-lng-deal-with-qatar-2022-11-29/>

Had Germany's Renewable Installation plan worked, Germany would not have had these issues. 33 years is more than enough time to determine if a concept is viable. Figure 1, below, copied from a Yale footnoted article shows that Germany has not come close to achieving its carbon reduction goals despite 33 years of trying, while during the period expensing hundreds of billions of dollars. Since 2016, Germany has fallen farther behind and had to restart coal fired electric generating plants in 2020, even prior to the war in Ukraine.⁹

Figure 1 Carbon Crossroads: Can Germany Revive Its Stalled Energy Transition? ¹⁰



The issues with the CLCPA Plan are as follows:

- 1 – There is a lack of available energy to support the Plan
- 2 – Costs to implement the Plan will far exceed other, better solutions

These costs accrue based upon shortages of materials and skilled labor, high energy storage costs, and a lack of financial adequacy

- 3 – Atmospheric Carbon Levels will rise far above what could be achieved using other alternatives
- 4 – Planned timing mandates are unachievable
- 5- There are major non-sequiter issues contained within the CLCPA

⁹ **Coal Keeps Germany's Lights On** Wall Street Journal March 9, 2023 <https://www.wsj.com/articles/germany-coal-energy-electricity-renewables-4700b442>

¹⁰ **Carbon Crossroads: Can Germany Revive Its Stalled Energy Transition?** Yale 360 December 13, 2018 <https://e360.yale.edu/features/carbon-crossroads-can-germany-revive-its-stalled-energy-transition>

1 – Lack of energy to Support the Plan

Mr. Ellenbogen’s analysis, and research done independently at Cornell, indicates that even if all of the renewables specified in the CLCPA are installed, the state will still be over 100,000 GWh short of what is needed and there will be hundreds of hours of rolling blackouts annually.

To make matters worse, the CLCPA will not achieve the installations that are in the plan. The state is falling behind NYSEERDA’s projected renewable facility installation rate because of interconnection issues due to trying to overlay distributed renewables on a system that was designed for large centralized power plants, NIMBY issues, high costs, labor shortages, commodity shortages, and the Jones Act, among other issues. These are not temporary problems. Further, when it was proposed in 2011, the CHPE Power Cable was originally designed to be a summer peaker offset. Now, with NY State’s building electrification plan, the winter loads will far exceed the summer loads. Studies from the Montreal Economic Institute have indicated that within a decade, Quebec will need all of its energy to support their own electric grid during extremely cold weather leaving the CHPE curtailed when heat pumps in NY City would need the energy the most.¹¹

In Figure 2, below, column A shows NY State’s fossil fuel energy load in 2019 expressed in GWh. Column B shows what can be achieved if everything is converted to renewable technologies such as heat pumps or Electric Vehicles. Keep in mind that this does not include generation that is already supplied by Hydropower, nuclear, or pre-existing renewables which amounts to approximately 65,000 GWh. Including that energy, full electrification would reduce the total load from 850,000 GWh to 440,000 GWh of energy usage, so the reduction is a worthwhile pursuit, however NY State’s execution of the Plan is not going to achieve that.

Column D shows the projected energy output of the 2035 renewable generation installations in 2019 when the analysis was originally performed. It is about 70% of the 2022 electric utility fossil fuel load that must be reached by 2030, five years earlier than the 2035 date in Figure 2.

Renewable generation installations are falling well behind the 2019 projected 2035 installation rate with solar projects being canceled because of high costs and interconnection issues. Projects that aren’t being canceled are being delayed because of labor shortages, financing issues, NIMBY issues, and interconnection issues. Offshore wind is presently having major delays in the installation rates with inflation, high interest rates, and the Jones Act all impacting the process. A recent article from the Boston Globe, **‘Made in America’ is sinking offshore wind**, defines the Jones Act issue.¹²

The Jones Act is a little-known provision in the much larger Merchant Marine Act of 1920 and was intended to boost the shipbuilding industry in the wake of World War I. The Jones Act requires that all goods transported between American ports must be carried on ships that are built, owned, and crewed by US citizens. Presently, of the approximately fifty Jack Ships in the world that are

11 **Rising demand stretching Canadian hydropower thin** Associated Press June 9, 2023
<https://journalrecord.com/2023/06/09/rising-demand-stretching-canadian-hydropower-thin/>

12 **‘Made in America’ is sinking offshore wind** Boston Globe August 7, 2023
<https://www.bostonglobe.com/2023/08/07/opinion/offshore-wind-challenge-jones-act/>

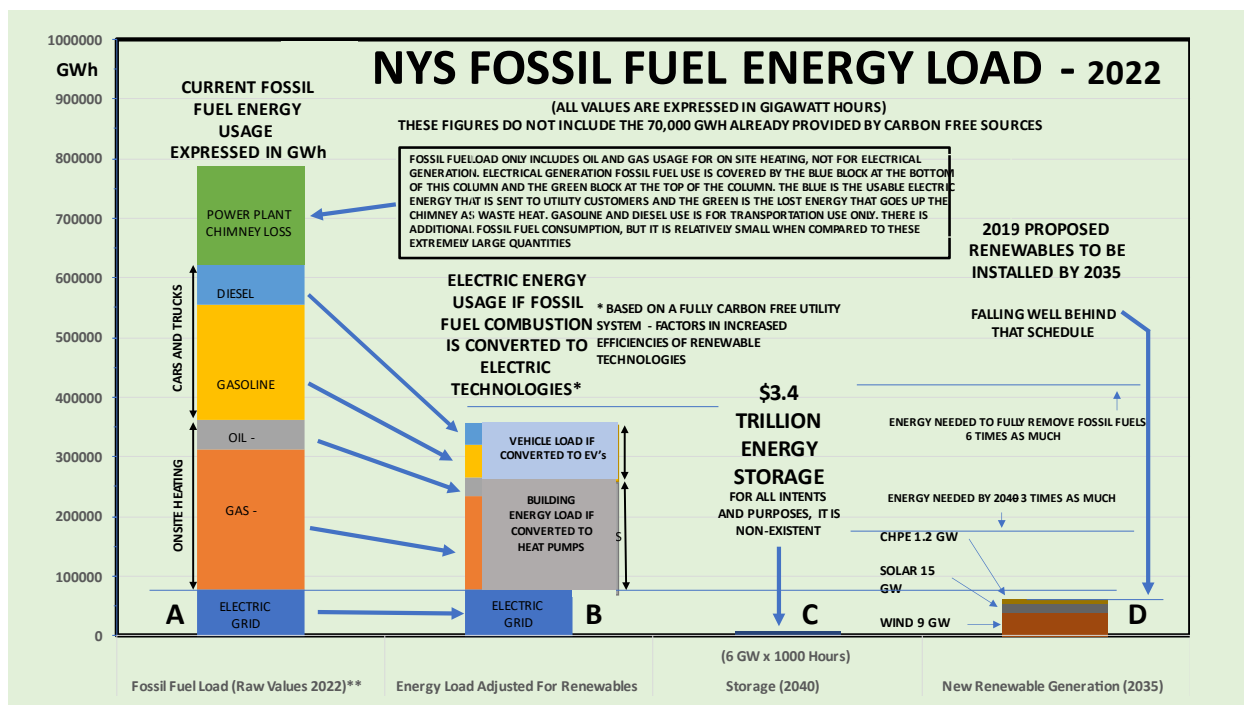
used to install offshore wind, 1/3 are in Europe and 2/3 are in China/Southeast Asia. The first Jones Act compliant Jack Ship in the United States will not go into service until 2024 and it will be owned by Dominion Energy. After installing 1.1GW of offshore Wind for NY State and 704 MW of Offshore Wind for Connecticut and Rhode Island, it will be obligated to install offshore wind in Virginia prior to being used elsewhere. The keel for the Dominion Charybdis was laid in 2020¹³, so these ships take over three years to build and launch. No one should expect a rapid influx of additional ships and NY State will still be about 8 Gigawatts short of its 9-Gigawatt goal for 2035 and what will be needed to achieve a 70% clean grid by 2030. Other states on the East Coast that have their own offshore wind initiatives, including Massachusetts and New Jersey, will also be seeking to use a very limited fleet of Jack Ships. Further, on page 64 (page 71 of the pdf) of the Initial Report on the New York Power Grid Study¹⁴ prepared by the NYSDPS, NYSERDA, and the Brattle Group, It states the following, in italics:

