



Nuclear New York

Independent Advocates
for Reliable Carbon-Free Energy
3961 47th St Sunnyside, NY 11104
NuclearNY.org



New York Energy and Climate Advocates

310 W. 86th St. #6B, New York, NY 10024

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Mandatory Reporting
625 Broadway, Albany NY, 12233
(518) 402-8451
air.regs@dec.ny.gov

VIA ELECTRONIC FILING

RE: Mandatory Greenhouse Gas Reporting Rule

Please accept the following comments from Nuclear New York and New York Energy & Climate Advocates regarding the proposed Mandatory Greenhouse Gas Reporting Rule by the Department of Environmental Conservation (DEC). Our comments are not intended to be an exhaustive review of the draft rule, but rather are written to provide clarity with respect DEC's directive as set forth by the Climate Leadership and Protection Act (CLCPA), and address apparent misinterpretations of that directive by other commenters in this proceeding.

We recognize that the CLCPA requires that the DEC promulgate rules to achieve reductions in statewide greenhouse gas emissions, which are defined as:

*the total annual emissions of greenhouse gases produced within the state from anthropogenic sources and greenhouse gases produced outside of the state that are associated with the generation of electricity imported into the state **and the extraction and transmission of fossil fuels imported into the state.***

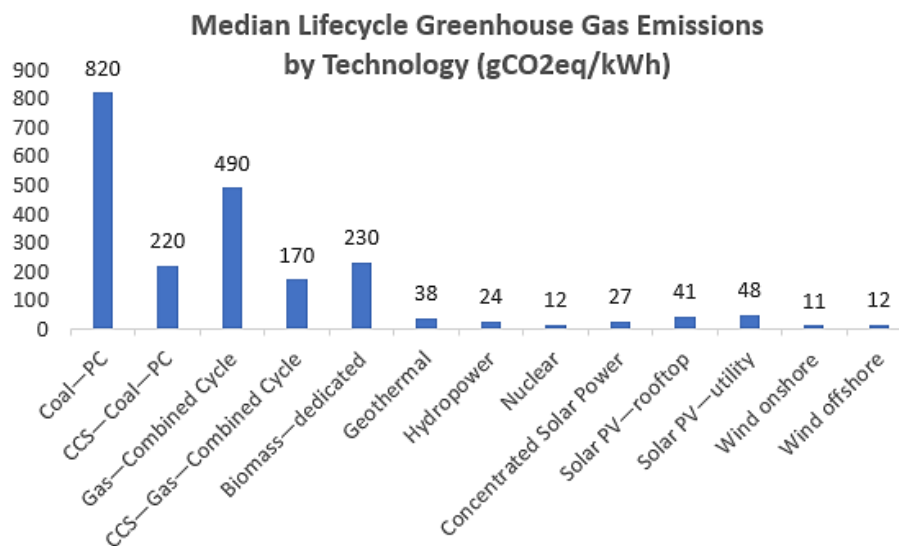
With respect to "upstream" emissions, this was intended to include greenhouse gases from fossil fuels that leak into the atmosphere, such as methane leakage from gas wells, compressor stations, and pipelines. However, the CLCPA does not require that DEC account for all lifecycle emissions associated with energy (such as the construction or operation of generation facilities and infrastructure.)

That said, we do not disagree that lifecycle emissions are relevant to effective decarbonization, and that knowledge of lifecycle emissions ought to contribute to the state's energy planning decisions. However, accurately accounting for all lifecycle emissions is an exceedingly difficult task that can be very specific to changing circumstances in the state, the country, and the world. We also respect that DEC is attempting to craft a rule that is consistent with its mandate under the CLCPA.

To the extent that DEC and other state agencies consider lifecycle emissions, it will be important to rely on credible information, not outlier reports.

