Comments on the Blueprint for Consideration of Advanced Nuclear Technology

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Introduction

I taught Mathematics and Computer Science for 35 years, spending part of that time at each of Scranton University, St. Lawrence, and SUNY Oneonta. I retired early to homeschool four daughters. I have been involved in regional energy and environment issues for 15 years. I regularly write commentary for papers across the state and am a party to PSC proceedings including 15-E-0302, 20-G-0131, 24-E-0165, 19-E-0378, 19-G-0379. I have participated in DEC and FERC hearings. I regularly present to civic and college audiences on state energy planning. My environmental efforts are not financially supported by – and my comments here are not endorsed by -- any industry or NGO.

To assess the timeliness and importance of the Draft Blueprint, we must consider what state agencies, the business community, the grid operator, and others have had to say about the current plan. We must also look at reports which support nuclear power from a variety of sources.

Section 1 The Business Council with an aside from the NYS Bar Association

It is unfortunate that it took a Business Council letter to the governor[1] to initiate the energy plan review that many have been calling for since passage of the Climate Leadership and Community Protection Act (CLCPA) in 2019 and development of the related Scoping Plan[2] by the Climate Action Council (CAC). The Business Council noted, (as did the Comptroller and even – albeit in different language – the grid operator),

> **New York's business community is facing additional uncertainties under the CLCPA, including its impact on the cost, availability and reliability of electric power delivered through a grid increasingly reliant on intermittent solar and wind generation...**

No engineering or fiscal evaluation was provided to support the CLCPA mandates or scoping plan projections. It is past time for such a review and we must be hopeful that the Draft

[1] https://www.bcnys.org/news/statement-regarding-clcpa-letter-calling-answers-key-policy-concerns
[2] https://climate.ny.gov/resources/scoping-plan/

Blueprint constitutes such a reconning. This need for analysis of goals and projections is made repeatedly by the Business Council:

> **Now that we more clearly understand the real-world challenges of meeting the CLCPA's mandates, we urge the state to conduct a comprehensive assessment of the CLCPA mandates, implementation efforts to date, and future actions.**

The Comptroller's report discussed below focused on issues of funding. The Business Council insisted that:

> **[NYS must] Develop... a comprehensive accounting of direct state spending and state "directed" spending, the source of funds and their use**

As we will examine later in the context of the grid operator's – NYISO's -- publications, a constrained capacity margin for the downstate region could prove critical even in normal weather, but

> **[NYS must] Assess power quality, system reliability, and public safety considerations on a seasonal basis including extreme weather sensitivities to ensure businesses can operate smoothly, and New York residents can live safely throughout the year**

NYSERDA's Biennial report[3], casts doubt on New York's likelihood of achieving the CLCPA's 70-by-30 target. The Business Council realized that, in fact, every decarbonization target in the CLCPA has been compromised as well:

> **[NYS must] evaluate the achievability of the 40% by 2030 mandate, and if it is not reasonably achievable, make amendments to the CLCPA's emission reduction timetable**

We have sacrificed billions of dollars, thousands of acres, and five years for a flawed energy plan. As detailed by a NYS Bar Association article, in efforts to implement the Scoping Plan, we have robbed communities of home rule of law and environmental protection, too:

> **[T]he burden of hosting renewables facilities, especially solar farms, will not be distributed evenly ... [but] concentrated in those areas where it is easiest and least expensive for energy companies to build. …[D]evelopers will choose sites where population density and land prices are low, the ground is level, the soil contains no rocks or roots, and transmission lines are close ... These also happen to be the very places where New York's prime agricultural soils are located…The siting laws require the developer only to mitigate environmental harms to the extent possible on whatever land it proposes to build the facility… [T]he process makes local law and knowledge about where best to site the facilities irrelevant… When invoked, [94-c]**

[3] https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?Mattercaseno=15-E-0302

denies towns and villages the land use authority granted them under enabling statutes almost 100 years old.[4]

But perhaps we have circled back to an appropriate starting point with the Draft Blueprint. Nuclear resources provide mature safe carbon-free baseload energy which align with the state's decarbonization goals. The Business Council writes that identifying the required baseload emission-free resources to support decarbonizations should have been the State's first step:

[Identifying a zero-emission resource DEFR must] be resolved sooner rather than later because the outcome could affect the planned deployment of wind, solar, and energy storage, and the potential retirement of existing resources. [To this end,] the state should examine the use of... clean nuclear energy

Legitimate concerns of signatories to the Business Council letter – labor unions, chambers of commerce, and the business community -- align with coherent planning and responsible policy:

While New York can and should take steps to reduce greenhouse gas (GHG) emissions, its goal should be to present a model path forward, not a cautionary tale of unaffordable costs, harmful economic disruptions, and threats to future economic growth…Unrealistic mandates erode public confidence and undermine the state's ultimate GHG emission reduction goals. It is more important that New York leads by example by taking a workable approach to its energy and emission goals than failing to meet an arbitrary schedule.

Section 2 Comptroller DiNapoli

The State Comptroller was prompted to audit the energy plan.[5] Comptroller DiNapoli charged that,

...the absence of cost estimates also makes it difficult, if not impossible, to assess its impact on New Yorkers, including those who are currently struggling to pay their utility bills and who have faced rising costs over the past two decades.

Governor Hochul suddenly grew a conscience about rate-payer costs: "The costs have gone up so much I now have to say, 'What is the cost on the typical New York family…we have to think about the collateral damage of these decisions. Either mitigate them or rethink them.'"[6]

The Climate Act was expected to have both fiscal and programmatic impacts on several State agencies and authorities. However when the Clean Energy Standard and

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[4] https://nysba.org/preempting-local-zoning-codes-fuels-opposition-to-renewable-energy-in-new-york

[5] https://www.osc.ny.gov/files/state-agencies/audits/pdf/sga-2024-22s4.pdf and https://www.osc.ny.gov/press/releases/2024/07/dinapoli-improved-planning-needed-new-york-achieve-its-clean-energy-goals

[6] https://waterfrontonline.blog/2024/08/09/hochul-under-pressure-to-relax-nys-landmark-climate-law-as-state-fails-to-meet-deadlines-for-switch-to-renewables/

Climate Act were passed (in 2019) no State or federal funding were budgeted. Currently, almost all funding to support the CES and Climate Act programs is ratepayer based. New York state ratepayers have contributed almost $2.6 Billion to the CES program from 2016 through 2021.

Thousands of miles of transmission at full nameplate capacity for hundreds of solar and wind facilities would need to be funded to achieve the 2030 goal of 70% renewable statewide electric generation (and the 2040 goal of a carbon-free grid). In an effort to make this a reality, the state passed RAPID – eminent domain for developers of low-density, poorly performing resources to seize land to run transmission. To pay for that transmission, the Public Service Commission (PSC) approved a massive rate hike. Former Commissioner John B. Howard (who was replaced on the Commission Board by Governor Hochul in February 2024) stated during that meeting as he voted “no” on the plan, "It will be after the (energy) bill impacts hit, and I guarantee you, when these costs hit our rate (increase request) cases, the howl from these same constituencies will be heard from here to Timbuktu." We must hope that the Draft Blueprint effort will enable New York to avoid this outcome.

Comptroller auditors found that the PSC, tasked under the Climate Act with establishing and reviewing the state's renewable energy program, sometimes used obsolete data and wrong calculations to determine if the state could reach 70% renewably-sourced electricity by 2030. The PSC also did not fully account for potential risks and did not consider possible challenges that could delay meeting the state’s clean-energy targets. For example, according to the Independent System Operator (NYISO), the state would need technology not identified in the scoping plan to provide energy when intermittent generation was insufficient or batteries were depleted.