Should these challenges limit interconnections in New York City below the 5-6 GW amounts studied—either routed through the harbor or brought into New York City through the Long Island Sound—more than 3-4 GW of OSW generation may need to be interconnected to the onshore grid on Long Island, leading to substantially higher curtailment and the need for additional onshore transmission from Long Island to the rest of the State to mitigate the risk of these curtailments..

So even if NY State can build the 9 Gigawatts of Offshore Wind, there is going to be difficulty in interconnected it to the system without curtailing the energy output, It is going to require large amounts of transmission infrastructure being built in some of the most densely populated areas in the United States. If the first NYS OSW landing project in Wainscott, Long Island is any indicator¹⁵, this is going to be a time consuming and expensive process. That follows a ten year approval process for the CHPE cable which faced large amounts of public resistance. It was finally approved but is going to be in service 10 years after its initially planned date. It is against this backdrop that NY State is trying to execute its plan.

- 4 **Going Green: Still Challenging Turf** NY Times November 14, 2008,
<https://www.nytimes.com/2008/11/16/realestate/16wczo.html>
- 5 **Westchester Plastics Maker Embraced Renewable Energy Decades Before Gas Moratorium** Wall Street Journal
October 27, 2019, <https://www.wsj.com/articles/westchester-plastics-maker-embraced-renewable-energy-decades-before-gas-moratorium-11572174001>
- 13 Charybdis Dominion Energy <https://www.dominionenergy.com/projects-and-facilities/wind-power-facilities-and-projects/charybdis>
- 14 **Initial Report on the New York Power Grid Study** NYSDPS, NYSERDA, Brattle Group January 19,2021
https://dzdeca.a2cdn1.secureserver.net/wp-content/uploads/2022/01/Brattlefiles-20842_initial_report_on_the_new_york_power_grid_study-pp71.pdf
- 15 **Wainscott Residents Sue to Stop Wind Cable** The Easthampton Star March 17, 2022
<https://www.easthamptonstar.com/villages/2022317/wainscott-residents-sue-to-stop-wind-cable>

Figure 2 NY State Fossil Fuel Energy Load vs. Renewable Installation



2 – Project costs will far exceed other, better solutions, based upon a shortage of materials, labor, and capital needed to complete Plan implementation

The recently released NYSERDA 6 GW Energy Storage Report¹⁶, on page 94 of the 104 pages documents a need for 1000+ hours of storage or 6,000 GWh of storage. Text from page 94 follows in italics.

*Solar output is highest in the summer and lowest in the winter, and wind output is complementary to solar, as shown in Figure 40. **With seasonal storage (1000+ hours)**, the availability of a specific resource during critical weeks – or in between multiple critical weeks in a season matters less; instead, the cheapest form of energy, such as solar in the spring and summer, can be stored and discharged over multiple winter weeks.*

Column C in Figure 2 shows the 6,000 GWh of storage displayed on the same scale of generation and demand. It is almost non-existent relative to the loads and will be totally inadequate to support the system. Far more storage than that will be needed to support a renewable system, however the NYSERDA report also documents a 2022 storage cost of \$560 per KWh. At that price, the 6,000 GWh will cost \$3.4 trillion, or about 16 times NY State's annual budget. Some have been proposing using EV batteries to support the system. Typically EV users are either charging EV batteries for use or using those batteries for transportation. The concept of back feeding energy into the system is nice in theory but cannot be relied upon in any practical sense. Further, how many people will willingly use their car to support the utility when they find out they will receive 20% less revenue for discharging than they paid for charging and that the more frequent cycling will shorten the battery life. There are also capacitive batteries now being manufactured.

16 New York's 6 GW Energy Storage Roadmap NYSERDA December 28,2022
<https://www.nyserdera.ny.gov/-/media/Project/Nyserda/Files/Programs/Energy-Storage/ny-6-gw-energy-storage-roadmap.pdf>

While some homes were entirely powered by backup generation during outages caused by Hurricane Sandy, businesses are now looking in to storage systems in light of such recent events, and have very little faith that NY State will be able to provide sufficient energy to maintain the Downstate system. The NYISO has stated the the Downstate System will be under stress starting in 2023 and running to at least 2033. As a result of the NYISO's statement, businesses have been exploring ways to operate the factories off of the grid for extended periods during power outages. Factories investigating capacitive batteries have found that they have a lower energy density than Lithium-Ion batteries so they will be larger for an equivalent rating, but for a stationary battery it is not as much of an issue as it would be on an EV. While the newer technology has a 25–40-year lifespan, far longer than the ten years of Lithium-Ion batteries, and it is far less volatile in terms of fire risks, it is still priced at \$583 per KWh. Extrapolated to the 6,000 GWh of storage need documented in the NYSERDA Energy Storage report, that is \$3.5 trillion. That is just for the shown inadequate energy storage and does not include any cost of renewable generation or costs for transmission or distribution. Even if they can reduce the cost by 70%, it is still \$1 trillion, over 4.25 times NY State's annual budget for technology that will only store energy. And that uses an extremely optimistic assumption that a 70% cost reduction can be achieved, which is highly unlikely within such a short mandated time frame and the 6000 GWh of storage will still be inadequate. You could build sixty-six Vogtle type AP-1000 nuclear plants for that same \$1 trillion, even after the cost overruns, and generate 535 Terawatt Hours of energy annually that could electrify all of NY State and a substantial portion of the entire Northeast U.S. **How can that storage cost be justified?**

The Champlain Hudson Power Express, originally proposed in 2011 and approved by the PSC in 2013 has risen in cost from \$2 billion to \$6 billion, a 235% increase in inflation adjusted dollars. The startup date for the CHPE was originally 2015- 2016 but that is now pushed back to 2026, a delay of ten years. The electrification mandates for new buildings are going to add additional burdens on residents and rate payers, especially poorer homeowners. Based upon recent statements from landlords in NY City, the cost of installation and retrofits will be in the range of \$50,000 to \$77,000 per domicile, not including the costs of rewiring of the utility system to supply sufficient power to the buildings.¹⁷

There is a documented shortage of electricians and other skilled laborers needed to complete the transition.¹⁸ In discussions with contractors, they are having the identical problem and can't find workers, even minimally qualified ones. Decisions made decades ago to not teach the Trades in public schools are negatively impacting the workforce.

