Addenda #42 – April 2024

Re: Ch. 11, Vehicle "Electrification" by 2050, Impossible!!

SDG 7 - Ensure access to affordable, reliable, sustainable and modern energy for all

EV Transition Problems

EV Inventories Hit Record High in US as Cars Pile Up on Dealer Lots Bloomberg; December 14, 2023

Electric vehicle inventories on US dealer lots reached a new high in December, with a 114day supply that was more than double what it was a year ago.... Both Ford and GM are pulling back on production plans

The EPA Clean School Bus Program Could Be Impacted by Utility Delays U.S. Environmental Protection Agency Report; December 27, 2023

"We concluded that there were no significant supply chain issues or production delays that impacted the EPA's efforts to disburse funds through the first round of the Clean School Bus Program's funding. However, the Agency may be unable to effectively manage and achieve the program mission unless local utility companies can meet increasing power supply demands for electric school buses."

"The increased demand on utility companies may impact the timeliness of replacing diesel buses."

EVs Will Have No Effect on Oil Demand

Art Berman blog; January 8, 2024

(Berman is a geologist with 40-years of experience in the petroleum industry)

It seems reasonable that oil demand will fall as the number of electric vehicles (EV) increases. Unfortunately, there is no support for that popular belief. In fact, <u>the data suggests that</u> EVs will have close to zero effect on oil demand even in the longer term.

If you like EVs, you should buy one but <u>the data don't support that driving one will do</u> <u>anything to save the planet</u>.

Industry pain abounds as electric car demand hits slowdown

Reuters; January 30, 2024

There's no doubt that <u>the limitations</u> - EV charging and the lack of battery resiliency at low temperatures - are causing consumer anxiety,

Industry Pain abounds as Electric Car Demand Hits Slowdown

U.S. News; January 30, 2024

Global EV momentum is stalling. The market is over-supplied vs demand," Morgan Stanley analyst Adam Jonas said in a recent research note.... Albemarle, the world's largest producer of key EV battery material lithium, said this month it was <u>cutting jobs and capital spending</u> in response to slipping prices.

Biden administration to reportedly relax EV rule on tailpipe emissions CNBC; February 18, 2024

The administration would give car manufacturers more time instead of requiring them to rapidly ramp up sales of electric vehicles over the next few years, the report said, adding that the new rule could be published by early spring.... The shift would mean that EV sales would not need to rise sharply until after 2030.

EV sector grapples with layoffs, production cuts and altered plans Reuters; February 22, 2024

"On Thursday, German luxury carmaker Mercedes toned down expectations on EV demand and said it will update its gasoline-powered engine vehicle lineup well into the next decade.... Mercedes delayed its goal to go all-electric by 2030. Instead, it now says it will retain combustion engines in at least half of its vehicles until then."

"The enthusiasm of early adopters of EVs wasn't representative of the longer-term and broader demand for these vehicles,"

The one group Biden still needs to win over on electric vehicles Politico: March 21, 2024

President Joe Biden's new rule that will juice sales of electric vehicles is drawing praise from environmentalists, a powerful union and even the carmakers who will have to build and sell the cars.... Now Biden just needs to convince skeptical Americans.

And opinion polls have shown that many Americans are interested in the vehicles, but they <u>don't back government rules</u> that would phase out gas and diesel cars.

Here's why tire companies love EVs

CNBC; March 19, 2024

The tire business is a business of low growth, low margins and extreme competition. Tire makers are at the mercy of of raw material prices. And about half of customers are largely indifferent to the brand of tires they buy. Price is the main differentiator. But industry analysts say EVs provide tire makers with the biggest growth opportunity they have seen in decades.

AlixPartners estimates that <u>tires on EVs require 20 percent more frequent replacement and</u> <u>can cost 50 percent more.</u>

EV prices drop up to 20% as new and used inventory surges ars Technica; April 11, 2024

... according to cars.com's data, prices have decreased by 4.3 percent year-on-year to an average selling price of \$63,806

So now after a couple of years of the American public actually hearing about and experiencing the downside results of vehicle electrification, demand is slowing, auto manufacturers are cutting production, scrapping plans for manufacturing plants for EV's and batteries, and lowering prices to reduce unsold inventory.

The only reason EV adoption will be successful, is through continued government support of vehicle and battery manufacturers, to artificially lower the financial impact to consumer. The \$1.2 trillion American Jobs Infrastructure Plan and the \$485 billion Inflation Reduction Act earmarked substantial funding for loans, grants and direct spending to support the transition to zero-emissions electric vehicles.

Federal <u>mandates</u> for tailpipe emissions reductions and state EV sales <u>mandates</u> will then drive the final push to consumer adoption of vehicle electrification, regardless of consumer acceptance and demand for EV's., and disproportionately impacting middle-and lower-income households.

Addenda #43 – April 2024

Re: Ch. 9, Progressive States Climate Policies SDG 7 - Ensure access to <u>affordable</u>, <u>reliable</u>, <u>sustainable</u> and modern energy for all SDG 10 – <u>Reduce inequality</u> within and among countries

In chapter 9, I detailed climate policies that have been implemented by Progressive state governments. New York states "Climate Leadership and Community Protection Act" (CLCPA) was signed into law in 2019 under then Governor Andrew Cuomo. Subsequent "clean energy mandates" have been signed into law under current Governor Kathy Hochul.