The Comptroller’s audit also found that the PSC had no back-up plan if the Climate Act’s goals were not met within prescribed timeframes, except for the continued reliance on fossil fuels.

Auditors -- as well as the NYISO -- identified other factors that could delay achievement of the Climate Act goals, including increasingly severe weather, renewable electricity demands, a delayed Champlain Hudson Power Express (CHPE) line and potential limitations on the hydroelectric power it is expected to provide, as well as material availability and supply chain issues.

DiNapoli writes that while staff from the NYISO met with the Climate Action Council, their input was ignored.

Section 3 NYSERDA

The Business Council had warned “[70-by-30 target] in the CLCPA [faces] significant challenges including load growth, supply chain issues, inflation, workforce availability, permitting and interconnection delays, and global competition...”. NYSERDA itself acknowledged those issues

in its biennial report[7]. NYSERDA admitted that the state will undoubtedly miss the 2030 CLCPA goal of meeting 70% of electricity demand with renewable energy:

> **The amounts of Tier 1 (solar and wind) project deployment that would be needed … in order to achieve the 70% goal in 2030 may far exceed what the renewables industry could be expected to develop in this timeframe**

It appears that approved projects would have to be four or five times what current solicitations are yielding.

> **[T]he expected amount of renewable generation from operational and awarded/contracted sources in 2030 totals 73,292 GWh. [For] the 2030 statewide electric load, there is a renewable energy supply deficit of 42,145 GWh that would have to be addressed through future procurements in order to reach the 70% goal amount of 115,437 GWh…The analysis suggests NYSERDA would have to procure approximately 14,048 GWh per solicitation, assuming no project attrition, or, assuming a 30% attrition rate, an amount of 20,068 GWh per solicitation. This volume is significantly higher than the annual procurement quantity of 4,500 GWh per Tier 1 solicitation (before attrition) estimated in the [2020 CES Order].**

To meet the 70-by-30 goal, the state would need, in the next six years, to bring online five times the solar and wind built in the last 30 years.

NYSERDA Scenario 3 to achieve CLCPA targets provides build out projections: For upstate, about a million acres of forest and farmland will need to be sacrificed to support 55 gigawatts (GW) of solar and 10 GW of land-based wind. That would be in addition to massive investments in batteries, transmission, and backup generation from unidentified sources. For Long Island, property values, fishing, and marine habitat will be compromised by 17 GW of offshore wind. 1.7 GW of (Empire and Sunrise) offshore wind projects are now moving forward. These projects were approved with strike prices four times current wholesale electricity costs. So, clearly, all New Yorkers will be hammered by the state's failure to perform any fiscal scrutiny of the plan.

To get to our current failure-point, New York has had to cancel home rule of law and side-step the safeguards of the environmental quality review act (SEQRA) for upstate communities. Beyond the huge tax-payer-funded subsidies for resources which, mostly, generate no energy at all, Albany revised the assessment formula towns must use, robbing them of fair tax revenue. But even this has not been enough. This year's budget included "RAPID": accelerated transmission buildout financed by rural rate payers. Based on megawatt-hours of energy moved, this will be some of the most expensive transmission on the planet. Transmission must

[7] Ibid https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?Mattercaseno=15-E-0302

support full nameplate capacity, but due to the astonishingly low-capacity factors of solar and wind—especially in New York-- the wires will, mostly, carry no energy at all.

NYSERDA's report never discusses growing rural resistance to industrial energy infrastructure. Dozens of community organizations have joined the Clean Energy Standard proceeding at the Public Service Commission and have filed their objections to the state's benighted plan. What is their message to the state? Restore home rule and full SEQRA protection. Restore fair tax assessments. Perform a detailed fiscal analysis to show New Yorkers what it will cost them. Conduct a credible engineering analysis to show what kind of energy mix New York will really need to provide reliable affordable carbon-free electricity. Include nuclear power in the energy mix.[8]

Section 4 Research, Empirical data, the NYISO, and a sidebar from the NERC

The Comptroller had noted that NYISO input had been disregarded in developing the scoping plan. Ignoring input from the grid operator indicates a disconnect from reality as well as a cavalier attitude to citizen health, fiscal responsibility, and safety issues dependent on reliable and affordable electricity. NYISO's Q2 STAR report, published in July 2023, identified a reliability need of 446 megawatts on the grid in the New York City area starting in the summer of 2025. In its 2024 RNA, NYISO found a statewide resource deficiency of at least 1,000 MW by 2034 resulting in violations of resource adequacy and transmission security criteria driven by increasing demand, large loads, and assumed gas unavailability. NYISO reports indicate that at least 17 GW of existing fossil-fuel capacity will be needed after 2030; that peaker and other fossil-fuel power plants scheduled for closure may need to remain in operation to assure reliability; and that even its current pessimistic forecasts could worsen with delays in CHPE and other projects.

Assessing negative progress since passage of the CLCPA, the state has gone from a grid over 60% carbon-free in 2019 to over 50% fossil-fuel-powered today. Research in this area indicates that even with an 80% "renewably-powered" grid, 40% firm capacity will still be needed.[9] Thernstrom's and Brick's research on renewable energy sounds like they had New York in mind:

> **…the debate over how to reduce GHGs from the utility sector has become a drama of confused ends and means, where political and intellectual support for solar and wind power have distracted policymakers' attention from the larger goal of cost-effective decarbonization.**

[8] Stakeholder Comments Rural NY Communities and Groups 11-02-2023 in https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?Mattercaseno=15-E-0302

[9] Renewables and decarbonization: Studies of California, Wisconsin and Germany Stephen Brick & Samuel Thernstrom https://www.sciencedirect.com/science/article/pii/S1040619016300136

A prime example of this confusion is a body of studies arguing that the GHG reduction burden can be met solely or mainly by renewable energy alone (Jacobson and Delucci, 2009; Kombikraftwerk2; Chandler et al., 2014). In seeking to demonstrate that renewables can by themselves replace all fossil fuels and nuclear energy, these studies run the risk of treating renewables as a societal end in itself, instead of just one among a suite of technologies that could be used to achieve the combined goals of environmental protection, cost-containment, and electric system reliability.

Findings in this paper mirror criticism of the state Scoping Plan: huge overbuild will be needed; a grid powered by intermittent resources will not be cheap or reliable; dumping intermittent electricity and powering up peakers is necessary:

•IR-heavy [intermittent-renewable] systems are significantly larger than conventional counterparts; this is because intermittent resources like wind and PV have low capacity factors; to generate the same amount of output, a larger system is needed.
• Using EIA assumptions for technology costs, IR-heavy systems are more expensive on a dollars-per-megawatt-hour basis.
•To achieve CO2 reductions on par with balanced portfolios, IR systems must be built much larger, to between 154 and 195% RPS (renewable-portfolio-standards) levels.
•Wind and solar output exhibit seasonal episodes of both sustained oversupply and undersupply that overwhelm any conceivable storage strategy. Battery storage technologies may have a role in managing shorter-term imbalances but are unlikely to solve the very large seasonal swings in generation output under high-penetration IR scenarios. Pumped hydroelectric storage (PSH) is the only available technology applicable to longer-term storage… While some long-term storage may be feasible, wasted surplus is unavoidable in high-IR systems, and backup conventional generation remains necessary.

Empirical evidence – provided by those places twenty or thirty years ahead of New York down this garden path -- supports this research, and indicates that substantial fossil-fuel support, at nearly the same capacity as before the renewable plunge, continues to be needed. Intermittent generators require fast-ramping 'peaker-plant' type backup which is much less efficient (30%-35%) than energy from slow-ramping combined-cycle gas generators (60%). As renewables are added to the grid, there may be little reduction in fossil-fuel use and corresponding CO2E emissions due to efficiency loss, even as costs climb with new transmission, batteries, and replacement. Both California and Germany have expensive unreliable electric grids which still depend on lots of gas, and even coal-fired power.