Beyond that, when the Reactive Power project was conducted with with NYSERDA and Con Ed in 2010, three of the four utility transformers that were being measured were operating at their capacity on a hot summer day. However, winter loads under the CLCPA plan and NY Heats, along with vehicle charging, will place loads some 230% above the present summertime loads that were measured in 2010 by 2053.

17 Too Much Green to Go Green: Complexes Face Crushing Costs The Real Deal June 5, 2023

<https://therealdeal.com/new-york/2023/06/05/too-much-green-to-go-green-complexes-face-crushing-costs/>

18 The Great Electrician Shortage The New Yorker April 24, 2023

<https://www.newyorker.com/news/dept-of-energy/the-great-electrician-shortage>

This is made apparent on page 19 of the 2023 NYISO Gold Book¹⁹ that shows potential peak winter loads approaching 59 GW by 2040 and 74 GW by 2053, whereas the current peak summer loads are 32 GW.

As a result, conversion to heat pumps and large local loads will require that the entire system will have to be rewired and almost every transformer in the system will have to be replaced at a time when there is an acute transformer shortage²⁰. Utilities are worried about having a sufficient number of transformers needed to repair the system after a storm, let alone having enough to rewire the entire system and that is not the only issue. While 2050 is less than 30 years away, the rewiring timeframe for the system will take far longer than that to support those loads.

There are approximately 72,000 miles of roads in NY State that will need to be rewired, of the state's 112,000 total miles. There are 22,000 miles of major highways that won't need to be rewired as there are few structures on them. Approximately 20% of the remainder (18,000 miles) uses electric heat and could actually have the load on those circuits reduced by switching from radiant electric heat to heat pumps. California is currently rewiring areas of the state that are prone to forest fires. Last year, they rewired 72 miles. By 2027, they expect to be able to rewire a peak of 1200 miles per year²¹. Using an equivalent rate, 72,000 miles at 1,200 miles per year yields a 60 year rewiring timeframe to install higher capacity wires and transformers. How does that fit in with a 7 year or 17 year timeframe or the 2050 date, less than 30 years away?

In the interim, the state has passed an EV mandate for 2035 and most major vehicle manufacturers have committed to ceasing internal combustion vehicle production by 2035 or 2040.²² This is going to greatly increase system load by 2035 and even more by 2050. Based upon gasoline usage in NY State in 2019 and the relative energy efficiency of 80% efficient EV's versus the 22% efficient internal combustion engines, 100% vehicle saturation would result in a 50,000 GWh increase in annual system load. If 43% energy efficient diesel trucks are added to that, another 30,000 GWh will be added to the system. Even a 70% saturation of EV's fifteen years after the car companies stop making internal combustion engines will result in almost 60,000 additional GWh on the system in 27 years. Where is that generation going to come from and what distribution system is going to carry it throughout the state?

With the state expensing resources elsewhere on technologies that are far more expensive than what is needed, there will be insufficient labor and resources to build up the necessary vehicle infrastructure that will be required.

19 **NYISO 2023 Gold Book** <https://www.nyiso.com/documents/20142/2226333/2023-Gold-Book-Public.pdf/c079fc6b-514f-b28d-60e2-256546600214>

20 **Power companies warn of dangerous transformer shortage** **The Neighbor August 9, 2023**
https://www.mdjonline.com/neighbor_newspapers/news/national/power-companies-warn-of-dangerous-transformer-shortage/video_2debbacd-b04e-598a-8aee-2930dc41426e.html

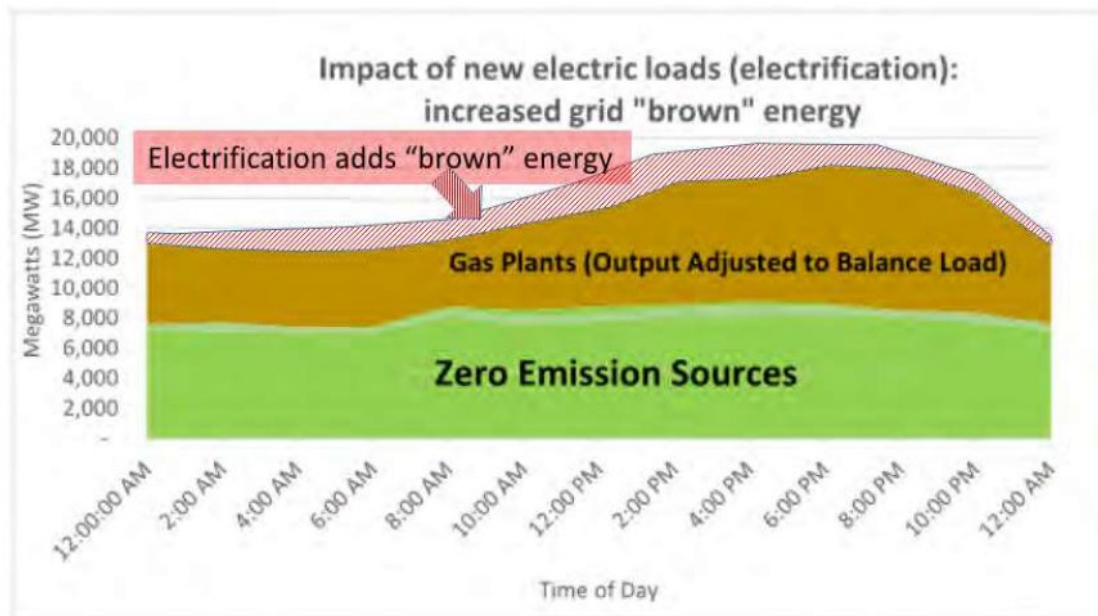
21 **PG&E on track to bury 10,000 miles of underground power lines in high-fire risk areas**
<https://www.kcra.com/article/pge-track-bury-10000-miles-underground-power-lines-high-fire-risk-areas/44645248>

22 **Here are the main electric vehicle goals set by automakers and major markets** **Protocol October 14, 2022**
<https://www.protocol.com/climate/electric-vehicle-automaker-goals>

3 – The Plan will raise atmospheric carbon levels far above what can be achieved using other alternatives

Mandates resulting from the CLCPA are going to increase atmospheric carbon. Because of a renewable energy/carbon free energy shortage that will last several decades, as seen in Figure 2, contrary to the claims of its proponents, all additional loads will be supported by fossil fuel generation, even during the shoulder months as shown below in Figure 3.