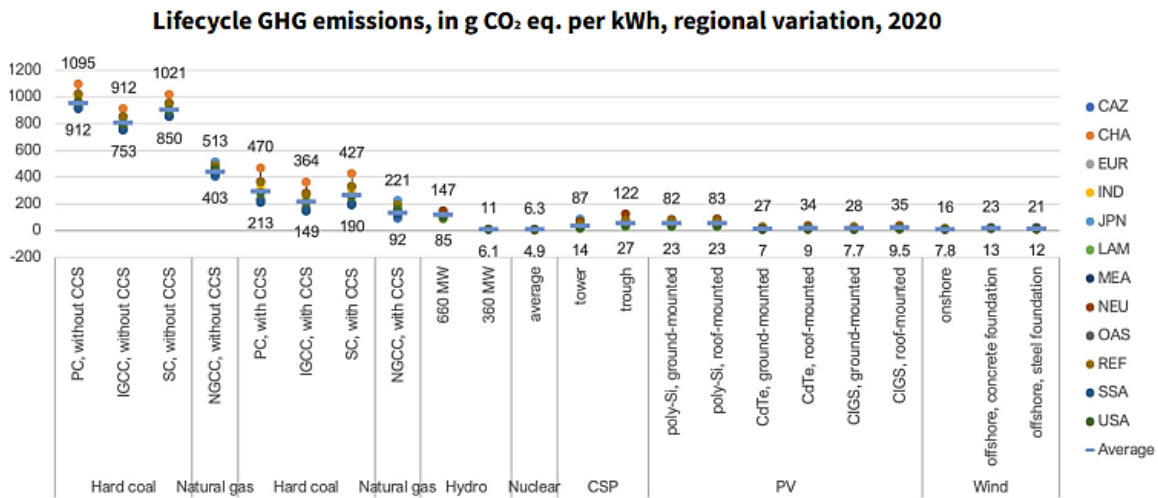
We are aware of comments filed by Energy Justice Network (EJN) touching upon these matters. We also agree with or are sympathetic to several of the points made by EJN regarding greenhouse gas accounting for incinerators, landfills, biomass, and biofuels. However, the comments by EJN on nuclear power appear to come from elsewhere and lack its more thoughtful assessment of other topics. For example, the comments on nuclear refer to an outlier report by Benjamin Sovacool that includes an exceedingly low estimate of lifecycle greenhouse gas emissions from biomass (including forest co-combustion with coal). This entirely contradicts the informed discussion of biomass seen elsewhere within the EJN document. Notably, the comments are also silent in calling for any accounting of lifecycle emissions associated with solar, wind, or batteries.

In reality, the broad consensus of the scientific community is that nuclear power actually has the lowest, or among the lowest, lifecycle emissions of the entire energy sector. The following illustrates findings from a comprehensive analysis of lifecycle greenhouse gas emissions for various technologies prepared by the Intergovernmental Panel on Climate Change (IPCC) as part of its Fifth Assessment report.¹



¹ Schlömer S., T. Bruckner, L. Fulton, E. Hertwich, A. McKinnon, D. Perczyk, J. Roy, R. Schaeffer, R. Sims, P. Smith, and R. Wisser, 2014: Annex III: Technology-specific cost and performance parameters. In: *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.; see Table A.III.2 Emissions of selected electricity supply technologies. https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_annex-iii.pdf

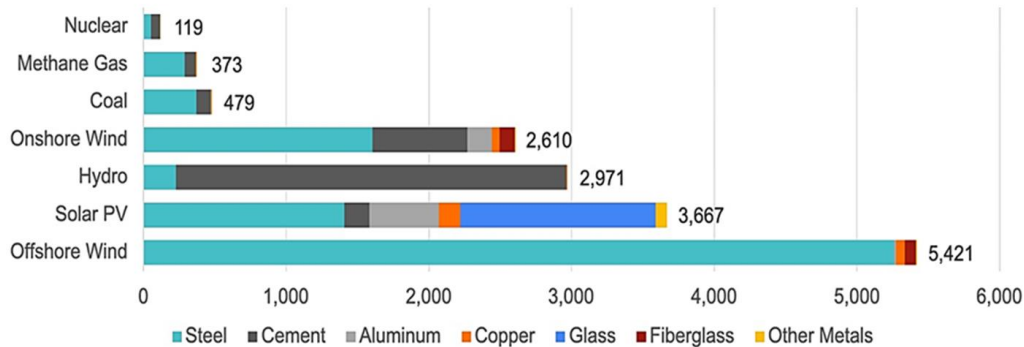
As seen above, lifecycle greenhouse gas emissions for nuclear power are as low or lower than solar, wind, and hydropower; and both renewables and nuclear produce significantly lower lifecycle emissions than fossil fuels (even if fossil fuels are used in conjunction with carbon capture and sequestration). Meanwhile, biomass produces nearly five times more lifecycle emissions than utility grade solar, the most carbon-intensive technology recognized as renewable by the CLCPA. Recent analysis by the United Nations Economic Commission of Europe reports similar findings, with nuclear having the lowest lifecycle greenhouse gas emissions of any source.²



The reason that solar panels and wind turbines have relatively high lifecycle emissions is because they are low-energy-density, low-capacity-factors sources that require a significant amount of equipment to make small amounts of electricity. This is compounded by the fact that they have relatively short lifespans, typically requiring replacement in a couple of decades, whereas nuclear plants can operate 80 or more years. Notwithstanding the fact that solar and wind do not require a fuel source in producing electricity, this translates to much higher reliance upon extractive materials than for other forms of energy as seen below.