None of these mandates were subjected to public commentary periods. None of these mandates were debated in the state legislature. None of these mandates were voted on by New York state residents.

The latest bill pushed by our state legislators, the NY HEAT Act (S2016B/A4592B), effectively blocks the expansion and maintenance of natural gas infrastructure in New York. According to environmental groups, the bill would stop utility companies from building out "more polluting gas infrastructure."

One thing the NY HEAT Act would do is end what is known as the "100-foot rule". In New York, this rule requires utility companies to connect new customers to gas lines for free if the extension is 100-feet or less. The cost burden is subsidized by all customers served by the utility, adding an estimated \$200 million to ratepayer utility bills annually. What makes this situation any different than municipalities asking (or requiring) taxpayers to fund the construction of new baseball or football stadiums, shopping malls or other projects that politicians claim have long-term benefits to the public?

The Syracuse Chiefs NBT Bank Stadium received \$16 million funding from state taxpayers. The Buffalo Bills new Highmark Stadium will cost NY taxpayers \$850 million. The Pyramid Companies received a 30-year property tax exemption to expand Carousel Mall into Destiny USA, costing state taxpayers \$10 million per year. Micron Technologies will receive \$6.1 billion in federal tax dollars as well as saving \$284 million in state and local property tax payments over 49-years for building a new semiconductor fabrication facility in Clay NY.

Subsidization of all these 'desirable' projects was approved by politicians who promoted all the new jobs they would create and the subsequent sales tax revenue that the state would receive through their continued operations. But 'undesirable' subsidies going to polluting utility companies must be stopped.

The NY HEAT Act also sets "hard targets" for utility companies to reduce overall gas use: "Aligns utility regulation with state <u>climate justice</u> and emission reduction targets..."

Part of that gas reduction strategy is to deny funding to utility companies to expand or even maintain existing natural gas infrastructure.

This should be concerning to all New Yorkers, since 40% of all the energy "consumed" in NY state and 47% of all electricity generated in New York state was from natural gas in 2021.

Note: This is the most recent year production and consumption numbers are available for.

'True renewables' on the other hand, as defined by environmental advocates; solar, wind and batteries, accounted for less than 1% of all energy consumed and less than 7% of all electricity generated in 2021. It doesn't take a rocket scientist to realize that our leaders are putting the electrical grid in a precarious position for future consumption verses production.

"It's common sense not to continue to fund the gas system" NY Senator Liz Krueger (Democrat) NY HEAT Act sponsor

Note: Krueger has been in the NY Senate since 2002, endorsed by the Democrat and Working Families Party. She received a B.S. in "Social Policy/Human Development" from Northwestern University in 1979, and her M.A. in "Public Policy" from the University of Chicago in 1981. (The University of Chicago offers several courses on Marxism and Socialism, no surprise then on Krueger's political activism...)

Another important part of the NY HEAR Act is that it would cap expenses for gas and electric bills for low-and-moderate-income households to no more than 6% of their annual income.

Supporters of the Act claim one-quarter of all NY residents have a "high energy burden", spending more than 6% of their annual income on utility bills.

In effect, this is redistribution of wealth in which poorer households, regardless of how much energy they use, pay a smaller amount for their use of that energy.

Math calculations:

Census Data shows there were 7.6 million households in New York state in 2022. If 25% are "high energy burden" households, that equals 1.9 million households. If the average monthly savings under the 6% income cap is \$136 per month, that equals \$258.5 million per month, \$3.102 billion per year that those households will "save" on electric and gas bills. This "savings" of course, must be made up by the remaining 75% of New York households, who will be billed at higher rates to subsidize that spending cap.

This is just a part of the "Environmental Justice" policy that governor Hochul campaigned on in 2022 and continues to implement in government mandates and legislation she has signed since taking office.

Note: NY Senate Democrats passed the bill in March, but the Assembly failed to add it to the FY2025 state Budget. Environmentalists were outraged, claiming Assembly Democrats and the Governor "failed New Yorkers". We can be thankful that they did, utility customers could have seen a 20% increase in gas bills over the next two years if the bill passed.

Addenda #44 – April 2024

Re: Ch. 9, Progressive States Climate Policies

SDG 7 - Ensure access to affordable, reliable, sustainable and modern energy for all





The "electric grid" in New York state consists of many components, all of which must continually work together, in order to provide utility customers with heating, air-conditioning, lighting and power used in daily lives.

The first group are the energy "producers". These are the power plants that produce the electricity we use. New York state has more than 700 power generation units. Natural gas-fired power plants generate 47% of the electricity produced for the grid, hydroelectric plants generate 23%, nuclear 22%, other renewables (wind, solar, geothermal and biomass) 7%, and fuel oil fired plants generated 1% as of December 2023.

These power plants produce 45% of all electricity consumed in New York state. The other 55% of electricity New York utility customers consume is imported from out of state sources, most of which comes from hydropower plants in Canada. (More on this later)

Next are the utility companies. They purchase the electricity from the producers and deliver it through a complex system of electrical substations and transmission lines to their customers. In New York state, the electric utilities are Central Hudson Gas & Electric, Consolidated Edison, New York State Electric & Gas, National Grid, Orange and Rockland, Rochester Gas and Electric, Long Island Power Authority, and the New York Power Authority.