Figure 3 Impact of New Loads (Electrification) Increases Fossil Fuel Generation ²³



With NY State's aversion to upgrading its generating plant fleet, heat pumps in most cases will be forced to operate from older, 35% efficient fossil fuel generation for the foreseeable future. If line losses are figured in, the delivered electrical energy efficiency to the heat pumps will be 28%. Even if an air source heat pump is operating at 300% efficiency on a 40-degree day, the net 84% efficiency is lower than that of an 85% - 95% onsite gas combustion system. On a colder day, when the heat pumps are operating at 200% efficiency, the fossil fuel generating plants will combust 30% more fuel than the onsite heating. On a very cold day, the holistic efficiency of the heat pumps will be 28% and the fossil fuel generating plants will combust 70% more fuel than the onsite combustion. That does not include emissions from refrigerant leakage from all of the additional heat pumps that will be operating. Refrigerants can have a GHG rating 600 – 2500 times greater than CO₂ and studies that have been done have shown that split chilling systems can have a 50% leakage rate. ^{24 a,b}

23 Innovative Thermal Strategies: Electrification's Best Friend Steve Beyers, Koenraad Beckers, Jefferson Tester August 31, 2022
National Renewable Energy Lab, Cornell University <https://www.osti.gov/biblio/1983893>

24a Air Conditioning has Climate Problem. New Technology Could Help Washington Post September 22, 2022
<https://www.washingtonpost.com/climate-environment/2022/09/10/air-conditioner-ac-unit-climate-change/>

24b There's an Invisible Climate Threat Seeping From Grocery Store Freezers.... Washington Post February 15, 2021
<https://www.washingtonpost.com/climate-environment/2021/02/15/these-gases-your-grocery-freezer-are-fueling-climate-change-biden-wants-fix-that/>

The Micron facility in Clay, NY is another example of how the CLCPA is going to raise carbon emissions. A recent analysis has indicated that the facility will need 16 TWh annually by 2043.²⁵ As a comparison, the recently closed 2 GW Indian Point Nuclear plant generated 16.3 TWh in its last full year of operation with a capacity factor of 0.93. While NYPA has said that they will support the Micron facility with 140 MW of Hydropower (7% of Micron’s needs), in reality that much hydropower is not available in NY State, as clearly seen in Figure 3. All additional loads in NY State are supported by fossil fuel generation so whoever is presently using that 140 MW will be “switched” (on paper) to fossil fuels with higher emissions. As there will not be sufficient generation in NY State to support the Micron plant and the state’s Eastern neighbors have their own energy issues, the energy for the Micron facility will be imported from long distances, probably Pennsylvania or Ohio which are primarily fossil fuel generation states, including coal generation. Only a 3% power line loss on 16 TWh of energy will result in approximately 500 GWh of lost energy, and the associated emissions, annually on the power lines supporting the Micron Facility. To put that into perspective, Cornell University’s total energy usage in a year is 200 GWh, so the lost energy under the CLCPA mandates in one year transmitting power to the Micron Facility could operate Cornell University for 2-1/2 years. A far better solution would be to put a 2 GW Combined Cycle or Nuclear plant on the Micron site which would eliminate all of that line loss and also make thermal energy available to the facility to help them reduce costs. Micron would be green in reality instead of papering over the issue with carbon credits and energy allocations that look “green” but aren’t. All of this is being done to try and comply with an energy policy that is hamstringing the state in its climate efforts but instead it will, in actuality, result in much higher carbon emissions related to the facility than could otherwise be achieved.

Every state that is trying this type of planning has the same issue, whether it is California, Massachusetts, New Jersey, or New York. They are not able to install enough renewable generation to generate enough energy to shut down their fossil fuel plants as planned within the mandated time frames. As a result, the states are running dirty fossil fuel plants far longer than expected. In June, it was stated by NY State and the NYISO that , ***“As New York Lags on Climate Goals, Some Dirty Plants May Stay Open Past Deadline”***.^{26a} Just this past week it was California stating that, ***“Closure of 3 SoCal power plants, including one in Long Beach, likely to be postponed”***.^{26b}

Figure 4, below, shows the difference in pollutant emissions between older, existing fossil fuel plants and the newer, combined cycle plants²⁷. NY State is clinging to the illusion that it is going to be able to offset the massive load that is about to arrive with renewable generation and batteries.

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- 25 **Micron’s Unmatched Environmental Impact at Clay Chip Fabs Doubles in Latest Estimates** Syracuse.com August 1, 2023 <https://www.syracuse.com/business/2023/08/microns-unmatched-environmental-impact-at-clay-chip-fabs-doubles-in-latest-estimates.html>
- 26a **As New York Lags on Climate Goals, Some Dirty Plants May Stay Open Past Deadline** NY Focus June 14, 2023 <https://nysfocus.com/2023/06/14/new-york-air-pollution-climate-peaker-plant>
- 26b **Closure of 3 SoCal power plants, including one in Long Beach, likely to be postponed** Long Beach Post August 10, 2023 <https://lbpost.com/news/aes-alamitos-power-plant-closure-2026/>
- 27 **Survey of National Grid Generation Formerly Owned By LILCO** Raul R. Rodriguez June 25, 2015 <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKewixj-6jvtiAAxUsg4kEHdXfAjoQFnoECBYQAO&url=https%3A%2F%2Fwww3.epa.gov%2Fregion1%2Fnpdes%2Fschillerstation%2Fpdfs%2FAR-323.pdf&usg=AOvVaw2BtKc6qDvPtyjpSWQFLyQf&opi=89978449>

That misconception is going to leave the older, dirtier fossil fuel generating plants running decades longer than they would otherwise have to. In the graph in Figure 4 and the Tables in Figure 5, shown is the Caithness Plant which is a combined cycle facility while the other three generating plants are steam turbine generation plants. All of the steam generating plants are still operating eight years later despite this paragraph in the document from a 2015 study analyzing them.

As discussed herein, the majority of this former LILCO generation should be retired as soon as their generating capacity can be replaced.. In addition to substantial concerns regarding their reliability, these generating units are grossly inefficient by today's standards and are environmentally unfriendly, both in terms of air emissions and water usage. These units need to be replaced by new, modern, highly efficient clean gas-fired combined cycle generation. Replacement of the old, former LILCO generating units with new combined cycle generation would improve significantly Long Island's economy and environment, as well as greatly improve the reliability of Long Island's electric grid.