In Power Trends 2022[10] the NYISO pointed out that NYS was going backwards, not forwards, in reducing emissions.

> **Recent increases in the CO2 emission rate coincide with the phased closure of Indian Point nuclear units 2 and 3 in 2020 and 2021, and corresponding increases in production from fossil resources needed to meet demand and maintain reliability.**

In Power Trends 2023[11], the NYISO tied energy cost and reliability in NYS to bad planning:

> **…wholesale electric prices in New York have generally increased as a result of the retirement of the Indian Point 2 in April 2020 and Indian Point 3 in April 2021. As eastern New York has become more reliant on natural gas-fired generation, spikes in congestion because of tight gas market conditions on cold winter days have become more frequent.**

Indeed, the North American Energy Reliability Corporation (NERC) in its 2023 ERO Reliability Risk Priorities Report[12] listed five threats to the bulk power system (BPS). Number one was bad energy policy and number two was changes to the grid to support bad policy. NERC warns that neighbor state may not wish to buy or sell energy when New York's intermittent generation is too large or too small. This echoes analysis from Brick and Thernstrom, and California's experience. It provides an ominous warning for New York: With the largest battery on earth California dumped 3 TWh of solar last year: they could not give it away or store it. When neighbors do not send coal-fired electricity, the lights go out in LA.

Section 5 Conclusion: In support of nuclear power providing carbon-free baseload to address energy reliability, affordability, and grid decarbonization

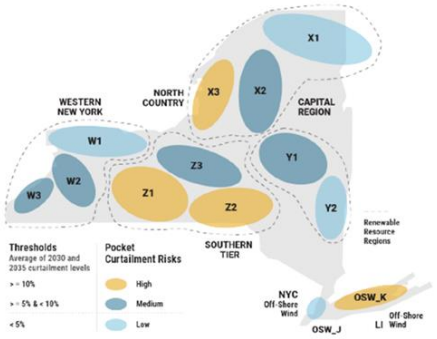
Issues to speak to:

- **Readiness of technology**
- **Safety**
- **Siting**
- **Environmental Justice**
- **Cost**
- **Fuel/Waste**

[10] https://www.nyiso.com/documents/20142/2223020/2022-Power-Trends-Report.pdf
[11] https://www.nyiso.com/documents/20142/2223020/2023-Power-Trends.pdf
[12] https://www.nerc.com/comm/RISC/Related%20Files%20DL/RISC_ERO_Priorities_Report_2023_Board_Approved_Aug_17_2023.pdf

Readiness

Each of the question categories cuts across generation technologies. While I appreciate State interest in hearing how nuclear addresses concerns, I will also look at issues with other technologies. This chart from NYISO 21-40 Outlook[13] indicates how 'not-ready' for solar and wind NYS is. Curtailment pockets across the Southern Tier, Finger Lakes, and North Country will prevent energy generated by resources in northern or western New York from reaching the metro region for years, perhaps for decades.



A thousand miles of expensive new transmission as well as BESS providing 85-170 GWh – all currently unbuilt—is needed to support solar and wind resources. Clean Path delivery of energy to NYC depends upon as yet unapproved and unbuilt solar, wind, and transmission. Supply-chain and labor constraints, material shortages – particularly aluminum impacting transformer availability – will slow installation of necessary support for renewable resources. Increasing public opposition to solar, wind, and batteries will further slow siting and installation. RAPID – eminent domain for energy infrastructure – is likely to increase opposition to siting more than it accelerates transmission construction. BPRA represents yet another ignorant misallocation of resources.

Is nuclear technology ready? France, Sweden, and Ontario managed significantly to decarbonize their grids while maintaining affordable reliable electricity and growing their economies. In fact, France and Sweden did so decades ago, with older nuclear technology. As Vogtle has shown, the AP1000 can be permitted, built, and brought online. While this project came in over budget and late, we see from renewable contracts, permitting, and construction that those resources are not immune to the same issues: If New York needed energy costing what recent offshore strike prices reflected, electricity costs could quadruple. When France built out nuclear power, it used a cookie-cutter approach, repeating the same successful design over and over.

Ontario provides an interesting example. Like NYS, Ontario had a politically designed 'green-energy act', advertised to be reliable and affordable. Experience proved otherwise. Cost

[13] https://www.nyiso.com/documents/20142/33384099/2021-2040-Outlook-Report.pdf/

estimates were flawed, and the plan exacerbated an existing north-south/rural-metro divide. The act was repealed.

New York policy-makers might read reports from the Intergovernmental Panel on Climate Change and the UNECE to see what technologies are needed to tackle the problem.

> **Design improvements for nuclear reactors have resulted in so-called Generation III+ designs with simplified and standardized instrumentation, strengthened ontainments, and 'passive' safety designs seeking to provide emergency cooling even when power is lost for days. Nuclear power reactor designs incorporating a 'defense-in-depth' approach possess multiple safety systems including both physical barriers with various layers and institutional controls, redundancy, and diversification — all targeted at minimizing the probability of accidents and avoiding major human consequences from radiation when they occur (NEA, 2008).**[14]

And from UNECE:

> **Nuclear power is a low-carbon energy source that has avoided about 74Gt of CO2 emissions over the past 50 years, nearly two years' worth of total global energy-related emissions. Only hydropower has played a greater role in avoiding emissions over this period.**
>
> **Nuclear power currently provides 20% of electricity generated in the UNECE region and 43% of low-carbon generation. Time is running out to rapidly transform the global energy system as fossil fuels still account for over half of electricity generation in the UNECE region. A new technology brief from the United Nations published today notes that nuclear power can be seen as part of a broader portfolio alongside deploying other sustainable low- or zero-carbon technologies to decarbonise the global energy system and energy intensive industries to deliver on the Paris Agreement and the 2030 Agenda for Sustainable Development.**
>
> **The IPCC 1.5°C report published in 2018 presented mitigation scenarios in which nuclear generation would grow on average 2.5 times from today's level by 2050. In addition, a 'middle-of-the-road' illustrative scenario – in which social, economic, and technological trends follow current patterns and there are no major changes in diet or travel habits – sees demand for nuclear generation increase six times by 2050 with the technology providing 25% of global electricity.**
>
> **Nuclear power has the potential to increase its integration with other low-carbon energy sources in a future decarbonised energy mix.**
>
> **"For those countries who choose to implement this technology, nuclear power is an important source of low-carbon electricity and heat that can contribute to attaining carbon neutrality and hence help to mitigate climate change and attain the 2030**

[14] P550 https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter7.pdf

Agenda for Sustainable Development" said UNECE Executive Secretary Olga Algayerova.[15]

At COP28, the U.S. and more than 20 other countries pledged to triple nuclear power by 2050 to achieve net-zero carbon emissions and limit climate change. The US Department of State

> **[Recognizes] that analysis from the Intergovernmental Panel on Climate Change shows nuclear energy approximately tripling its global installed electrical capacity from 2020 to 2050 in the average 1.5°C scenario;**
>
> **[Recognizes] that analysis from the International Energy Agency shows nuclear power more than doubling from 2020 to 2050 in global net-zero emissions by 2050 scenarios and shows that decreasing nuclear power would make reaching net zero more difficult and costly;**
>
> **[Recognizes] that new nuclear technologies could occupy a small land footprint and can be sited where needed, partner well with renewable energy sources, and have additional flexibilities that support decarbonization beyond the power sector, including hard-to-abate industrial sectors;**