Then there are Regional Transmission Organizations (RTO) or Independent System Operators (ISO). The RTO's and ISO's main responsibility is ensuring a *reliable* and competitive flow of electricity to consumers via the electrical transmission grid, working with the system and energy policies that are already in place in their areas.

Reliability of the Grid

In New York state, the Independent System Organization (ISO) is the *New York Independent System Operator*, or NYISO. NYISO is responsible for ensuring the <u>reliability</u> of the production and transmission of electricity throughout the 11,173 miles of transmission lines serving utilities and customers in New York state. (See Figure 4.1)

The NYISO website gives "real-time" data about the state electrical grid, including the cost of electricity produced by the power plants which is purchased by the utility companies, the amount of electricity generated by "source", and the actual electric load on the grid. NYISO also produces periodic reports on the reliability of the state's electrical grid. The purpose of these reports is to give state energy policymakers the information they need to make "good choices" to ensure the *reliability* of the electrical grid and *affordability* of the wholesale electricity market for the 7.6 million households in New York state. The following is from a report NYISO published in May 2022...

Power Trends 2022 The Path to a Reliable, Greener Grid for New York THE NEW YORK ISO ANNUAL GRID & MARKETS REPORT https://www.nyiso.com/documents/20142/2223020/2022-Power-Trends-Report.pdf

POWER TRENDS 2022 is the NYISO's annual analysis of factors influencing New York State's power grid and wholesale electricity markets. Begun in 2001 as Power Alert, the report provides a yearly review of key developments and emerging issues.

POWER TRENDS 2022 DATA is from the 2022 Load & Capacity Data Report (also known as the Gold Book), unless otherwise noted. Published annually by the NYISO, the Gold Book presents New York Control Area system, transmission and generation data and NYISO load forecasts of peak demand, energy requirements, energy efficiency, and emergency demand response; existing and proposed resource capability; and existing and proposed transmission facilities.

New York's renewable and environmental goals <u>are driving profound changes</u> on the electric system. The CLCPA, which targets a zero-emissions grid by 2040, is shifting how energy is produced, delivered, and consumed in New York. The NYISO believes New York's energy and environmental objectives are attainable <u>by balancing reliability</u>, <u>economic</u>, <u>and policy priorities</u>.

The NYISO's analysis of future clean-energy scenarios concludes that maintaining reliability on the grid of the future will require significant amounts of on-demand, flexible resources that can account for the intermittency of renewables.

Simply deactivating existing generation without having new resources on the system capable of providing comparable attributes <u>risks the ability to maintain_a reliable electric system</u>. To facilitate a successful transition, to weather-dependent resources, we must build and interconnect technologies that fill in reliability gaps and mimic the reliability attributes of our existing fleet of generation.

In this paragraph, NYISO warns state policy makers (politicians) that they risk the reliability of the state electrical grid if they continue to close existing reliable sources of electricity generation before new generation sources are completed and operational. This should sound reasonable and logical to anyone... except to Progressive Green Energy promoters creating and "enforcing" policies such as the CLCPA in New York state.

- In 2005, New York had 48-coal fired generation stations with 4,273 MW (4.27 GW) of capacity, representing 10.0% of the state's total electric generating capacity. The last coal-fired power plant in New York closed in 2022.
 (1 MW or Megawatt = 1 million watts, 1 GW or Gigawatt = 1 billion watts)
- At their peak, New York's nuclear reactors provided a combined 5,400 MW (5.4 GW) of capacity and generated one third of the state's grid electricity.
 By 2023, there were just four remaining nuclear reactors in operation with a combined 3,400 MW (3.4 GW) generating just 21% of the state's grid electricity.
 Following a decades-long campaign by anti-nuclear environmental groups, Indian Point Unit #2 shut down in 2020 and Unit #3 shut down in 2021. At over one gigawatt each, Indian Point was the most powerful nuclear power plant in New York, providing about 25% of New York City's electricity, all emission-free. (Remember this for later) The closure of this plant removed 1,000 full-time jobs from the region, with a total payroll of \$140 million per year.

Note: Environmentalists and Green Energy advocates do not count nuclear as a "true renewable" power source, and actively advocate for closure of the state's three remaining nuclear power plants.

In 2023, Natural Gas fired power plants provided a combined 5,311,000 MW (5,311 GW) of capacity and generated 47% of the state's grid net electricity.

Note: Environmentalists and Green Energy advocates including New York governor Hochul have passed mandates to effectively ban natural gas consumption in all new residential and commercial construction and maintenance of the existing natural gas infrastructure in New York state.

At the end of 2022, "true renewable" power sources provided a combined 759,000 MW of capacity and generated less than 7% of the state's grid electricity. If hydropower is included, electricity produced by all renewables is 3,313,000 MW or 29.5% of the state's grid net electricity.

Note: Environmental activists are against hydropower as a renewable power source due to the "adverse effects" they have on the surrounding environment and ecosystem, actively advocating for closing or not renewing their licenses when the time comes.