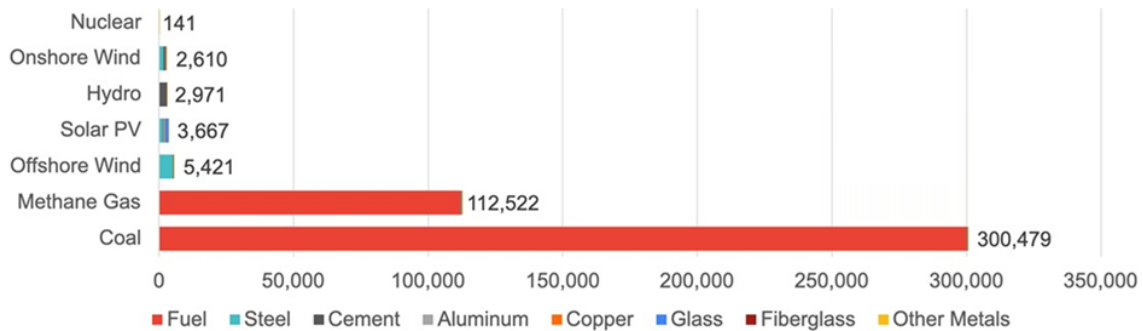
² *Carbon Neutrality in the UNECE Region: Integrated Lifecycle Assessment of Electricity Sources*, UN Economic Commission of Europe, March 2022 (UNECE report). https://unece.org/sites/default/files/2022-04/LCA_3_FINAL%20March%202022.pdf ; see also *Global Climate Objectives Fall Short Without Nuclear Power in the Mix: UNECE*, United Nations—UN News. August 11, 2021. <https://news.un.org/en/story/2021/08/1097572> ; UNECE technology brief: https://unece.org/sites/default/files/2021-08/Nuclear%20power%20brief_EN_0.pdf ; A 2021 report by the Joint Research Center for the European Commission to evaluate energy taxonomies found similar results, citing a compiled review of 21 competent sources, and showing an average emission intensity of 28 Tonnes CO₂e/GWh for nuclear compared to 26 Tonnes CO₂e/GWh for wind, and significantly less than 85 Tonnes CO₂e/GWh for solar. <https://publications.jrc.ec.europa.eu/repository/handle/JRC125953>

Material Intensity by Technology (grams per MWh)³



Notably, the total amount of material extraction required for nuclear power changes little when uranium fuel is included. This is because of its incredible high energy density. (Indeed, a single uranium pellet the size of a gummy bear contains as much energy as a ton of coal.) On the other hand, including fuel dramatically increases the material impacts of coal and gas.

Material + Fuel Intensity by Technology (grams per MWh)⁴



³ Seneviratne based on *Future demand for electricity generation materials under different climate mitigation scenarios* (Wang et al, Jan 2023), capacity factors, and plant lifetimes

Capacity factor: nuclear 85%, gas 65%, coal 65%, onshore wind 35%, hydro 42%, solar 20%, offshore wind 45%
Plant life (years): nuclear 80, gas 25, coal 25, onshore wind 25, hydro 100, solar 25, offshore wind 25

⁴ Source: Seneviratne based on *Future demand for electricity generation materials under different climate mitigation scenarios* (Wang et al, Jan 2023), *How much coal/gas/oil matches the energy of a single nuclear fuel pellet?* (Touran, 2023), capacity factors, plant lifetimes, and uranium enrichment multiplier

Capacity factor: nuclear 85%, gas 65%, coal 65%, onshore wind 35%, hydro 42%, solar 20%, offshore wind 45%
Plant life (years): nuclear 80, gas 25, coal 25, onshore wind 25, hydro 100, solar 25, offshore wind 25

Although sunlight and blowing wind may be free, the materials that go into making solar panels and wind turbines are not. They involve significant and ongoing extraction—a fact often ignored by “100% renewable” enthusiasts. Indeed, since solar and wind have a much higher material content than other forms of energy, and since those materials require frequent replacement, it may not be unreasonable to consider the components of solar panels and wind turbines as “fuel.”

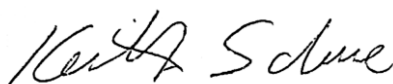
Finally, we wish to point out that if New York were to conduct a truly comprehensive assessment of lifecycle emissions, appurtenant infrastructure and facilities must also be considered. Solar and wind are not complete solutions. To function effectively, they require battery storage and backup generation. Moreover, they require significantly more transmission than firm generators that can be appropriately sized and located near load centers. If the lifecycle emissions and materials associated with system-level infrastructure to support solar and wind on the grid were taken into account, the benefits of nuclear energy seen in the charts above would be even more pronounced.

Thank you again for this opportunity to comment. We hope this information can positively contribute to the Department’s work.

Respectfully submitted,



Dietmar Detering, Chair
Nuclear New York
dietmar@nuclearny.org
917-251-2235



Keith Schue
New York Energy & Climate Advocates
keithschue@gmail.com
407-470-9433