And so, the US will

> **Commit to work together to advance a global aspirational goal of tripling nuclear energy capacity from 2020 by 2050[16]**

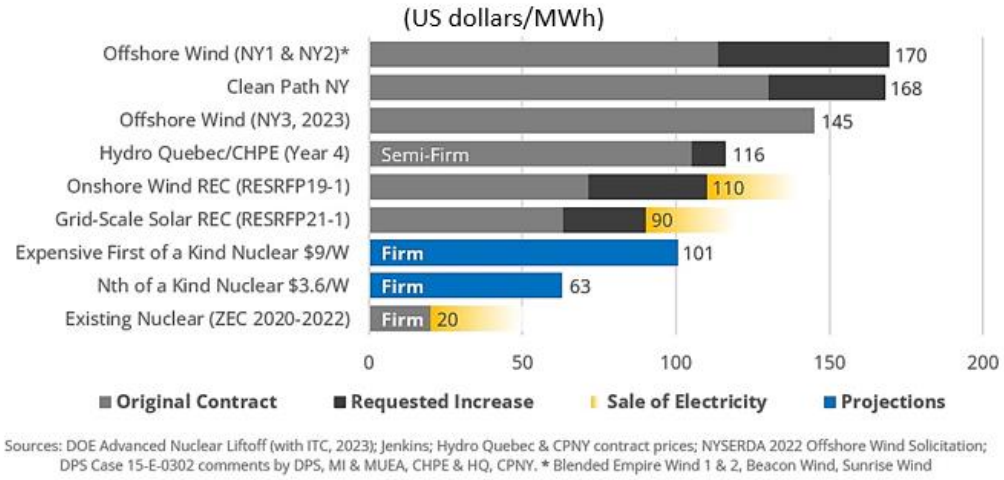
Unlike solar and wind, which will require thousands of miles of new transmission, backup power, batteries, and replacement in 25 years, nuclear power plants fit perfectly in the existing grid which was designed for large baseload resources. Unlike solar and wind, which generate about one permanent job for every thousand acres bulldozed, nuclear power creates thousands of highly-paid jobs for the 80-100 years of a reactor's operation.

While nuclear power is expensive, it is not more expensive than projects the state is currently pursuing in support of its scoping plan and NYSERDA buildout projections: offshore wind,

[15] https://unece.org/climate-change/press/international-climate-objectives-will-not-be-met-if-nuclear-power-excluded

[16] https://www.state.gov/declaration-to-triple-nuclear-energy

onshore wind, CHPE, CPNY, and grid scale solar.



Sources: DOE Advanced Nuclear Liftoff (with ITC, 2023); Jenkins; Hydro Quebec & CPNY contract prices; NYSERDA 2022 Offshore Wind Solicitation; DPS Case 15-E-0302 comments by DPS, MI & MUEA, CHPE & HQ, CPNY. * Blended Empire Wind 1 & 2, Beacon Wind, Sunrise Wind

CHPE need send no energy in winter, even as NY becomes winter peaking. We must examine this embarrassing note from the CPNY site[17]:

> **Clean Path NY will generate 3,800 megawatts of new clean energy, including 1,800 megawatts of new solar power and 2,000 megawatts of new on-shore wind power. All the new renewable energy will be generated in New York, keeping jobs and investment in the state.**

In fact, CPNY is a cable and does not 'generate' anything other than some heat in transmission. If any of the projected solar and wind gets built, CPNY may move some renewably-generated electricity. However, when the numbers are crunched for solar and wind capacity factors, we find that this represents only about 60% of CPNY's 1300MW transmission capability. Due to intermittency, the line would also be idle much of the time. Or, perhaps, it will move gas-generated power. In any case, CHPE and CPNY at full capacity together only provide a tenth of the energy the metro region currently needs, and metro demand is likely to double in coming decades making the contribution of these gigantic cables insignificant. Solar in NYS has a capacity factor like that of SW Alaska, and we must give up half-a-million acres of farmland to support it. Onshore wind in NYS has half the capacity factor that it has in Nebraska and requires 50 acres per MW. The Scenario 3 onshore wind projections will also consume about half a million acres.

Safety

If we are concerned with safety, we need to look at other carbon-free resources as well. Do we support hydro? A little digging will show you that hundreds have died in hydro failures in the

[17] https://www.cleanpathny.com/

USA. Most of the dam failures in the 1970s caused more deaths than reported by responsible outlets on the Chernobyl disaster. Here are a few:

- February 26, 1972 - Buffalo Creek Valley, West Virginia
  The failure of a coal-waste impoundment at the valley's head took 125 lives, and caused more than $400 million in damages, including the destruction of over 500 homes.

- June 9, 1972 – Rapid City, South Dakota
  The Canyon Lake Dam failure took an undetermined number of lives (estimates range from 33 to 237). Damages, including the destruction of 1,335 homes, totaled more than $60 million.
- June 5, 1976 – Teton, Idaho
  Eleven people perished when Teton Dam failed. The failure caused an unprecedented amount of property damage totaling more than $1 billion.

- July 19-20, 1977 – Laurel Run, Pennsylvania
  Laurel Run Dam failed, killing over 40 people and causing $5.3 million in damages.

- November 6, 1977 – Toccoa Falls, Georgia
  Kelly Barnes Dam failed, killing 39 students and college staff and causing about $2.5 million in damages.

Stanford has collected data on the dam failures in the US with this record of fatalities.[18]

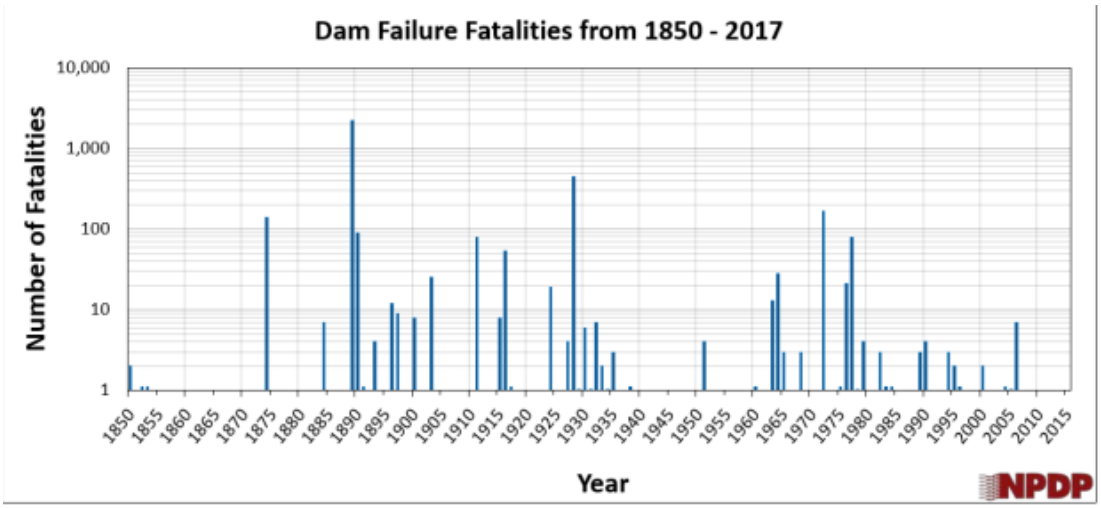


Figure 6 Timeline of dam failure events that have resulted in fatalities in the U.S.