The goal of the CLCPA was to provide 70% of electricity "used in" New York from renewables by 2030, and 100% "clean, carbon-free electricity" by 2040. With the 70% goal less than six years away, it just seems unlikely New York will be able to achieve these goals....

Record solar power generated in New York state -grid operator New York state's power grid met about 20% of its electricity demand with energy from the sun for <u>one hour</u> [the noon hour] last week... Reuters; May 24, 2023

What about the other 80% of demand and 23 hours of operation????

New York must triple its renewable capacity in 8 years to meet 2030 target: state comptroller

Project cancelations, delays in siting and interconnection processes, and inconsistent incentive programs have all hindered the ability of New York developers to deploy new renewable energy capacity, according to the report.

Utility Dive; August 2, 2023

A Balanced Approach to a Clean and Reliable Grid The New York ISO Annual Grid & Markets Report

New York ISO; August 14, 2023

.... to achieve state policy mandates by 2040, up to 124 GW of installed generation capacity will be necessary, tripling the amount of generation capacity available today. At least 95 GW will need to be new generation projects and/or modifications to existing plants...

Uncertain Future for Solar, Wind Projects as New York Rejects Funding Boost Without increased funding, several companies said they may not be able to build wind and solar projects, putting the transition to renewables at risk. The City; October 13, 2023

Ørsted ceases development of its US offshore wind projects Ocean Wind 1 and 2, takes final investment decision on Revolution Wind Ørsted Press Release; October 31, 2023

BP and Equinor Cancel Big New York Offshore Wind Project

Following decisions of its Board of Directors, Ørsted will cease development of the Ocean Wind 1 and 2 projects and has taken final investment decision on the Revolution Wind project. The decisions are part of an ongoing review of Ørsted's US offshore wind portfolio. MSN News; January 3, 2024

Note that none of these articles include nuclear or hydroelectric as renewable energy sources.

NYISO Power Trends 2022 continued....

State of the Grid Short-Term Forecasting

On a typical day, demand ramps up throughout the morning, peaking in the afternoon or early evening hours. These daily patterns lead to seasonal patterns of electricity consumption. Traditionally, overall demand has been greater in the summer months in New York. Figure 3: 2021 New York Control Area (NYCA) Bulk Electric System 2021 Actual and 2042 Forecasted Winter/Summer Load Shapes



Figure 3 illustrates 2021 summer and winter 2021-22 peak-day hourly demand profiles in New York State. To demonstrate how electricity usage is expected to change as the state advances towards the objectives of the CLCPA, Figure 3 includes projected high-load weekday profiles for the summer of 2042 and the winter of 2041-42. Load shapes are expected to shift in the future, with daily peak demand likely to occur later in the day when the load-reduction effects of behind-themeter (BTM) solar resources wane, which will increase the demand on the bulk electric system. In large part, this is because businesses and communities are continuing to adopt distributed energy resources (DERs) to produce electricity, such as solar installations on residential rooftops, commercial sites, and community solar. These BTM resources act to reduce the total energy consumed from the grid and can provide certain grid services similar to other types of electricity suppliers. While the NYISO does not have direct visibility into the performance of BTM resources, they are tracked in the demand forecasting and analysis process through real-time sampling to estimate the aggregate impact of these resources.

Figure 3 shows that during the summer of 2021, peak electricity consumption of just over 30,000 MW, occurred between 3:00 PM and 6:00 PM as air conditioning ramped up in the heat of the afternoon, and people were getting home from work. By the summer of 2042, with "electrification" mostly achieved (enforced) in New York, electricity consumption will increase by 27% overnight (as customers recharge their EV's) and hit a peak of around 35,000 MW around 7:00 PM almost 17% higher than in 2021.

Winter electrical consumption will be even higher, as heating will be provided by electric furnaces, boilers and heat pumps, instead of natural gas equipment. Between 2021/2022 and 2041/2042, peak electricity consumption will increase from 23,200 MW to 42,000 MW. That's an increase of 18,800MW or 81% over the next twenty years!! [Reference: Addenda June 2023, replacement of gas fired home boiler]

"The conversion of space heating from fossil fuel to electric technologies will [also] add significantly to system demand."

Figure 8: Electric Vehicle Energy and Peak Impacts - Baseline Forecast



Figure 8 shows the projected growth of electric vehicles due to mandates imposed by governor Hochul in 2022, with an estimated 7.7 million electric vehicles to be on the road in New York state by 2040.

Summer peak electrical consumption will increase by 2,500 MW, while winter peak electrical consumption will increase by 3,000 MW. Remember, colder weather requires heating of EV batteries and vehicle occupants, decreasing the range of EV batteries and requiring more frequent charging.

NYISO Power Trends 2022 continued...

Resource Adequacy

Reliability rules require that there be enough generating capacity available to maintain resource adequacy. Resource adequacy is the minimum level of capacity necessary to meet forecasted peak electric demand while accounting for the performance of supply resources, transmission capability, and risks associated with extreme weather.