There was an effort to retool the E.F. Barrett plant in 2017 as a combined cycle plant, however it was declined in favor of future renewable generation. Now, six years later, it is still polluting the air and releasing large amounts of hot cooling water into the local bodies of water. It is also using at least twice as much fuel as the combined cycle plant would. How is this sound energy policy and how does leaving these polluting plants operating promote *Climate Justice* ?

At this writing, the E.F. Barrett Plant has been operating continuously for the past several weeks supporting the increased cooling load from the recent heat wave. As can be seen in Figure 6, wind speeds are at their lowest off the coast of Long Island during the summer months. As a result, Offshore Wind Farms are going to have difficulty replacing that fossil fuel generation during the cooling season. Europe has a similar problem over the summer with the North Sea Wind Farms during heat waves.

Figure 4 Comparison of Air Emissions From Long Island Poawer Plants

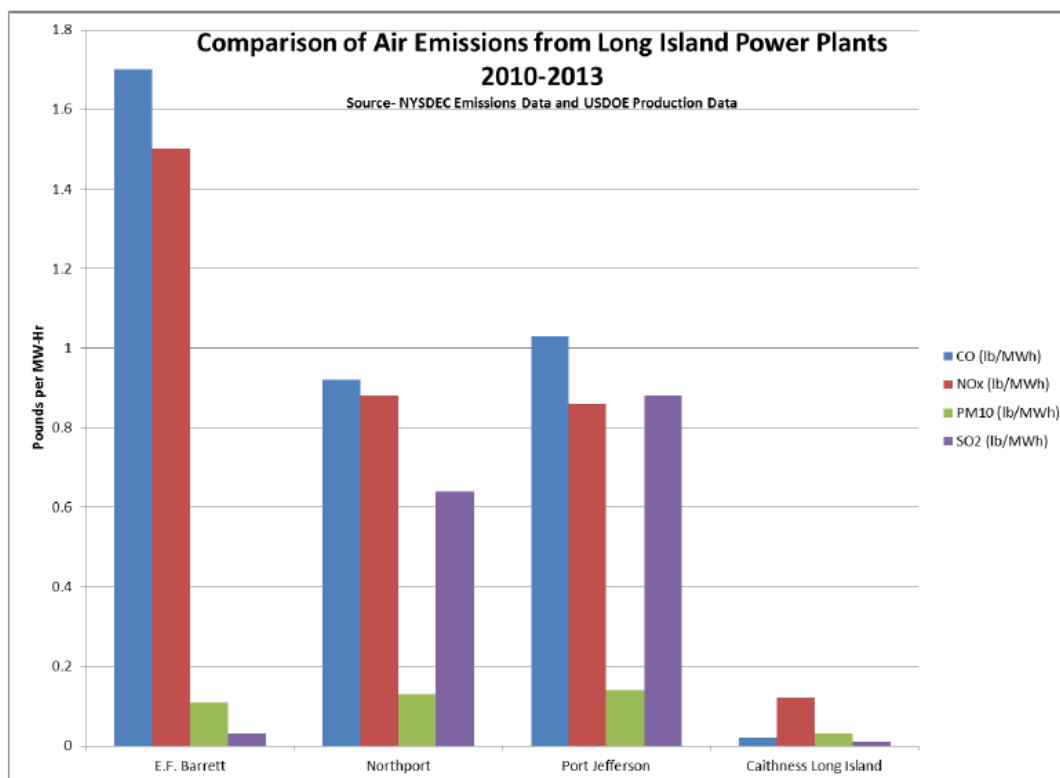


Figure 5 Data for the Chart In Figure 4

Facility	CO (lb/MWh)	NOx (lb/MWh)	PM10 (lb/MWh)	SO2 (lb/MWh)
E.F. Barrett	1.7	1.5	0.11	0.03
Northport	0.92	0.88	0.13	0.64
Port Jefferson	1.03	0.86	0.14	0.88

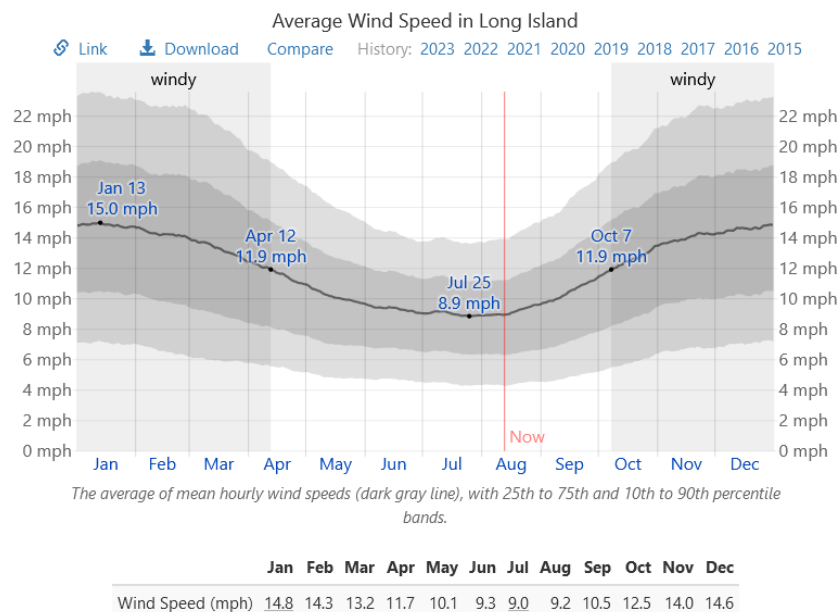
(CO=Carbon Monoxide, NOx=Nitrogen Oxides, PM10=Particulate Matter, SO2=Sulfur Dioxide, , lb/MWh= pounds per megawatt-hour)

In sharp contrast, the approximately 350 MW Caithness Long Island plant, which went into commercial operation in 2009, has much lower emissions as shown in the table below:

Table 4A: Average Air Emissions of Caithness Long Island 2010-2013

Facility	CO (lb/MWh)	NOx (lb/MWh)	PM10 (lb/MWh)	SO2 (lb/MWh)
Caithness Long Island	0.02	0.12	0.03	0.01

Figure 6 Long Island Wind Speeds by Month²⁸



²⁸ Climate and Average Weather Year Round in Long Island New York Weatherspark
<https://weatherspark.com/y/150351/Average-Weather-in-Long-Island-New-York-United-States-Year-Round>

4 – The State’s Energy Plan can’t be completed in the mandates time frame

Short of adding sufficient nuclear generation to the system, there is no good answer to any of the 14 questions in the proceeding. 7 years and 17 years is too short of a time period. Based upon what is in available technical literature, even the SMR's (Small Modular Reactors) might not be able to be installed by 2040 and they are already being manufactured. That is not to say that those should not be considered because other, less viable options will take even longer than that to install. The SMR’s certainly would not be ready by 2030. The Vogtle Units 3 & 4 (1 GW AP-1000 nuclear reactors) will have been under construction for ten years when the second one goes on-line in 2024. If a similar project was started in NY State tomorrow, it might be ready by 2033, assuming no NIMBY resistance or lawsuits which is highly unlikely.