In China, thousands died from collapse of the Shimantan Dam on the Hong River: The absence of an early-warning system or an evacuation plan exacerbated the disaster, and 26,000 people died in the floods, according to the official death toll. In addition, an estimated 145,000 people

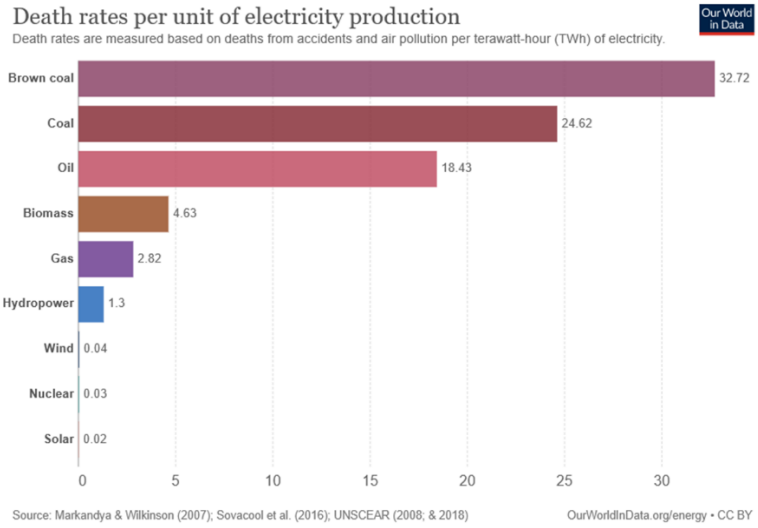
[18] https://npdp.stanford.edu/sites/default/files/reports/npdp_dam_failure_summary_compilation_v1_2018.pdf

died from epidemics (caused by contamination of the water) and from famine; some estimates put the total death toll at more than 220,000. The number of people affected by the disaster exceeded 10 million.[19]

While anti-nuclear misinformation certainly tells a different story, there were no deaths at Three Mile and no radiation deaths at Fukushima. Certainly, there were several dozen deaths at Chernobyl. However, rabid anti-nuclear misinformation – similar to filings NYSERDA is receiving now from so-called 'big green' organizations -- prompted many more unnecessary abortions in the Ukraine and eastern Europe.[20]

> **Multiple studies have shown that there were no pregnancies affected by radiation from Chernobyl, although many unnecessary abortions were performed out of unfounded fear**.

According to Oxford, nuclear power is as safe as solar or wind. [21]



On the flip side, wherever nuclear has been shuttered -- MA, VT, CA, NY, or Germany -- it is replaced by fossil fuels. If we are concerned with human health as well as global warming, this should be a serious concern. A Harvard study finds that eight million people die globally from fossil-fuel combustion emissions every year.[22] Hansen and Kharecha write

> **Using historical production data, we calculate that global nuclear power has prevented an average of 1.84 million air pollution-related deaths and 64 gigatonnes of**

[19] https://www.britannica.com/event/Typhoon-Nina-Banqiao-dam-failure
[20] https://www.ans.org/news/article-2143/how-hbo-got-it-wrong-on-chernobyl/
[21] https://ourworldindata.org/safest-sources-of-energy
[22] https://seas.harvard.edu/news/2021/02/deaths-fossil-fuel-emissions-higher-previously-thought

CO2-equivalent (GtCO2-eq) greenhouse gas (GHG) emissions that would have resulted from fossil fuel burning.[23]

New York is liable for a fraction of current global combustion-emission deaths, as two big gas power plants were built to replace Indian Point (IP), leaving NYC short of power but generating tens of millions of avoidable CO2E emissions annually.

Siting

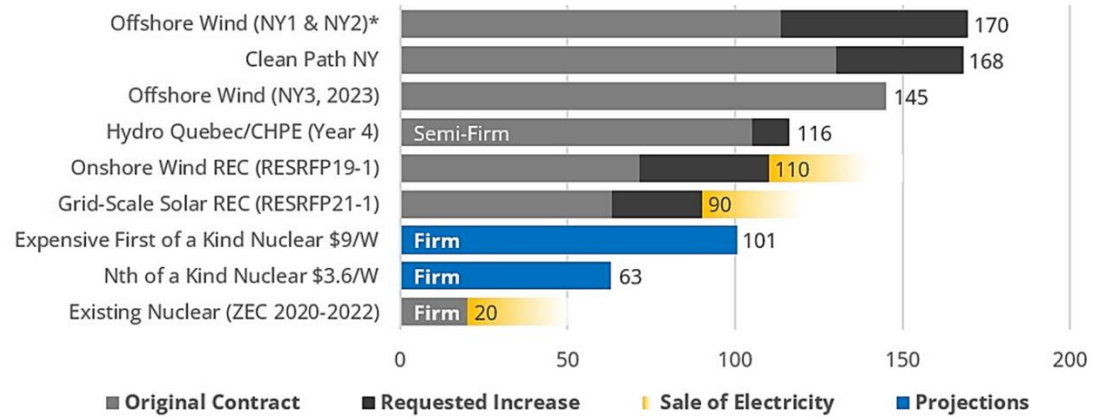
Of course, many supporters of the Draft Blueprint would argue that home rule of law and full protection of SEQRA should be considered in any industrial siting. These have been sidelined in the siting of massive solar and wind projects. So, a first step in 'siting' concerns would be to dismantle ORES/94-C. If we did so, developers might find it very difficult to site industrial solar and wind – projects with dubious environmental, performance, and decommissioning track records and which are not required to pay fair tax assessments.

Of course, as has been the case with solar and wind installations, finding communities willing to host nuclear may not be easy. However, those places that currently have nuclear facilities know that the plants are safe, provide local tax revenue and high-paid generational employment, and so these would be likely locations for more. For example, Wayne County, which is where the Ginna plant is located, loves its nuclear power plant and is willing to host more. A resolution to that effect was adopted by every town supervisor in the county. As SMRs become available, these will prove a perfect fit for industrial applications like the proposed Micron plant and for town microgrids as well. Secretary of Energy Granholm recently dubbed this trend BYOP: "bring your own power."

Cost

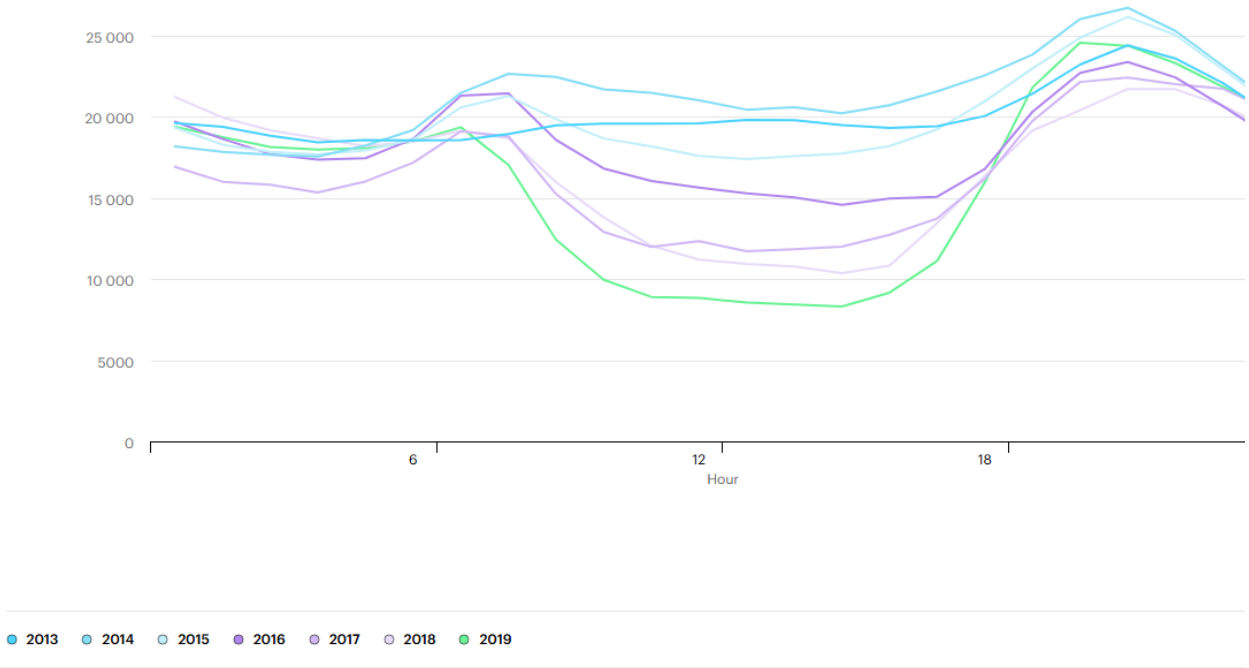
Nuclear power is expensive, but not more expensive than projects the state is pursuing in an effort to meet decarbonization targets in the CLCPA. Vogtle came in over budget and overdue: typical for a first-of-a-kind effort. As the cost chart shows, Nth of a kind development is a way to significantly cut costs.