For the 2022-23 capability year beginning May 1, 2022, the approved IRM is 19.6%. Based on a projected summer 2022 peak demand of 31,765 MW, the total installed capacity requirement for the upcoming summer capability period is 37,991 MW. The 2022-23 IRM represents a decrease over the prior year level of 20.7%. The IRM is likely to increase with the expansion of intermittent renewable resources on the system. In its Technical Study Report on the IRM, the NYSRC noted that increased wind penetration, "raises the IRM because wind capacity has a lower contribution to reliability than traditional resources." Further, historically strong reliability margins, which represent both resource adequacy and transmission security capabilities above and beyond IRM and locational capacity requirements and have supported the reliability and resilience of the New York system, are narrowing.

NYISO states that wind capacity has a "lower contribution to reliability" than traditional resources (natural gas and nuclear), yet Governor Hochul continues to promote offshore wind projects as the future of New York energy production.

Refer to Addenda – January 2024, Hywind Scotland. The average "capacity factor" of all of Equinor's European offshore windfarms was just 54% of the rated generation capacity.

Note: IRM stands for "installed reserve margin, the minimum additional capacity that must be available above forecasted peak demand to support system reliability.

The 2022 Power Trend Report shows reserve capacity decreasing from the prior year and being assumed to *"narrow"* (decrease) in the future with the installation of additional *"<u>intermittent</u> renewable resources."*

In the "Final Word" summary of the 2022 report, the authors state:

The transition to a greener grid in New York is leading to an electric system that is increasingly dynamic, decentralized, and reliant on renewable generation. Public policies are driving change on the grid through investments in new clean-energy resources and transmission system upgrades, but also through the <u>deactivation of generation resources</u> that provide critical reliability services to the grid.

<u>Because these deactivations are outpacing new supply additions and upgrades, reliability</u> <u>margins are tightening</u>. Delays in the construction of new supply and transmission, increases in the expected rate of generator deactivations, higher-than-expected demand levels, and the impacts of extreme weather <u>could threaten reliability and resilience</u>.

One year later, NYISO published an updated report on the status of the states power grid...

Power Trends 2023 A Balanced Approach to a Clean and Reliable Grid THE NEW YORK ISO ANNUAL GRID & MARKETS REPORT Revised August 14, 2023 Executive Summary

<u>The pace of change is accelerating</u> with the increased adoption of electric vehicles, and electric heating equipment to replace fossil fuel sources of building heat. In the New York City metropolitan area, data shows a continued rise in economic activity coming out of the pandemic. Across upstate New York, energy intensive microchip manufacturing facilities are developing in several locations. Together, these elements are increasing demand for electricity. However, pursuant to public policies, fossil fuel generation is retiring faster than renewable resources are entering service, leading to declining reliability margins across the state, but most acutely in the New York City area.

Of note, the NYISO's second quarter 2023 STAR report, issued in July 2023, found a <u>deficit</u> in reliability margins for the New York City area beginning in summer 2025. The deficit is as large as <u>446 MWs</u>.... As of May 2023, the Peaker Rule has resulted in the <u>closure or reduced operation of</u> <u>approximately 950 megawatts of generation in New York City</u>. An additional 500 megawatts of generation is expected to limit or discontinue operations in 2025 <u>in response to these new emissions</u> <u>limitations</u>.

Note: Reference New York and New York City Energy Shortfalls on page 206.

New York City has a population of around 8.3 million people and is the world's leading center of banking, finance and communication, with more than 500 million square feet of office space. The Energy Committee of the New York Building Congress published a report in 2016 forecasting electricity demand in New York City for the next decade (2017-2027). The estimated Summer Peak Demand for 2017 was 11,973 Megawatts, increasing to 12,788 MW by 2027.

As previously noted, the *transition to a greener grid* will mean significantly increased loads for winter months in the future, as natural gas heating sources are replaced by *clean electricity* heating sources.

Since the CLCPA target date for a 100% carbon free electrical grid is 2040, it is logical to assume that the peak demand in years beyond 2027 will be significantly higher.

NYISO also publishes seasonal reliability reports on the state electric grid. The most recent seasonal reliability report: *An Assessment of Winter Operational Risks for a Power System in Transition,* was released in November 2023.

https://www.nyiso.com/documents/20142/41258685/Analysis-Group-2023-Fuel-Security-Study-Final.pdf

The transition of the power grid - as evidenced by the requirements set forth in the CLCPA and other policies established by the state legislature and regulatory agencies - involves rapidly declining reliance on fossil fuels, <u>and increasing reliance on weather-dependent renewables</u>, energy storage, and other low-/no-carbon resources. Electricity demand is forecasted to substantially increase (and the timing of its use will change significantly) over the next two decades.... Yet at the same time, the CLCPA requires that 70 percent of the state's electricity be provided by renewable generation by 2030, and 100 percent of the state's electricity be provided by zeroemitting generation by 2040.

The ongoing transition of the power system is an important consideration, particularly in light of the findings in this report (summarized below). This review is focused on a "snapshot" of future system conditions in the winters of 2023/2024, 2026/2027 and 2030/2031. Putting the analysis into the context of the continued evolution of the power system, one thing stands out: the availability and consistent contributions of adequate amounts of natural gas-fired and oil-fired (or dual fuel) generating resources is necessary to maintain power system reliability in cold winter conditions throughout the ongoing transition of the power system toward a zero-emission system. This is particularly true for meeting the energy needs of New York City. Simply put, avoidance of potential loss of load events in New York City, under plausible adverse winter conditions, requires operation of natural gas and oil-fired units during this transition.