The entire thought process documented in the CLCPA is defective. NY State wants to operate some of the generation 3% of the year? That doesn't work in the real world. Most generating technologies don't lend themselves well to being dormant 97% of the time. Additionally, based upon the math, the 3% is an extremely low estimate. It would be far more cost effective to build more nuclear generation and fewer renewables. That would remove the intermittency issue and the storage cost issue documented earlier.

As indicated in the 2023 Renewable Energy Conference at Pace previously mentioned, the rollout of fiber optics by the phone companies shows the fallacy of the entire NY State process in trying to implement the energy transition thinking that new technologies will be available. For those that are interested, a link to the conference is at Footnote 2.

The fiber optic rollout was a utility scale project and a much simpler one than what NY State is trying to achieve with its energy transition. There was no NIMBY resistance to running fiber cable on existing poles that already had wires on them. No one was complaining about killing fish, destroying views, ruining farmland, contaminating rivers,

The principle of transmitting information using pulses of light through glass fibers was discovered in 1952. Corning had been making glass for over 100 years and it still took 18 years to perfect the process and make the glass fiber commercially viable by the 1970’s.

The phone companies had tremendous financial incentives to switch to glass fiber because of the much lower costs of glass versus copper and the much higher information bandwidth of the glass fibers. That compares to renewable energy installations that have historically raised costs everywhere they have been installed. Germany’s utility rates are twice those of France, next door.

In 1977, GTE sent the first live traffic through a pilot fiber optic system in Long Beach, California. To date, the energy technologies being discussed by NY State have no mass manufacturing capability (except for the batteries) and building large scale manufacturing takes years. Even with large scale manufacturing already in place and huge economic advantages, fiber optic networks did not get installed at a large scale until the early 1990's, forty years after it was discovered, and many areas still don't have fiber installed almost 70 years later. Using the best-case scenario, it will be five to six decades before a new technology will be able to assist with implementing NY State’s energy plan, far longer than the 17 years between now and 2040.

Comparing where the state was four years ago with today, a lot of paper has been generated. There hasn't been nearly as much progress on installing systems or solving technical challenges, including the interconnection of the 9 GW of Atlantic Offshore Wind. Every day yields another

headline of canceled battery installations, canceled renewable projects because of transmission line costs making the projects non-profitable, and offshore wind being impacted by inflationary pressures, interest rates, and the Jones Act precluding the use of needed ships.

The state may get some boutique technologies installed at a small scale by 2030 but nothing of the magnitude that is needed to support the system. It has been a major issue to even figure out how to get the renewables installed and interconnected in a timely fashion. All of the Offshore Wind Contracts are being renegotiated and will impose an enormous burden on the NY State ratepayers.

Why is the PSC trying to figure out how to do something in seven years or seventeen years that Germany hasn't figured out in 33 years despite hundreds of billions of dollars of capital outlay. Beyond the technical hurdles, how is the state going to pay for it? They want to be 70% renewable by 2030. Not only will the state not be able to install sufficient renewable generation by 2030 to offset 70% of the current system load, the load is going to increase because of the building mandates and EV purchases, and there also are going to be major grid stability issues.

5- Major non sequitur issues with the logic and analysis contained within the CLCPA

If you do a deep dive into appendix G of the CLCPA, which documents the energy portfolio that will be needed for the Plan, it is based upon fantasy. It uses a solar Capacity Factor (CF) of 22% in a state that has a solar capacity factor of 13% when the arrays are new.

Figure 7 Energy Chart From Appendix G of the CLCPA

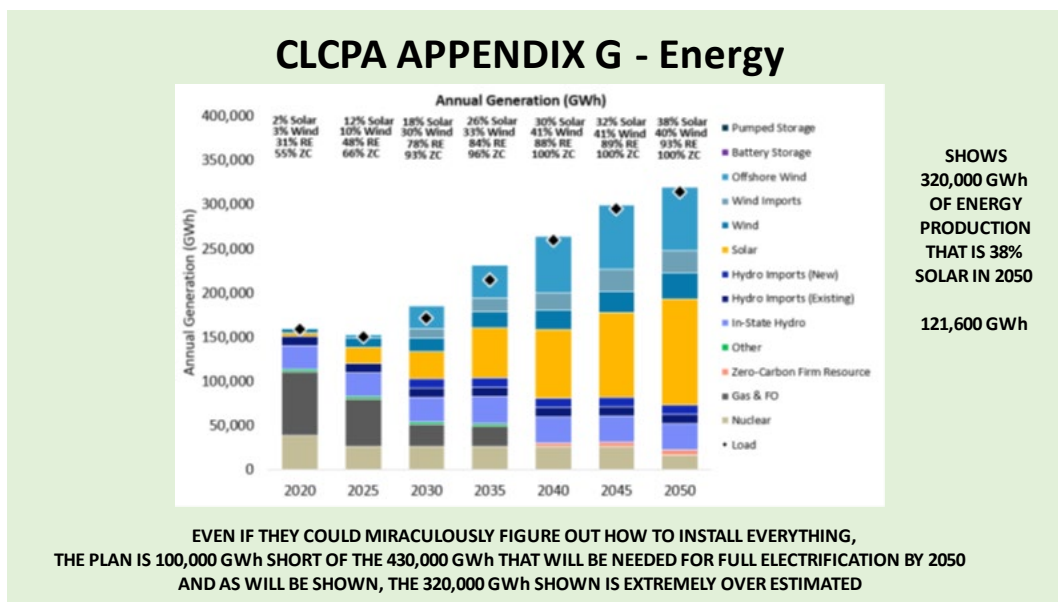
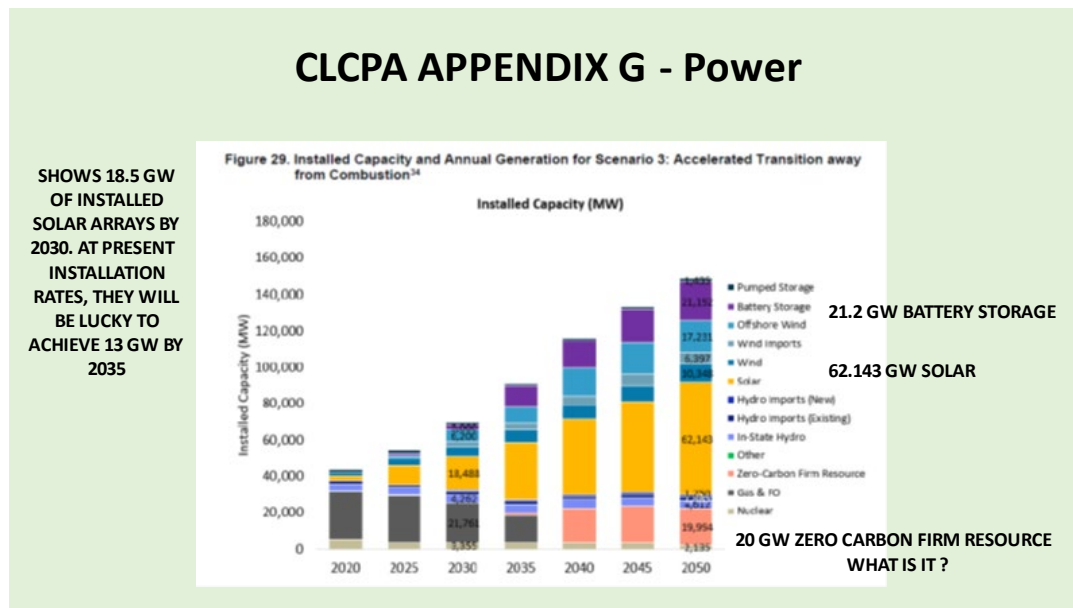