[23] https://pubs.giss.nasa.gov/abs/kh05000e.html



Sources: DOE Advanced Nuclear Liftoff (with ITC, 2023); Jenkins; Hydro Quebec & CPNY contract prices; NYSERDA 2022 Offshore Wind Solicitation; DPS Case 15-E-0302 comments by DPS, MI & MUEA, CHPE & HQ, CPNY. * Blended Empire Wind 1 & 2, Beacon Wind, Sunrise Wind

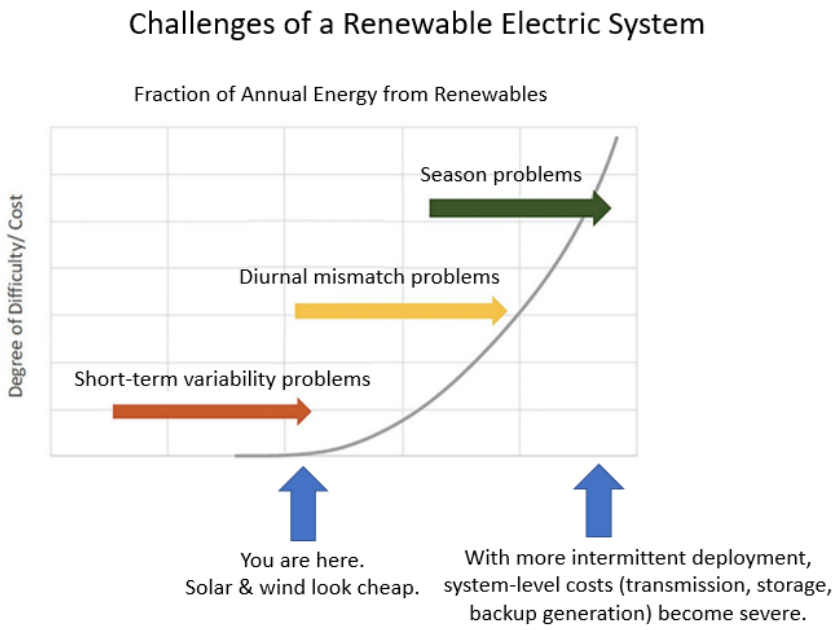
A part of the cost discussion must consider cost of alternatives, and in New York's case, alternatives which will not reliably power the grid. LCOE tables do not accurately reflect costs for generating resources. Nuclear power provides baseload generation for 80-100 years, at over 90% capacity factor, creating highly paid jobs for generations, and fits in the existing grid without thousands of miles of new transmission. California has twice the solar capacity factor of New York, and deserts to put the panels, but California's "duck curve"[24] has deepened as intermittent resources were added to the grid. Solar generates energy when people are away at work. When they get home, the gas plants are fired up.



California has not even managed to solve the diurnal problem, despite having the largest li-ion

[24] https://www.iea.org/data-and-statistics/charts/the-california-duck-curve

battery on earth (Moss Landing). As reflected in research, transmission, storage, and backup costs climb as the grid's percentage of intermittent resources increases.



ɔurce: National Renewable Energy Labs, 2021

Batteries to support intermittent generators will cost hundreds of billions of dollars and will need replacement in a decade or two. Despite its battery storage, California dumped 3TWh of energy last year. They could not store excess solar energy or give it away.

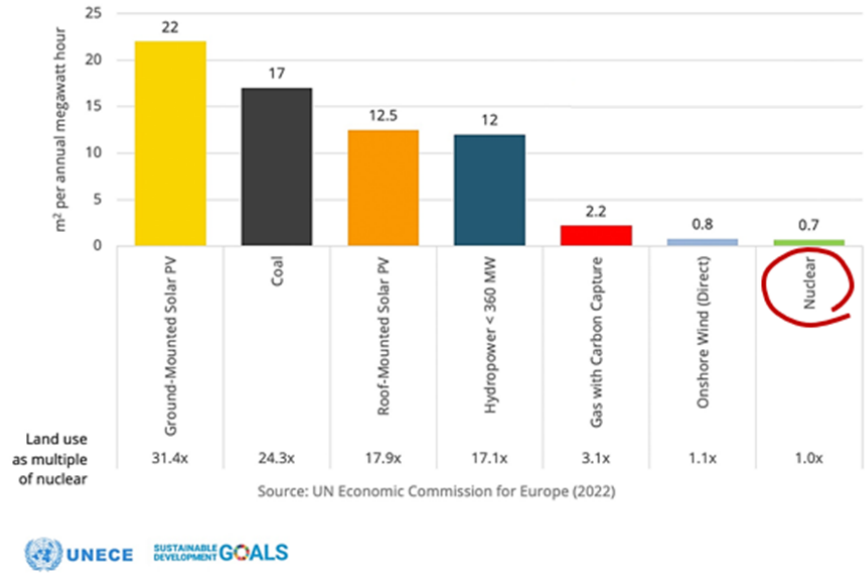
There is also a human cost of plan failure. For our current path, NYISO has reported on the narrowing downstate capacity margin. We see peakers and big gas plants running more than ever before. We have BESS systems on fire and rising energy costs. The poor and elderly will be the first casualties in extended blackouts and price spikes. New York's plan requires tripling energy imports and exports. As NERC has reported, and as California's example has demonstrated, neighbors may not have energy to spare when we need it, and they may not want our excess solar or wind when we need to sell it to keep costs in check.

A part of 'cost' must be the sacrifice of a million acres of forest and farmland which the Scoping Plan requires. (Ignoring acreage for new transmission and 80-150 GWh of storage, using 50 acres per MW X 10 GW land-based wind[25] and 8 acres per MW solar X 55 GW, we need to bulldoze about a million acres.) Those fields and woodlands currently provide wildlife habitat or crops for market. Presumably there is some dollar value in forests and farmland which the state is not considering.