The availability of oil and gas generation resources is <u>critical</u> to alleviate potential loss of load events.

This study showed the real potential for "loss of load": disruption and loss of electricity generation in New York state and especially in New York City in *each scenario* of severe winter conditions; a time that we can least afford to lose electrically powered heating. The Analysis Group stresses the importance of having natural gas and oil-fired power production available to prevent loss of load and potentially loss of life during the transition to zero-emissions electrical grid; a transmission that will most likely take significantly longer than the CLCPA target.

Providing Electricity is a Critical Balancing Act

The electrical grid **must** always be "in balance." Electricity must be manufactured and then used within milliseconds. This means that in order to have a stable electrical grid, the ISO as "Balancing Authority" (BA) must continually call on power plants to come online to produce electricity as the demand increases and ask them to stop producing electricity as the demand decreases.

Making more or less electricity than is immediately used will disrupt the electrical grid. The electrical grid in the US operates on "alternating current" or AC, produced at a frequency of 60 Hertz. If more electricity is fed into the grid than is consumed, the frequency increases. If too little electricity is fed into the grid to meet demand, the frequency drops. Either situation existing for too long causes power plants to automatically shut down, causing a blackout.

In the effort to balance the amount of electricity produced (supply) and electricity used (demand), some power sources run all the time while others will run only when called upon to meet increased demand. The problem that the BA also must deal with is that different production technologies have different abilities to increase or decrease production. Natural gas, diesel fuel oil and hydro plant turbines can ramp up and down quickly. Nuclear plant steam turbines must change power levels slowly.

Renewable power sources present considerable problems because they rely on changing sun or wind conditions. As the BA has no control over when utility customers use power, they also have no control over when and how much power is available from solar or wind farms. Solar electricity production can increase for brief moments or drop significantly on overcast days. Sudden changes in wind speed and direction can significantly impact electricity production of wind turbines.

Less than half of the generation capacity in the U.S. comes from power plants designed to run all the time to meet demand. "The rest is in reserve for the hotter or higher demand days," says Steve Hauser, vice president of grid integration at the National Renewable Energy Laboratory.

The increasing use of renewable power sources complicates the efforts of the BA to keep the grid in balance, react to demand peaks, and avoid either rolling blackouts or full blackouts to customers on the grid.

➢ How Can the ISO Act to Maintain the Balance?

It can continually increase and decrease the supply to the grid by using those reliable and flexible power sources detailed above: fuel oil, natural gas and hydro.

Since natural gas plants produce almost half the electricity consumed in New York state, this shouldn't be a problem.... Except Progressive Democrat politicians are making it their mission to decrease and eventually eliminate the use of natural gas and fuel oil as electricity plant sources. The unintended consequence of this policy can lead to rolling blackouts.

> The Ever Changing Consumption of Electricity



The display above is from the NYISO website "real-time dashboard." It shows the actual electricity consumption from 12:00 AM Monday April 29, to 11:10 PM Tuesday April 30. Notice that the demand (electricity being used) fluctuates during the day as people go about their daily go-to-work and return-home schedules.

Electricity consumption increased 26% over a 5 ¹/₂- hour period Monday morning as people were waking and getting ready for the new work week. Consumption increased again by another 14% over the 13 ¹/₂-hour period as temperatures increased and people returned home from work later that day.

Temperatures reached the mid 80's across New York state on that Monday. During hotter summer months and periods of prolonged heat waves, the increases are significantly higher. As the conversion from natural gas heating sources to electricity powered sources continues, the increases in electricity use, the "peaks and valleys" will likely outpace those during summertime.

Note: Refer to Figure 3, Winter 2021/22 vs. Winter 2041/42; NYISO Power Trends 2022.

Sustainable Living (Enforced Conservation)

In Chapter 15, Sustainable Living (*Sustainable Development Goal #11*), I explained the Agenda 2030 based concepts of *Smart Cities* and *Smart Thermostats*, and how they are being used by policy makers to control our consumption of all resources, including electricity.

As demand for electricity continues to increase due to government mandates and legislation and as renewable power sources become a larger percentage of electricity production, balancing of the electrical grid will become more difficult to achieve.

Remember that imbalances of production and consumption *will* create widespread blackouts. If the BA cannot call on those reliable fossil fuel power plants to make up those shortfalls, the only option they will have to keep the grid "in balance", will be <u>forced</u> conservation of electricity.

Why does the electricity grid have to stay in balance?

energuide.be; All about energy in Brussels, A Sibelga initiative

[Note: The Sibelga initiative, is to help achieve their goal for carbon neutrality by 2050] <u>https://www.sibelga.be/en/about-sibelga/strategy-and-mission</u>

How can we act to maintain the balance?

- 1. Decreasing or increasing electricity production I think we've already covered this topic...
- 2. Reducing electricity use

<u>Agreements</u> are made with certain professional customers (consumers and prosumers). Where there is a risk of imbalance on the grid, these industrial customers agree to regulate their consumption and/or their production for a certain time. In return, they receive financial compensation.