Figure 7, above, is copied from Appendix G of the CLCPA. In 2050, it shows 320,000 GWh of Energy Generation that is 38% Solar equaling to 121,600 GWh. Figure 8, below, is also copied from Appendix G of the CLCPA and shows 62.145 GW of installed Solar in 2050. Doing the math,

$$62.143 \text{ GW} \times 365 \text{ DAYS} \times 24 \text{ HOURS} \times 0.2234 \text{ CF} = 121,600 \text{ GWh}$$

It would require a Solar Capacity factor of 0.2234 to reconcile the two charts. However, the Solar Capacity factor in NY State is 13%, not 22.34% resulting in the CLCPA's calculated solar output being overestimated by 72% or 51,000 GWh. Using the correct solar capacity factor results in only 70,768 GWh of solar output in 2050, 51,000 GWh less. Additionally, based upon the earlier presented calculations, the system will need 440,000 GWh of generation, 120,000 GWh more than the 2050 figure in Appendix G and 170,000 GWh more if the overstated 51,000 GWh is subtracted. This explains the comment by the Cornell Professor, previously cited, that we can expect hundreds of hours of rolling blackouts every year if the CLCPA is executed as planned.

Figure 8 Power Chart From Appendix G of the CLCPA



Also appearing in appendix G is the following statement:

Reducing GHG in line with Climate Act limits avoids economic impacts of damages caused by climate change equaling approximately \$240 to \$255 billion.

NY States total GHG emissions are 350 million metric tons (MT), 190 MT in state and 160 MT out of state, primarily related to fossil fuel extraction. The first obvious issue with this is that NY State has no control over energy extraction out of state so those emissions will be there whether NY State uses fossil fuels or not. However, a much larger issue is that the worldwide INCREASE of GHG in 2021 and 2022 totaled 2.5 billion metric tons, 40% of that from increased coal combustion, approximately 1 billion metric tons. The 2.5 billion MT is seven times NY State's total. Keep in mind that was just the increase in emissions and not the total global emissions. NY State could eliminate 100% of both its in state and out of state emissions and would gain no economic benefit from damages caused by climate change. The solar capacity factor issue and the economic issue above are two of many issues that appear in the CLCPA document, but they are the simplest to explain.

How such problematic arithmetic is being used as the basis for energy policy for 19.5 million people is beyond belief. Contrary to its goal, the CLCPA is going to increase fossil fuel usage well above where it could be with more sensible policies.

Further, what is going to happen when utility rates really start to spike and there is a rebellion from the citizenry of NY State? This happened in Ontario, Canada four years ago so it isn't beyond the realm of possibility. The green energy policy there was repealed, and they are worse off than if they had gone at a pace that was acceptable to the populace. Worse, as documented earlier, the utility rate spikes in NY State are going to occur with zero to little climate benefit.

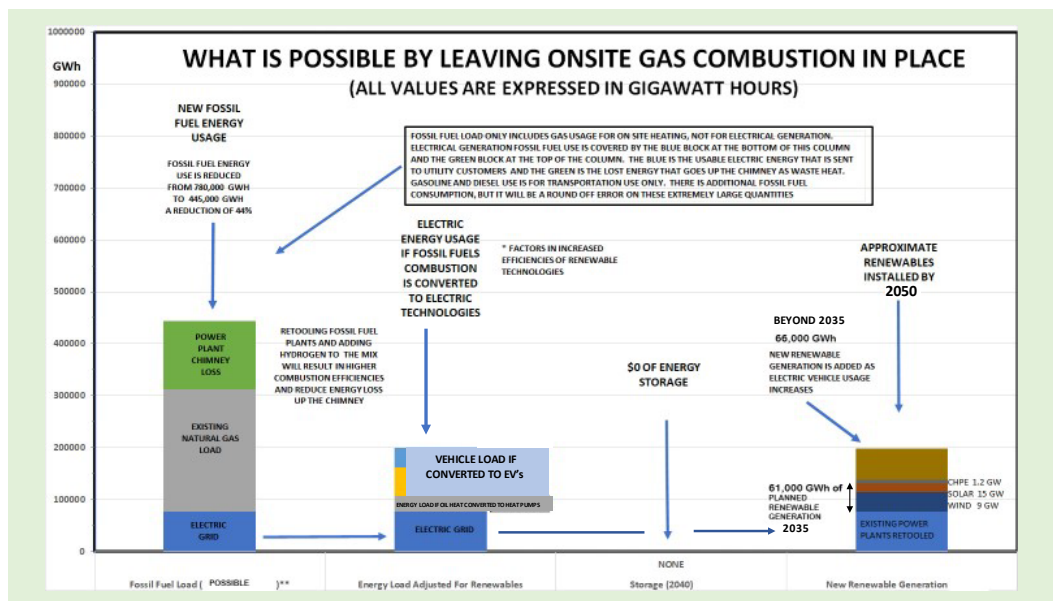
Better solutions that hold up to mathematical scrutiny and that can be economically implemented while greatly reducing GHG are available, but the mandated ideology imposed by the CLCPA precludes their use.

VIABLE ALTERNATIVES

While they are not the final solution, Combined Cycle Plants are designed to use the utility system as it exists. They can be built relatively quickly, and they are far less polluting than the existing fossil fuel plants that they would replace as shown in Figure 4. In addition, they would use about half of the energy that the current older generating plants use which would also contribute to reducing out of state emissions on the state spreadsheet. With regard to Micron Technologies, one could be built on-site that would eliminate 350 GWh of line loss while also providing Micron easy access to high temperature thermal energy. The Energy on Demand aspect of the generating plants also eliminates the need for trillions of dollars of battery storage. It is not a perfect solution, but it is a far better solution than “ideal” solutions that can't be executed because of the previously documented issues. As hydrogen technologies are perfected and a sufficient supply of hydrogen is developed, hydrogen injection technologies can help to further reduce the GHG emissions of the plants.