[25] http://www.aweo.org/windarea.html

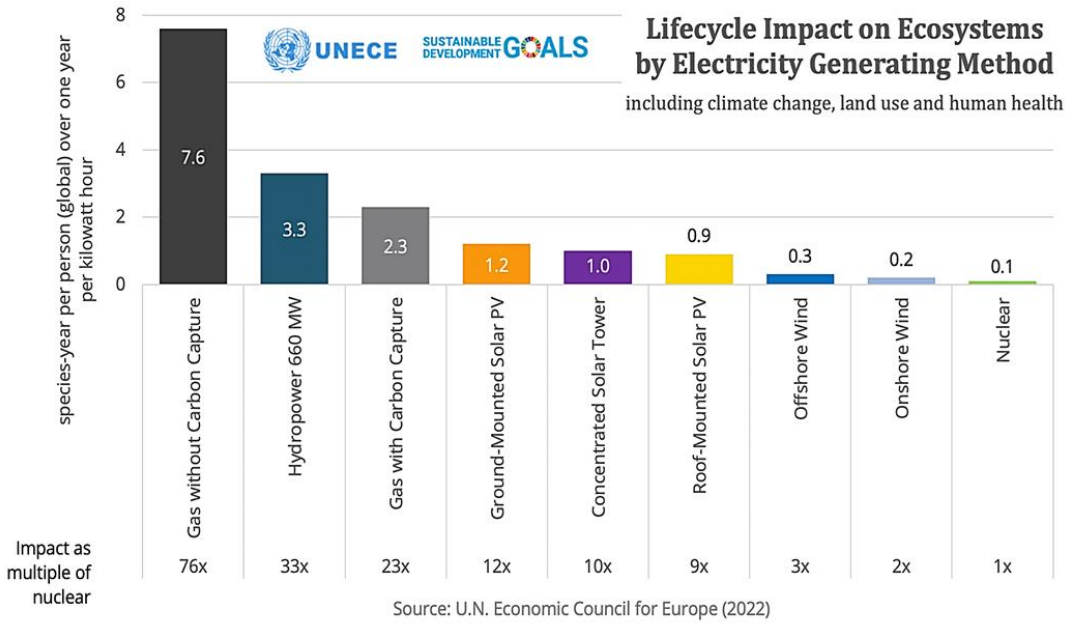
Nuclear power is energy-dense and requires little land. Indian Point occupied 240 acres and provided a quarter on NYC's electricity. The first 60,000 acres of farmland bulldozed for solar will represent New York's effort to replace carbon-free baseload energy at 90% capacity factor with Chinese panels providing intermittent energy – not when you need it – and requiring new transmission, continued fossil-fuel backup, and battery storage. There is no way to make this look intelligent.

Lifecycle Land Use Intensity per unit of electricity by source



UNECE SUSTAINABLE DEVELOPMENT GOALS

Nuclear has the smallest impact on ecosystems of any generating source, according to the UNECE.



Plenty of research supports these advantages of nuclear energy:

> **Nuclear energy has generally been an important component in transitioning to a more sustainable society because of minimal carbon emissions, high power and energy density and quick electricity generation capacity with less land required. It has been given priority development over renewable energy sources since its offers significant benefits in optimizing energy structure, ensuring ecological stability, and reducing air pollution. Additionally, nuclear energy expansion affects industry-wide technology boosting production and energy efficiency, lowering power generation costs, and reducing energy dependence, all of which contribute to achieving the sustainable energy and green growth targets. Hence, nuclear energy is the best option to assist environmental policies aimed at global ecological stability, energy security, and green growth in the long run.[26]**
>
> **Two new studies now present a strong case for nuclear. Air pollution would increase if nuclear plants in the U.S. are shut down, as coal and natural gas plants would step up to fill the gap, according to one study published in Nature Energy. This would result in an additional 5,200 deaths in just one year. The other study, in Scientific Reports, finds that nuclear is the winner in terms of land use and related environmental impact compared to other carbon-free energy sources.[27]**

Environmental Justice

[26] https://www.sciencedirect.com/science/article/pii/S1738573322002650
[27] https://www.anthropocenemagazine.org/2023/04/the-case-for-nuclear-power-no-pollution-and-low-footprint

A narrow "environmental justice" (EJ) discussion framed by downstate politicians and "Big Green" organizations will not provide a clear picture of the impacts of New York's current policy. As we consider our supply-chains for a 'green' transition, we must look at Asia and Africa. No consideration of EJ should exclude labor conditions in China, which makes most of the world's solar panels. There, forced child and Uyghur labor is well-documented.[28]

'Green' technologies have their mining, production, siting, and decommissioning costs, too numerous to detail here. Copper and aluminum mining – needed for wires and transformers, like metal mining in general -- is not eco-friendly.

> **At least 23 million people around the world live on flood-plains contaminated by potentially harmful concentrations of toxic waste from metal-mining activity, according to a study…UK scientists mapped the world's 22,609 active and 159,735 abandoned metal mines and calculated the extent of pollution from them. ..Chemicals can leach from mining operations into soil and waterways…This is particularly critical as the demand surges for metals that will support battery technology and electrification, including lithium and copper, says Prof Mark Macklin from the University of Lincoln, who led the research.[29]**

Mining for lithium, like most metals, is a dirty business. As reported by the NYT, "Lithium Mining Projects May Not Be Green Friendly."[30] Duke University has also documented these impacts: "EVs and Cobalt Mining: Why Environmentalists Must Consider Justice Before Carbon."[31]

In closing Indian Point, Albany unplugged a quarter of the metro region's power. While Cricket Valley in Dover and CPV in Wawayanda were built to replace IP, a little arithmetic will indicate that the 1,100 MW generation from Cricket Valley and 650 MW from CPV, combined-cycle power plants running at about 60% capacity factor, do not replace IP's 2,100 MW running at over 90% CF. Consequently, existing environmental justice zones in NYC continue to be subject to emissions from big power plants and peakers, running more than ever before. And New York has created two new EJ zones: Dover and Wawayanda in the process.

Albany's single-minded pursuit of solar, wind, and battery buildout continues to create EJ communities across the state. Robbed of home rule, fair tax compensation, and even environmental protection, rural towns are unable to stop the onslaught. Impacts on communities from Buffalo to Amsterdam should be tallied side by side with the concerns of inner city populations.

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[28] https://www.bbc.com/news/world-asia-china-57124636

[29] https://www.bbc.com/news/science-environment-66880697

[30] https://www.nytimes.com/2021/05/06/business/lithium-mining-race.html

[31] https://blogs.nicholas.duke.edu/env212/evs-and-cobalt-mining-why-environmentalists-must-consider-justice-before-carbon

The scope and intent of this filing precludes exhaustive detailing of environmental and human harms associated with solar and wind resource installation, maintenance, operation, and decommissioning.

I will briefly look at human threats from wind power. A ScienceDirect article details threats to workers during installation and maintenance of larger and larger turbines, on and off shore.[32]

As is well documented, onshore wind installations can damage ground water systems.

> **The development of a wind farm has the potential to impact on groundwater quality, groundwater quantity and/or the established groundwater flow regime… Changes to the local water environment can affect receptors such as wells/boreholes, springs, wetlands and waterways, and can also have implications for groundwater dependent ecology and/or land stability. [33]**

Flicker and noise, ice throw and blade throw, all have human health impacts.

> **Analysis of the results showed that noise exposure up to 83 dBA is statistically significantly correlated to all subscales of general health, except for depression. They concluded that wind turbine noise has negative impacts on the health of directly exposed people. They also indicated that long-term noise exposure was a psychological stressor that can cause mentally abnormal responses and AHE, likely through interactions between the autonomic nervous system, neuroendocrine system, and the immune system period.[34]**

> **Noise and additional problems it causes are the most frequently reported complaints by those living around the turbines (Michaud et al. Citation2016c). Chronic noise interrupts daily individual activities such as communication, attention, adaptation, sleep, and relaxation; it can also lead to anger, burnout, displeasure, and stress-related symptoms. Features such as the continuity of WT noise (WTN) (day and night), the visibility of the source and the absence of masking background noise (generally installed in semi-rural areas away from the noisy city centre) cause disturbance (Basner et al. Citation2014). Stress hormone (catecholamine and cortisol) levels increase as hormonal response to noise (WHO Regional Office for Europe Citation2009). In addition, with the activation of the autonomic nervous system, the heart rate increases and blood pressure rises as a result of peripheral vasoconstriction. According to Pedersen, the risk perception and visual aspects of turbines constitute an important confounding factor for noise disturbance, significantly increasing perceived noise levels and causing deterioration in sleep quality, negative mood, and stress**