In the longer term, grid operators could also influence consumer behaviour by modifying prices to smooth [read, reduced] consumption. Already today, private consumers are encouraged to use electricity more cheaply (dual hourly tariff) when industrial customers are consuming less. Another example: the quarter-hourly rate system <u>discourages</u> industrial <u>consumers</u> from having excessive consumption peaks.

The development of <u>smart meters</u> could allow us to go further in <u>implementing tariffs</u> adapted to real-time conditions.

- *3. Importing or exporting electricity* Not feasible if each grid is dealing with the same problems.
- 4. Load shedding: Load shedding consists of temporarily <u>depriving some electricity consumers of</u> <u>supply</u> to avoid widespread power cuts. This solution is only used as a last resort.

Right from the "key partner" in energy in Belgium... and the future of the U.S. electric grid.

> New York and New York City Energy Shortfalls

The NYISO 2022 and 2023 Power Trends Reports emphasized the looming "deficit of resources" as reliable fossil fuel power plants are shut down faster than unreliable renewable plants can replace them.

The NYISO released a new report on April 12, 2024 titled *Short-Term Assessment of Reliability: 2024 Quarter 1,* which again, focused on the reliability need within New York City. The report re-emphasized a shortfall of as much as 446 MW of electricity beginning in the summer of 2025. That is just fourteen months away!

The "Peaker Rule" referred to earlier, is the adoption by the New York State Department of Environmental Conservation in 2019, to limit nitrogen oxide (NOx) emissions from combustion turbines that are found in fossil fuel power plant turbines. In order to comply with the Peaker Rule, 1,500 MW of peakers were to shut down by 2025. As of early 2023, 1,000 MWs of peakers were closed down and another 590 MWs were scheduled for retirement by May 2025.

"Peaker plants" are small electricity generating plants, typically fed by natural gas, fuel oil or kerosene. They operate less than 10 percent of the time, when peak-demand for electricity is required, like hot summer days. On those days when the NYISO report said New York City would see a "deficit of reliability margins." Closures of these plants are partly due to the fact that they have high levels of emissions, but the biggest push to close these plants has come from "environmental justice" groups.

New NYLPI Report: New Yorkers Pay the Price for Peaker Plants Emissions

Today, NYLPI released a new report revealing that New York City residents, through their electric bills, have paid more than \$4.5 billion over the past decade to owners of power plants that emit high levels of harmful pollutants <u>in communities of color</u> in New York City.

The report, "Dirty Energy, Big Money: How Private Companies Make Billions from Polluting Fossil Peaker Plants in New York City's Environmental Justice Communities – and How to Create a Cleaner, More Just Alternative", is authored by the newly-launched PEAK Coalition, which includes NYLPI along with the New York City Environmental Justice Alliance, UPROSE, THE POINT CDC, and Clean Energy Group.

Climate and Energy Justice, Community Justice, Coronavirus, Environmental Justice, News, PEAK Coalition, Press Release, May 7, 2020

New York says goodbye to 6 dirty power plants and hello to working with communities

New York's latest move toward its aggressive decarbonization goals makes good on the promise of <u>a more equitable</u> transition. On Tuesday, the New York Power Authority (NYPA), a publicly owned power utility, announced an agreement to work with environmental justice groups on a plan to transition six natural gas-fired power plants in New York City to cleaner technologies. Grist, Oct 15, 2020

Campaign to shut down New York City's peaker plants gains congressional ally

Rep. Carolyn Maloney, D-N.Y., on Thursday threw her support behind a proposal to cut the number of peaker power plants in New York City in half by 2025, followed by a complete shutdown in 2030. The fossil fuel plants are designed to provide additional power during times of high demand, such as hot summer days.

As chairwoman of the House Committee on Oversight and Reform, Maloney's support provided a boost to the Peak Coalition, <u>a group of environmental activist groups</u> in New York that have led the campaign to shut down peaker plants, citing the impact of air pollution on low-income and historically marginalized neighborhoods.

Utility Dive, Aug 27, 2021

Governor Hochul Signs Landmark Environmental Justice Legislation Reducing the Cumulative Impacts of Pollution on Disadvantaged Communities

"Low-income communities and communities of color throughout New York State have historically been burdened by a disproportionate number of pollution-generating facilities such as factories, power plants, bus depots, sewage treatment plants, garbage dumps and transfer stations, and trucking centers. This inequitable siting has turned these communities into environmental sacrifice zones."

We Act For Environmental Justice; December 31, 2022

Governor Hochul Announces \$6 Million Now Available for Environmental Justice Community Impact Grants

Governor Kathy Hochul today announced \$6 million in grants is now available to help communities facing environmental justice challenges and address environmental concerns. The latest round of Environmental Justice Community Impact Grants is the largest amount offered to date and is supported by the State's Environmental Protection Fund as part of New York's ongoing efforts to assist communities disproportionately burdened by environmental pollution. Governor Kathy Hochul Press Release, April 26, 2023

The governors recent state budgets include tens of millions in spending on Environmental Justice, targeting specific "victim groups" (lower-class, non-white), burdening the rest of state taxpayers and resulting in higher utility bills for all New York residents. Unless the NY HEAT Act is finally signed into law.