Figure 9 shows the chart in Figure 2 reimaged, leaving onsite gas combustion in place.

Figure 9 - What is possible by replacing all old fossil fuel generation with Combined cycle plants and localized Combined Heat and Power Systems



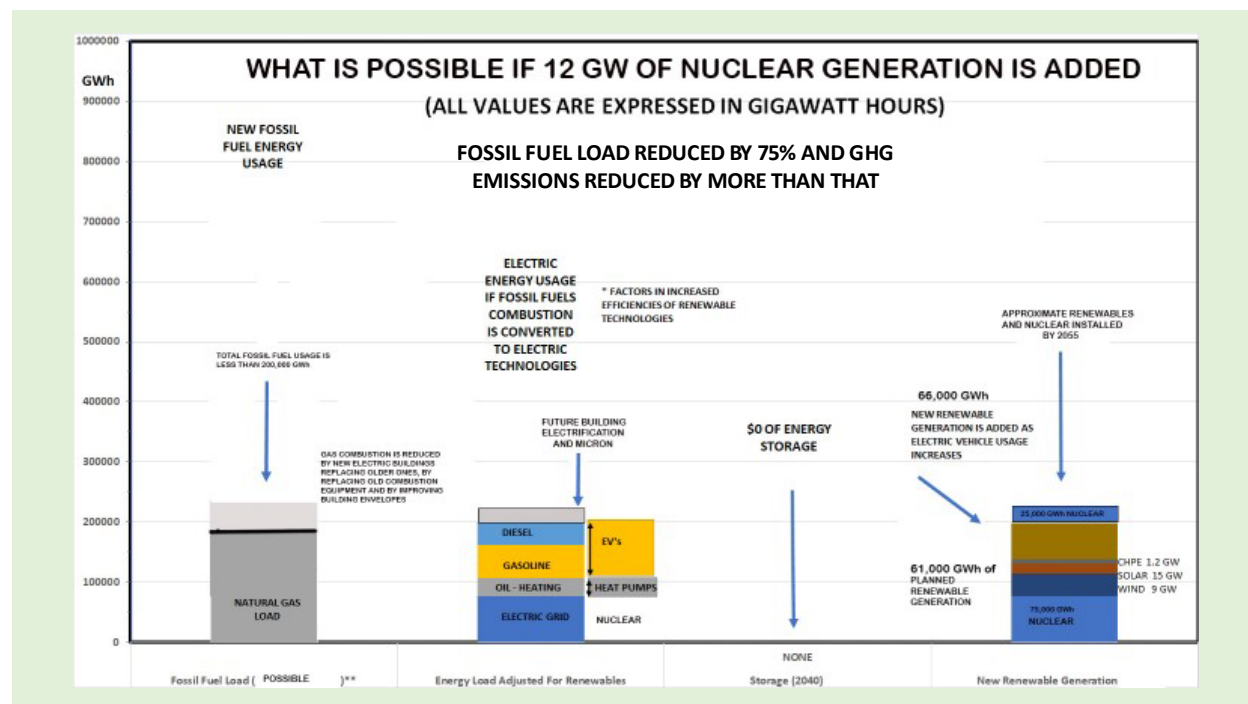
By doing that, the available renewable generation and some of the combined cycle generation can be applied to charge the EV's. The state's total fossil fuel energy use is reduced from 780,000 GWh to approximately 440,000 GWh. As the power plants can provide energy on demand and

can be cycled up and down to coincide with peaks of wind and solar, grid stability issues are eliminated as is the need for hundreds of billions to trillions of dollars of storage and system rewiring to support onsite gas combustion. The requirement for renewable generation will be greatly reduced so there may be a realistic ability to install the amount shown in Figure 9, double the 2035 amount, even with NIMBY resistance.

The saved capital from reduced rewiring costs and eliminating batteries can be applied to upgrading the system to support the EV charging. An EV charged from a 60% efficient combined cycle plant is about 20% more energy efficient than an internal combustion vehicle and releases no emissions in population centers where it can cause respiratory illnesses.

The ultimate answer is to build at least 12 GW of new nuclear generation and also replace the retiring nuclear generation. With that in place, the energy graph will appear as in Figure 10, however that will take a few decades and GHG emissions are an issue now. With the nuclear plants in place, the fossil fuel energy load is reduced to 220,000 GWh, a 72% reduction from its original value, with the worst emission sources entirely removed from the system. NY State should follow France's energy model which works and not a failed policy from Germany.

Figure 10 Replacing the Combined Cycle Generation with 12 GW of Nuclear Generation



REGARDING ANSWERS TO SOME OF THE 14 QUESTIONS:

"How should zero be defined?" Zero is zero. If they meant otherwise, they should have used the word "low". Carbon offset projects still have to be distinguished from true zero emission technologies such as solar, wind, and nuclear. If the state wants to offer credits to a process that offsets carbon for accounting purposes, that's fine but don't call it zero. It should be in a separate "offset" category.

Regarding Carbon Capture, many of the technologies cool the exhaust to separate the CO₂ as a liquid and either use it in other materials or pump it underground in a deep well to sequester it. While that will greatly reduce atmospheric CO₂, it will greatly increase energy use. That energy has to be accounted for. Where is it going to come from?

Regarding “Green Hydrogen”, hydrogen electrolysis should not qualify. There is going to be an enormous shortage of electrical energy to support the utility system, even if all of the renewables are magically installed. A recent study done in Australia²⁹ found that if all of their current proposals to produce green hydrogen by electrolysis were implemented, the total energy required would exceed all of Australia’s generating capacity. The math will be no different in NY State. A better solution would be to generate hydrogen by investing in a thermo-chemical process using the waste heat of the nuclear plants to power or by using the NYSERDA Biomass Power Guide qualifying waste to energy plants to generate the hydrogen.

CONCLUSION

The prior analysis is based upon facts, math, and physics, not opinions or wishful thinking.. The issues don’t require an understanding of calculus. They just require an open mind and a knowledge of arithmetic. People can’t only say, “Follow the science” when it tells them what they want to hear. Any engineer knows that science, math, and reality can screw up the best plans.

Einstein defined “Insanity” as repeating the same thing over and over again and expecting different results. Why is NY State repeating Germany’s failed renewable experiment that hasn’t worked in 33 years and expecting it to work in seven years or seventeen years. The results in NY State are going to be just as bad as they have been in Germany. However, time is now an issue and significant GHG reductions need to be achieved quickly. The CLCPA in New York State will not be any more successful than Germany policy has been in their efforts to combat climate change.

NY State is currently in the CLCPA, mandating a non-functional utility system which will be plagued by greater fossil fuel use, higher carbon emissions, energy failures, and stability issues that will result in deaths, and a mass exodus of people and businesses that will destroy the tax base and with it, the state economy.

29 Australia Goes All In on Green Hydrogen
<https://spectrum.ieee.org/green-hydrogen>

Peter Fairley IEEE Spectrum December 25, 2022