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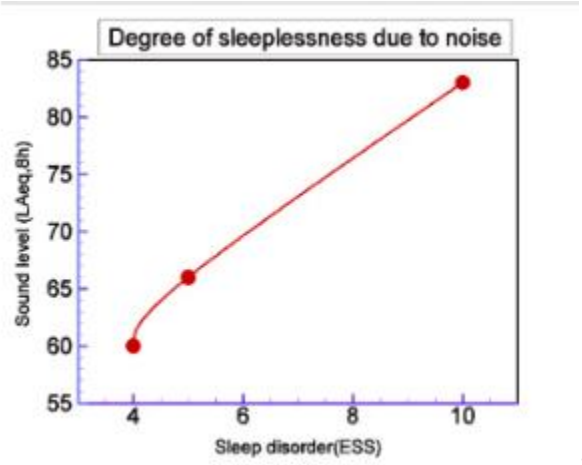
[32] https://www.sciencedirect.com/science/article/pii/S2352484721004303

[33] https://www.wind-watch.org/documents/wind-farms-and-groundwater-impacts-a-practice-guide-to-eia-and-planning-considerations

[34] https://journals.lww.com/endi/fulltext/2021/06030/wind_turbines_and_adverse_health_effects__applying.1.aspx

reporting (Chapman et al. Citation2013; Maffei et al. Citation2013). Adverse health effects are observed above 40 dBLnight,outside, including self-reported sleep disturbance, environmental insomnia, and increased use of sleeping pills and sedatives.[35]



[36]

Other major health concerns from living or working around turbines are epileptic seizures, headaches, nausea, and general disturbance from shadow flicker, which occurs when the sun shines through the turbine's spinning prongs, causing a shadowing effect that can sometimes be seen in homes and buildings.[37]

As we saw recently with offshore turbines off the coast of England and Nantucket, blades can shatter, littering the sea (or farm fields) with fiberglass.

…wind turbines can shed parts of or whole blades as a result of an accident or icing (or more broadly, blades can shed built-up ice, or turbines could collapse entirely).[38]

And, of course, turbines sometimes just catch on fire.

[35] https://www.tandfonline.com/doi/full/10.1080/09603123.2021.2010671#d1e136
[36] https://www.sciencedirect.com/science/article/pii/S2666790822000209
[37] https://www.popsci.com/environment/wind-turbines-effects-health
[38] https://www.wind-watch.org/documents/noise-flicker-health-and-safety

Fuel/Waste

As with other “suitability” topics, fuel and waste should be discussed in terms of solar and wind. Both require more energy and materials per MWh generated than does nuclear. That means more mining, more emissions, and more end-of-use waste for solar and wind, than for nuclear.

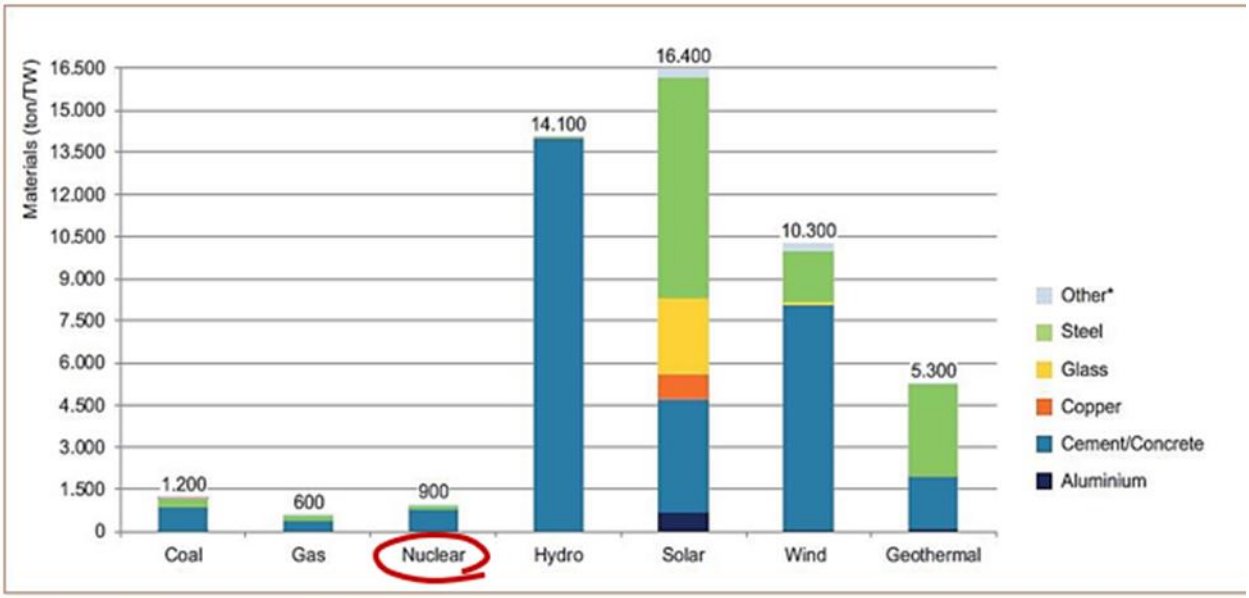


Figure 4: Base-Material Input per 1 TW Generation
Note: Other includes iron, lead, plastic, and silicon.; Schernikau assumes this is based on average US capacity factors
Source: Adapted from DOE 2015, Table 10.4, p390

Recent turbine blade failures show us that ‘waste’ from turbines may land in the ocean or our farm fields. Solar panels and turbine blades last 25 years or less, then go to landfills. That’s a sort of waste many are not considering.

In the history of nuclear power in the U.S. fuel waste from reactors has never harmed anyone. Because so-called ‘waste’ can be reprocessed and used in existing reactors, as the French have done for decades, or in next-generation reactors, ‘waste’ is probably a misnomer. Estimates are that reprocessing spent fuel ‘waste’ would provide hundreds of years of fuel for U.S. reactors. The waste consideration cuts two ways. When nuclear plants are shuttered in Massachusetts,

New York, California, Vermont, Germany, anywhere, they have been replaced by fossil fuels, including coal. All the nuclear waste from all the US reactors would fit into a big-box store. Coal plants globally produce that waste every hour, and cadmium, lead, arsenic, and other chemicals in ash have no half-life.

Some places like Ontario, which had adopted energy policies like New York's CLCPA and Scoping Plan, have seen the error of this path, repealed the misguided legislation, and have since pursued nuclear power. The 'big-green' mantra that renewables can deliver inexpensive reliable energy could not be more wrong. California and Germany have spent decades and billions of dollars on batteries, solar, wind, and transmission. They are now saddled with inefficient, costly, and unreliable grids. They depend on fossil-fuel fired electricity almost to the same extent as before their renewable build out. Germany mines and burns coal and needs lots of US LNG. Germany has the 4th most expensive electricity in Europe.[39] California imports coal-fired electricity and last year dumped about half as much solar energy as New York generated.[40] Californians have the most expensive electricity in the country.[41]

We are forced to conclude that, unlike solar and wind, nuclear can reliably economically power the state. Whether we look at land footprint, reliability, cost, materials, safety, jobs, emissions, or lifecycle environmental impacts, nuclear power is a wise energy choice for New York's future.

[39] Electricity price by country 2023 | Statista behind Ireland, Italy, and Belgium in 2023

[40] According to Governor Hochul, NY has installed about 6 GW of solar. Using a 14% capacity factor, NY would generate about 7 TWh of solar energy.

[41] https://www.marketwatch.com/guides/utilities/electricity-rates-by-state/ CA residents pay 29.5 cents per KWh