Doing the math, that 446 MW reliability shortfall could have easily been avoided if policy makers would have just waited until enough renewable resources were in place to replace them. But that is not how our policy maker's work.

However, NYISO as the balancing authority for the electrical grid, made the decision to keep four floating peaker plants in operation until "solutions could be installed to address the reliability deficiency."

This angered the Green Energy activists, who posted an editorial in the climate change newsletter *The Energy Mix*, titled *New York City Too Slow to Shutter Dirty Gas Peaker Plants*.

"The transition away from fossil fuels is just the beginning of what we owe working class people for being the foundation of this state,"

Since Governor Hochul's offshore wind program has been plagued by developers backing out of contracts with NY state, construction of two high voltage transmission lines bringing "clean electricity" from Canadian hydroelectric plants have been expedited.

The 339-mile *Champlain Hudson Power Express* transmission line is expected to bring 1,250 MW directly into New York City in the spring of 2026. The cables will run under Lake Champlain and underground along most of the 339-mile path.

A second project, *Clean Path NY*, is a 175-mile underground transmission line that will connect more than 20 wind and solar generation projects within New York state. This project is estimated to deliver more than 7.5 million MW of "emissions-free electricity" to the grid.

The problem with relying on imported electricity to solve New York City's deficit of reliability problem, is that Canada also has emissions targets. Canada endorsed the 2015 Paris Climate Agreement, and in 2021 passed the *Net-Zero Emissions Accountability Act*, with a target to achieve "net-zero emissions" by 2050.

In 2022, Canada consumed 3,929 terawatt-hours of energy. (One terawatt equals one trillion watts or one million megawatts)

Canada produces all the energy it consumes. It has vast resources of water, oil and (currently) natural gas for energy production. It does not import electricity the way New York state does.

At the end of 2022, just 36.1% of that energy produced came from renewable power sources including nuclear. Canada, unlike the U.S., does consider nuclear to be a true renewable power source, and considers it to play an "indispensable role" in the country's clean energy transition.

In 2015, when Canada endorsed the Paris Climate Agreement, 35.3% of the country's energy consumption was from "low-carbon sources. Over that seven-year period, Canada made relatively little gains toward achieving net-zero emissions target. Canada has put in place the same the same mandates for electrification of homes and transportation. If they also adopt our policies of closing fossil fuel power plants before having renewable sources ready to take their place, Canada will not have enough spare electricity for New York to import during those peak summer and winter periods.

Two large natural gas fields of the coast of Nova Scotia are expected to be depleted before 2025. 31% of the energy Canada produces and consumes comes from natural gas. When those fields become depleted, Canada will supply less natural gas to New England to maintain their own energy security. The same can be said for hydroelectricity currently imported by New England states, and, Governor Hochul's plan to "fix" that reliability shortfall of New York City by importing hydroelectric power from Canada.

As both the U.S. and Canada get closer to that 2050 Net-Zero target date, neither New England or New York state can rely with certainty on imported "clean electricity" to meet their climate goals or the projected energy deficits.

Resources: NYISO 2922 Power Trends https://www.nyiso.com/documents/20142/2223020/2022-Power-Trends-Report.pdf

NYISO 2023 Power Trends https://www.nyiso.com/documents/20142/2223020/2023-Power-Trends.pdf/

Fuel and Energy Security In New York State

https://www.nyiso.com/documents/20142/41258685/Analysis-Group-2023-Fuel-Security-Study-Final.pdf

NYISO Short-Term Assessment of Reliability: 2023 Quarter 4 https://www.nyiso.com/documents/20142/16004172/2023-Q4-STAR-Report.pdf/62c42ffb-912b-bc50-d0c4-1606934025d7

NYISO Winter Reliability Fact Sheet https://www.nyiso.com/documents/20142/23494579/Winter-Reliability-Challenges-in-NY-fact+sheet.pdf/82f11b63-ae26-31f2-a486-b296660702e8?t=1710012334925

An Assessment of Winter Operational Risks for a Power System in Transition <u>https://www.analysisgroup.com/globalassets/insights/publishing/2023-fuel-and-energy-security-in-new-york-state-an-assessment-of-winter-operational-risks.pdf</u>

Powering Large-Scale Economic Development Projects Requires Proactive Planning and Additional Resources

https://www.nyiso.com/-/powering-large-scale-economic-development-projects-requires-proactive-planningand-additional-resources

Generic "technical information" regarding Regional Transmission Organizations, Independent System Operators, "Balancing" the electrical grid, summer/winter reliability programs and Canada as an endless source of energy is taken from the book:

Shorting The Grid: The Hidden Fragility Of Our Electrical Grid Meridith Angwin, October 2020 Carnot Communications

"When rolling blackouts come to the electric grid, they will be old news to the grid insiders. Only the electricity customers will be surprised" Amazon book description

Q&A with Meredith Angwin, author of *Shorting the Grid: The Hidden Fragility of Our Electric Grid* <u>https://www.gridbrief.com/p/qa-meredith-angwin-author-shorting-grid-hidden-fragility-electric-grid</u>